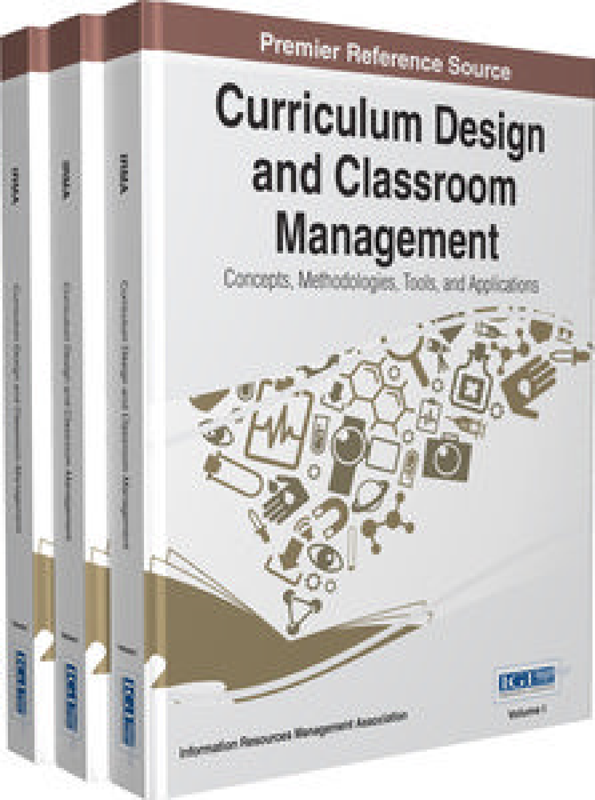

Premier Reference Source
Curriculum Design and Classroom Management
Concepts, Methodologies, Tools, and Applications
Information Resources Management Association
IRMA

Curriculum Design and Classroom Management:

Concepts, Methodologies, Tools, and Applications

Information Resources Management Association
USA

Information Science REFERENCE
An Imprint of IGI Global

Managing Director: Lindsay Johnston
Managing Editor: Austin DeMarco
Director of Intellectual Propery & Contracts: Jan Travers
Acquisitions Editor: Kayla Wolfe
Production Editor: Christina Henning
Development Editor: Chris Shearer
Multi-Volume Book Production Specialist: Deanna Jo Zombro
Typesetter: Amanda Smith, Tucker Knerr, Michael Brehm
Cover Design: Jason Mull

Published in the United States of America by
Information Science Reference (an imprint of IGI Global)
701 E. Chocolate Avenue
Hershey PA, USA 17033
Tel: 717-533-8845
Fax: 717-533-8661
E-mail: cust@igi-global.com
Web site: http://www.igi-global.com

Library of Congress Cataloging-in-Publication Data

Curriculum design and classroom management : concepts, methodologies, tools, and applications / Information Resources Management Association, editor.
volumes ; cm
ISBN 978-1-4666-8246-7 (hardcover) -- ISBN 978-1-4666-8247-4 (ebook) 1. Curriculum planning. 2. Curriculum planning--Case studies. 3. Classroom management. 4. Classroom management--Case studies. I. Information Resources Management Association, issuing body.
LB2806.15C6935 2015
375'.001--dc23

2015004055

British Cataloguing in Publication Data
A Cataloguing in Publication record for this book is available from the British Library.

List of Contributors

Table of Contents

Section 2
Tools and Technologies

This section presents an extensive coverage of various tools and technologies available in the field of Curriculum Design and Classroom Management that practitioners and academicians alike can utilize to develop different techniques. These chapters enlighten readers about fundamental research on the many tools facilitating the burgeoning field of Curriculum Design and Classroom Management. It is through these rigorously researched chapters that the reader is provided with countless examples of the up-and-coming tools and technologies emerging from the field of Curriculum Design and Classroom Management. With 13 chapters, this section offers a broad treatment of some of the many tools and technologies within the Curriculum Design and Classroom Management field.

Section 3
Frameworks and Methodologies

This section provides in-depth coverage of conceptual architecture frameworks to provide the reader with a comprehensive understanding of the emerging developments within the field of Curriculum Design and Classroom Management. Research fundamentals imperative to the understanding of developmental processes within Curriculum Design and Classroom Management are offered. From broad examinations to specific discussions on methodology, the research found within this section spans the discipline while offering detailed, specific discussions. From basic designs to abstract development, these chapters serve to expand the reaches of development and design technologies within the Curriculum Design and Classroom Management community. This section includes 16 contributions from researchers throughout the world on the topic of Curriculum Design and Classroom Management.

Section 4
Cases and Applications

This section discusses a variety of applications and opportunities available that can be considered by practitioners in developing viable and effective Curriculum Design and Classroom Management programs and processes. This section includes 20 chapters that discuss Curriculum Design and Classroom Management in a variety of settings. Contributions included in this section provide excellent coverage of today's IT community and how research into Curriculum Design and Classroom Management is impacting the social fabric of our present-day global village.

Section 6
Emerging Trends

This section highlights research potential within the field of Curriculum Design and Classroom Management while exploring uncharted areas of study for the advancement of the discipline. Introducing this section are chapters that set the stage for future research directions and topical suggestions for continued debate, centering on the new venues and forums for discussion. A pair of chapters on the usability and effectiveness research makes up the middle of the section of the final 10 chapters, and the book concludes with a look ahead into the future of the Curriculum Design and Classroom Management field, with "Trends of Blended Learning in K-12 Schools: Challenges and Possibilities." In all, this text will serve as a vital resource to practitioners and academics interested in the best practices and applications of the burgeoning field of Curriculum Design and Classroom Management.

Preface

The constantly changing landscape of Curriculum Design and Classroom Management makes it challenging for experts and practitioners to stay informed of the field's most up-to-date research. That is why Information Science Reference is pleased to offer this three-volume reference collection that will empower students, researchers, and academicians with a strong understanding of critical issues within Curriculum Design and Classroom Management by providing both broad and detailed perspectives on cutting-edge theories and developments. This reference is designed to act as a single reference source on conceptual, methodological, technical, and managerial issues, as well as provide insight into emerging trends and future opportunities within the discipline.

Curriculum Design and Classroom Management: Concepts, Methodologies, Tools and Applications is organized into six distinct sections that provide comprehensive coverage of important topics. The sections are: (1) Fundamental Concepts and Theories, (2) Tools and Technologies, (3) Frameworks and Methodologies, (4) Cases and Applications, (5) Issues and Challenges, and (6) Emerging Trends. The following paragraphs provide a summary of what to expect from this invaluable reference tool.

Section 1, "Fundamental Concepts and Theories," serves as a foundation for this extensive reference tool by addressing crucial theories essential to the understanding of Curriculum Design and Classroom Management. Introducing the book is "Literature Review in Conceptions and Approaches to Teaching using Blended Learning," a great foundation laying the groundwork for the basic concepts and theories that will be discussed throughout the rest of the book. Another chapter of note in Section 1 is titled "Flipping STEM Learning: Impact on Students' Process of Learning and Faculty Instructional Activities," which discusses the novel techniques of pathway analytics to assist Curriculum Design and Classroom Management policies and tactics. Section 1 concludes, and leads into the following portion of the book with a nice segue chapter, "Technology-Enhanced Learning: Towards Providing Supports for PhD Students and Researchers in Higher Education." Where Section 1 leaves off with fundamental concepts, Section 2 discusses tools and technologies in place for Curriculum Design and Classroom Management.

Section 2, "Tools and Technologies," presents extensive coverage of the various tools and technologies used in the implementation of Curriculum Design and Classroom Management. Section 2 begins where Section 1 left off, though this section describes more concrete tools at place in the modeling, planning, and applications of Curriculum Design and Classroom Management. The first chapter, "A Quest about eQuest and Blended Learning in Teacher Education: An Indian Study," lays a framework for the types of works that can be found in this section, a perfect resource for practitioners looking for the types of technologies currently in practice in Curriculum Design and Classroom Management. Section 2 is full of excellent chapters like this one, including such titles as "A Blended Course to Teach Graphical Programming Using LabVIEW," "Fantasy Workshop: Active Use of a Learning Management System

(LMS) as an Approach to Blended Learning," and "Increasing Research Students' Engagement through Virtual Communities," to name a few. Where Section 2 described specific tools and technologies at the disposal of practitioners, Section 3 describes frameworks and methodologies within the field.

Section 3, "Frameworks and Methodologies," presents in-depth coverage of the conceptual design and architecture of Curriculum Design and Classroom Management. Opening the section is "Blended Course Design: Where's the Pedagogy?" This section is vital for developers and practitioners who want to measure and track the progress of Curriculum Design and Classroom Management through the multiple lens of parametric design. Through case studies, this section lays excellent groundwork for later sections that will get into present and future applications for Curriculum Design and Classroom Management, including, of note: "Blended Learning for Learners in SMEs" and "Blending in the Humanities: Course Model and Assessment Results." The section concludes with another excellent work on sequence design, titled "Prioritization of Design Requirements for Quality Engineering Education."

Section 4, "Cases and Applications," describes how the broad range of Curriculum Design and Classroom Management efforts has been utilized and offers insight on and important lessons for their applications and impact. Section 4 includes the widest range of topics because it describes case studies, research, architectures, theory, analysis, and guides for implementation. The first chapter in the section is titled "How Do They Fare? Learning Achievement and Satisfaction with Blended Learning for Traditional-Age Undergraduates at Moderately Selective Colleges" The breadth of topics covered in the chapter is also reflected in the diversity of its authors, from countries all over the globe. Section 4 concludes with an excellent view of a case study in a new program, "M-Learning in the Middle East: The Case of Bahrain."

Section 5, "Issues and Challenges," presents coverage of academic and research perspectives on Curriculum Design and Classroom Management tools and applications. The section begins with "Using a Task-Based Approach for Supporting a Blended Learning Model for English as a Foreign Language." The section concludes with "Artful Learning: Holistic Curriculum Development for Mind, Body, Heart, and Spirit," a great transitional chapter between Sections 5 and 6 because it examines an important trend going into the future of the field. The last chapter manages to show a theoretical look into future and potential technologies, a topic covered in more detail in Section 6.

Section 6, "Emerging Trends," highlights areas for future research within the field of Curriculum Design and Classroom Management, opening with "Preparing to Teach with Flipped Classroom in Teacher Preparation Programs." Section 6 contains chapters that look at what might happen in the coming years that can extend the already staggering amount of applications for Curriculum Design and Classroom Management. Other chapters of note include "E-Learning: A Means to Increase Learner Involvement in Research" and "To Flip Or Not To Flip? That's Not the Question: Exploring Flipped Instruction in Technology Supported Language Learning Environments." The final chapter of the book looks at an emerging field within Curriculum Design and Classroom Management, in the excellent contribution, "Trends of Blended Learning in K-12 Schools: Challenges and Possibilities."

Although the primary organization of the contents in this multi-volume work is based on its six sections, offering a progression of coverage of the important concepts, methodologies, technologies, applications, social issues, and emerging trends, the reader can also identify specific contents by utilizing the extensive indexing system listed at the end of each volume.

As a comprehensive collection of research on the latest findings related to using technology to providing various services, *Curriculum Design and Classroom Management: Concepts, Methodologies, Tools and Applications*, provides researchers, administrators, and all audiences with a complete understanding of the development of applications and concepts in Curriculum Design and Classroom Management. Given the vast number of issues concerning usage, failure, success, policies, strategies, and applications of Curriculum Design and Classroom Management in countries around the world, *Curriculum Design and Classroom Management: Concepts, Methodologies, Tools and Applications* addresses the demand for a resource that encompasses the most pertinent research in technologies being employed to globally bolster the knowledge and applications of Curriculum Design and Classroom Management.

Section 1

Fundamental Concepts and Theories

This section serves as a foundation for this exhaustive reference tool by addressing underlying principles essential to the understanding of Curriculum Design and Classroom Management. Chapters found within these pages provide an excellent framework in which to position Curriculum Design and Classroom Management within the field of information science and technology. Insight regarding the critical incorporation of global measures into Curriculum Design and Classroom Management is addressed, while crucial stumbling blocks of this field are explored. With 14 chapters comprising this foundational section, the reader can learn and chose from a compendium of expert research on the elemental theories underscoring the Curriculum Design and Classroom Management discipline.

Chapter 1
Literature Review in Conceptions and Approaches to Teaching using Blended Learning

Vicki Caravias
Swinburne University of Technology, Australia

ABSTRACT

This paper presents a critical review and synthesis of research literature in higher education exploring teachers' conceptions of blended learning and their approaches to both design and teaching. Definitions of blended learning and conceptual frameworks are considered first. Attention is given to Picciano's Blending with Purpose Multimodal framework. This paper builds upon previous research on blended learning and conceptual framework by Picciano (A. Picciano, 2009) by exploring how objectives from Picciano's framework affect teachers' approaches to both design and teaching in face-to-face and online settings. Research results suggest that teachers use multiple approaches including face-to-face methods and online technologies that address the learning needs of a variety of students from different generations, personality types and learning styles.

1. INTRODUCTION

Over the past two decades the integration of Internet and Information and Communication Technologies (ICT) have enhanced knowledge and performance in many university courses (S. Jones, Johnson-Yale, Millermaier, & Pérez, 2008). Within higher education, Kanuka and Kelland (2008) reflect that:

Higher education literature on e-learning technology is replete with research that tinkers with, and then tests the effects if, instrumental practices. The ultimate aim is to determine once and for all, what works and what does not – passing by the questions of why (p.61).

During this time universities have incorporated learning management systems, such as Blackboard and Moodle, into their teaching practices (R. A.

DOI: 10.4018/978-1-4666-8246-7.ch001

Ellis, Goodyear, Prosser, & O'Hara, 2006; R. A. Ellis, Steed, & Applebee, 2006) to support teachers in delivering material to students. Learning Management Systems (LMS) provide the opportunity to deliver blended learning approaches that combine a mix of ICT with various learning resources and delivery methods. Coates et al. (2005) outline several key features of LMSs:

1. Asynchronous and synchronous communication between teacher-student and student-student (discussion boards, emails, live chats);
2. Content development and delivery (lecture notes, readings, practical activities);
3. Formative and summative assessment (submission of assignments, quizzes, collaborative work feedback, grades);
4. Class and user management (enrolling students, displaying timetable) (p. 20-21).

Coates, James and Baldwin (2005) found that LMS studies focused on the economic and technical issues of LMS usage (p. 26). They are also critical of the "textual nature" of LMSs (p. 27). Similarly, Prendergast (2004) argues:

Too often considerations about information technology have become the dominant factors in many strategies adopted by academic institutions. This has resulted in a rich information technological environment that fails to capture, motivate or retain learners (p.2).

Brabazon (2002) supports this view, by stating that:

Teachers and teaching are being challenged and undermined through the Internet. Learning is not technologically dependent. It is reliant on commitment, interest and passion (p.17).

Early adopters of blended learning argued that there are many possibilities offered by the technologies for Australian educators in higher education (Garrison, Anderson, & Archer, 1999). There are several reasons behind the drive to incorporate ICT into the educational process. First, pressure to utilise ICT at a university level comes from changes in the student demography. According to Concannon, Flynn and Campbell (Concannon, Flynn, & Campbell, 2005) the surge in "full time part time students is a phenomenon of recent years, where school leavers take part-time jobs whilst attending university" (p.502). For students who work full time, the flexible design accommodates their busy schedules. Without this flexibility, the students may not be able to pursue their degrees. Blended learning environments suit students who prefer face-to-face interaction in addition to students who prefer online learning.

Second, blended learning has the potential to promote lifelong learning in higher education (Dzakiria, Wahab, & Rahman, 2012). In their qualitative study, Dzakiria, Wahab and Rahman investigated the learning experiences of a students undertaking studies at University Utara Malaysia. They found that blended learning's "flexibility nature can promote lifelong learning anywhere, and anytime" (p. 299). This is supported by research carried out by Masalela (Masalela, 2009) whose qualitative study examined factors that influenced fifteen faculty members' decision to use blended learning and found that learners become self-directed, develop critical thinking skills and become independent thinkers through blended courses. In addition, develop lifelong skills to use when they leave the university.

Third, changes in the market for delivery of education comes from innovation in new technologies. In the case of University of Central Florida (Dziuban & Moskal, 2001), a three hour classroom instruction was replaced with a two hour online instruction session. The university was able to operate multiple classes in one classroom using the technological infrastructure of the university. In addition, blended learning enables multi-university offerings (Jefferies, Grodzinsky, & Griffin, 2003) and facilitates elective courses (Verkroost, Meijerink, Lintsen, & Veen, 2008). Lastly, there is pressure from government for universities to increase participation and widen access to higher education (N. Jones & Lau, 2010).

In sum, the current environment of higher education requires a careful consideration of the role of blended learning in addressing a number issues related to teaching and learning such as generational differences, personality types and learning styles. The goal of this review is to present an investigation of the research currently available on teachers' conceptions of blended learning and their approaches to both design and teaching in higher education using Picciano's Blending with Purpose Multimodal framework. This proposes that teachers consider their objectives and understand how to apply the technologies and approaches that will work best for their students. This paper contributes to the field of blended learning by exploring how objectives from Picciano's framework affect teachers' approach to both design and teaching in face-to-face and online settings such as content, social/emotional contexts, dialectic/questioning activities, synthesis/evaluation tools, collabora-tion/student-generated content, and reflection opportunities.

Structurally, this paper consists of five thematic sections with relevant sub-sections. First, the author defines blended learning. Secondly, the advantages and disadvantages of blended learning approach will be discussed. The third section of this paper explores the literature available on teachers' conceptions on blended learning and their approaches to both design and teaching in higher education using Picciano's Blend with Purpose Multimodal framework. In the fourth section the author describes the method for choosing the studies in this literature review. The fifth section presents findings and provides suggestions for how this literature review could help researchers approach and study teachers' conceptions on blended learning environments in the future.

2. LITERATURE REVIEW

There are a few literature reviews on blended learning (Bliuc, Goodyear, & Ellis, 2007; Charles R Graham, Allen, & Ure, 2003; Shivetts, 2011; Vignare, 2007). Apart from published texts (Bonk & Graham, 2006; Littlejohn & Pegler, 2007; A. G. Picciano, Dziuban, & Graham, 2013; E. Stacey & Gerbic, 2009) there are a small number of publications focusing on teachers' conceptions using blended learning environments (Gerbic, 2011).

This section presents a critical review and synthesis of the research literature in the field being investigated by this paper: how teachers experience and perceive the blended learning approach in higher education. The literature review commences by defining blended learning. The advantages and disadvantages of the blended learning approach are then discussed. This is followed by a review of the research literature on teachers' conceptions of blended learning and their approaches to both design and teaching in higher education using Picciano's Blending with Purpose Multimodal framework.

There are many definitions for blended learning.

2.1. Defining Blended Learning

Blended learning has been defined in a number of ways and a generally accepted definition does not exist. It is used interchangeably with distance learning, online learning, eLearning, blended teaching, e-teaching, blended e-learning, hybrid learning and flexible learning. The literature defines blended learning in many different ways according to instructional methods. The three most common definitions documented by Graham, Allen and Ure (C. R. Graham, Allen, & Ure, 2005), are:

1. Combining instructional modalities (or delivery media). From a training perspective, Skill and Young (2002) view blended learning as "a combination of in-class teaching and learning modalities with robust electronically mediated experiences" (p.25). Singh (2003) sees blended learning as a combination of multiple delivery media designed to complement each other and promote meaningful learning;
2. Combining instructional methods. According to Welker and Berardino (2006) blended learning is "the use of electronic learning tools that supplement but do not replace face-to-face learning" (p.33). Blended learning is an infusion of web-based technologies into face-to-face learning to create blended learning. Alternatively the combination of instructional methods is known as hybrid learning (De Witt & Kerres, 2003; Hermann, Popyack, Char, & Zoski, 2004; Kaleta, Skibba, & Joosten, 2007);
3. Combining online learning and face-to-face instruction (Garrison & Kanuka, 2004; Ginns & Ellis, 2007; Ginns, Prosser, & Barrie, 2007; Mortera-Gutierrez, 2006; Tang & Byrne, 2007).

Wu, Tenniyson and Hsia (Wu, Tennyson, & Hsia, 2010) state that blended learning is also noted as "blended e-learning system" that "refers to an instructional system that combines multiple delivery methods, including most often face-to-face classroom with asynchronous and/or synchronous online learning. It is characterised as maximising the best advantages of face-to-face and online education" (p. 155). This view is supported by Littlejohn and Pegler (2007).

A significant amount of blended learning research has already been done from the learning context of face-to-face activities and to which an online or web-based activity had been added. Skill and Young (2002) stated that "blended learning moves well beyond the concept of bolting a Website onto a traditional classroom-based course" (p.25). Furthermore, Graham (2006) defined blended learning as "the combination of the instruction from two historically separate models of teaching and learning: traditional face-to-face learning systems and distributed learning systems" (p.5) with an emphasis on the role of computer-based technologies. However, in a criticism of blended learning, Oliver and Trigwell (2005) argued that blended learning is really concerned with the process of blending media, teaching processes and presentation, rather than student's learning. They suggested that blended learning could be redeemed "by a closer analysis of the critical aspects of the subject matter that are in variation in the act of using blended learning" (p.24). Furthermore, Garrison and Kanuka (Garrison & Kanuka, 2004) state that blended learning should not be "just adding on to the existing dominant approach or method" (p.97) but should be transformative in higher education and increase the opportunities for critical and reflective thinking.

In a major review of blended e-learning in the UK, Sharpe (2006) concluded that while the term "blended learning" was unclear, it remained a practical term, because it could mean different things to different people. The term 'blended learning' is used in this paper to describe learning activities that involve a combination of face-to-face interactions and technologically mediated interactions between students, teachers and learning resources (Bliuc et al., 2007).

As described above, there are many variations in defining blended learning and different institutions implement blended learning approaches in different way (Delialioglu & Yildirim, 2008).

2.2. Advantages of the Blended Learning Approach

It has been widely argued in the literature that there are four main advantages for teachers to incorporate the blended learning approach into teaching practice:

1. Greater flexibility of time. Freedom for students to decide when each online lesson will be learned (Bouhnik & Marcus, 2006; Demetriadis & Pombortsis, 2007);
2. Lack of dependence on the time constraints of the teacher (Edginton & Holbrook, 2010; Lock, 2006);
3. Time for reflection. Freedom for students to express thoughts, and ask questions, without limitations (Chamberlin & Moon, 2005; Liaw, Huang, & Chen, 2007);
4. Meeting different needs and learning styles (Ho, Lu, & Thurmaier, 2006).

These advantages can support students to develop more responsibility for their learning (Rodriguez & Anicete, 2010) and improve critical thinking (Saundercook & Cooper, 2003). These perceptions are consistent with the literature that suggests that the blended learning approach can transform learning experiences (Garrison & Anderson, 2003; Knight, 2009). In particular, it has been argued that the blended learning approach can improve students' written communication skills, problem solving skills, and increase the opportunities for critical and reflective thinking (Garrison et al., 1999). Lapadat (Lapadat, 2002) found that with asynchronous text-based communication students have the time to carefully compose their thoughts and ideas into a written-form communication. This attention to writing, in combination with asynchronous communication, provides students with opportunities for critical reflection which is necessary for higher-order thinking (Garrison & Anderson, 2003).

The blended learning approach can provide students access to online learning materials and engage learners interactively (Concannon et al., 2005; Sharpe, 2006). Motteram (2006) found that the blended learning approach enhanced the learning experience as the course structure enabled them to deal with topics in their own time and to organise themselves better around the tasks in their own time. In two studies, one in the UK and one in Australia, the use of blended learning environments together with access to online learning materials were found to be determining factors behind increased student engagement and motivation (Concannon et al., 2005; De Lange, Suwardy, & Mavondo, 2003). In keeping with Motteram observations, (2006) Rodriguez and Anicete (2010) found that the blended learning approach enhanced the learning experience as the course structure enabled students to deal with topics in their own time and to organise themselves better around the tasks in their own time. Rodriguez and Anicete (2010) also argue that learning management systems, such as Modular Object Oriented Dynamic Learning Environment (MOODLE), can support students to develop more responsibility for their learning. This view is supported by Masalela (Masalela, 2009). Furthermore, Garrison and Anderson (2003) argue that access to information is an important part of learning however student's learning is largely achieved through engagement and interaction with other students. This view is supported by Chen and Looi (Chen & Looi, 2007) who indicated that online discussion contains more opportunities for the practice of in depth clarification and inference skills.

The younger generations according to Prensky's (2010) "digital natives" use online technologies for their social and informational activities whilst older generations use these technologies less so. Furthermore, students engage in ways they prefer according to their preferences, interests or abilities.

The blended learning approach can meet the different needs and learning styles of students. Kupetz and Ziegenmeyer (Kupetz & Ziegenmeyer, 2005) discussed and evaluated a model of blended learning for teaching English and focussed on how different types of learners can be supported and their research covers a wide range of activities: classroom recordings, multimedia-based case stories, electronic interviews and mini-practices. Each of these activities was designed to support different aspects of student learning and to be flexible enough to respond to the needs of different types of learners. Similarly, Julian and Boone (2001) found that "the importance of a blended learning approach to learning is that it ensures the widest possible impact of a learning experience" (p. 58) and proves to be very useful in improving teachers' abilities to respond a wide range of students' needs. In addition, Ho (2006) found that blended learning courses result in lower dropout rates compared to fully online courses. This view is supported by Dzuiban and Moskal (Dziuban & Moskal, 2001) who reported that students' withdrawal rates were reduced in blended learning courses.

Research literature elsewhere indicates that the blended learning approach can bring teachers and students closer together (Aspden & Helm, 2004; Graetz & Goliber, 2002). Aspden and Helm (2004) explored student engagement and interaction with students in the context of a blended learning situation and argue that the blended learning approach can help bring teachers and students together by making appropriate use of a mix of technologies students can feel increased connectivity with both their fellow students and university staff.

To increase the likelihood of positive student learning outcomes using the blended learning approach teachers must adopt new technologies (Piccoli, Ahmad, & Ives, 2001). Teachers publish their learning resources in learning management systems and students participate through computer networks. Teachers who use a learning management system can share course materials, syllabus, opinions and online assessments as well as use e-mail, discussion boards, calendars, blogs, journals, along with traditional face-to-face activities such as lectures and tutorials. Simply placing existing material online does not serve the students. Gerbic (2011) refers to this as "juxtaposition of two pedagogical settings" (p.222). Instead, the focus should be on recognising the potential of the blended learning approach to enhance student's learning outcomes. Garrison and Vaughan (2008) state that blended courses require these elements:

1. In-class activities that link the online assignments so as to reinforce the intent of activities outside the classroom;
2. Shift from teacher-centred to learner-centred activities in class as well as online;
3. Focus on student responsibility for navigating online resources and conducting online research; and
4. Evaluation instruments that provide frequent feedback.

A positive attitude towards computers and the Internet, for example, where teaching staff are not afraid of the complexity of using computers, will result in effective learners in a blended learning environment (Piccoli et al., 2001). Research results suggested that applying online technology in the classroom enhances students' achievement (Masalela, 2009). Evaluation instruments can provide frequent feedback such as an electronic grade book that captures students' accomplishments, reviewing course materials and communicating with teachers can be carried out more efficiently. In their quantitative study Amrein-Beardsley, Foulger and Toth (2007) investigated nine instructors perceptions of their students' and their own experiences with hybrid courses. From the questionnaires they concluded that students found the online grade book and announcements most useful. Students appreciated instructors who graded assignments and posted them in the grade book in a timely and efficient manner. Students found the course document downloads, Internet sites and links sent to them from the instructors equally useful in terms of technology tools that enhanced their learning.

Despite these advantages for teachers to incorporate the blended learning approach into teaching practice, thorough reviews of the literature have yet to show a reliable body of knowledge indicating that these benefits are an outcome for all students. Much of the research on blended learning reveals that deep learning is not easily achieved using the blended learning approach

(Garrison & Vaughan, 2008; Kanuka, 2008). These findings are consistent with prior research that has shown that these benefits are not easily achieved in face-to-face teaching (Biggs, 1999; P. Ramsden, 1991).

Other authors found that blended learning courses had negative outcomes.

2.3. Disadvantages of the Blended Learning Approach

A review of the literature suggests that there are five disadvantages for teachers to incorporate the blended learning approach into teaching practice:

1. Possibility of negative effects such as innovation fatigue amongst staff and students (Oliver & Trigwell, 2005);
2. Not enough guidance for students;
3. LMS technical issues;
4. Lack of interaction on the LMS; and
5. Unsatisfactory use of the face-to-face teaching time (Heinze & Procter, 2004).

Research indicates students' attitudes towards computers and the Internet is an important factor in the effectiveness of the blended learning approach (J. Arbaugh et al., 2009) (J. B. Arbaugh, 2002; Garrison & Vaughan, 2008; Piccoli et al., 2001; Sharpe & Benfield, 2005). Furthermore, several researchers indicate that technology quality affects student satisfaction with blended learning environments (Piccoli et al., 2001; Webster & Hackley, 1997). Research has shown that the learning environment is an alterable educational variable that can directly influence student outcomes (Waxman, Huang, & Wang, 1997).

Furthermore, studies have suggested that, in addition to adjusting to the technology delivered instruction, students must also adapt to the "learning approach" adopted by the tertiary institution. According to Garrison and Vaughan (2008, p. ix) "those who have grown up with interactive technology are not always comfortable with the information transmission approach of large lectures. Students expect a relevant and engaging learning approach" (p.ix). The idea of the "digital native" (Prensky, 2001) suggests that students will be able to use online methods of engagement, such as blogs, social media, wikis and mobile devices effectively and efficiently having grown up with the technologies. Prensky (2006) argues "today's students are no longer the people our educational system was designed to teach" (p. 2). This suggests that students who have grown up with technology may be better suited to the blended learning approach (Laurillard, 2002; Palloff & Pratt, 1999).

Elsewhere in the literature, Chen and Looi (Chen & Looi, 2007) found that in-class online discussion lacked interaction, because most of the online postings were task oriented, independent postings without replies and comments on postings by others. Secondly, too much online discussion in-class may slow the progress of the class. Thirdly, in-class online discussion does not assure that every learner will read the online postings, because reading online discussion was not a compulsory practice. Chen and Looi (Chen & Looi, 2007) research examined how to incorporate online discussion in a face-to-face classroom learning study comprising of sixteen Heads of Departments of Information Technology from Singapore schools who attended a professional development course. These findings are consistent with Collis et al's (Collis, Bruijstens, & van Veen, 2003) statement that online learning often requires a large amount of self discipline on the part of the learners and Salmon (Gilly Salmon, 2002) who states that one of the main disadvantages of blended learning is the lack of interaction between students. In addition, Ellis and Calco (R. Ellis & Calvo, 2004) found that undergraduate students could not connect the discussions in face-to-face teaching time and online to the goals of the course. These finding are consistent with Molesworth (Molesworth*, 2004) who found a lack of participation in computer-mediated classes with students wanting more integration into the overall course.

It has been suggested in the literature that teachers require better skills to incorporate the blended learning approach in their teaching (Coates et al., 2005). Salmon (2005) states that uploading PowerPoint slides into the learning management system is not enough to create good quality online learning materials. This view is supported by Heinze and Proctor's action research study that examined staff opinions regarding the delivery of a program at the University of Salford using blended learning. Heinze and Proctor (2004) found that simply using a learning management system instead of web pages to deliver handouts and presentations and combining it with discussion boards resulted in staff stating that they were not really doing any e-learning on the course.

Picciano's Blending with Purpose Multimodal model was derived from discussions above on blending learning environments, generations, personality types and learning styles.

2.4. Blending with Purpose: The Multimodal Model

The structure of this paper is based on Picciano's Blending with Purpose Multimodal framework (see Figure 1). Picciano (2009) Blending with Purpose Multimodal framework recognises that because students represent different generations, different personality types, and different learning styles, teachers should seek use multiple approaches including face-to-face methods and online technologies to meet the needs of a wide scope of students.

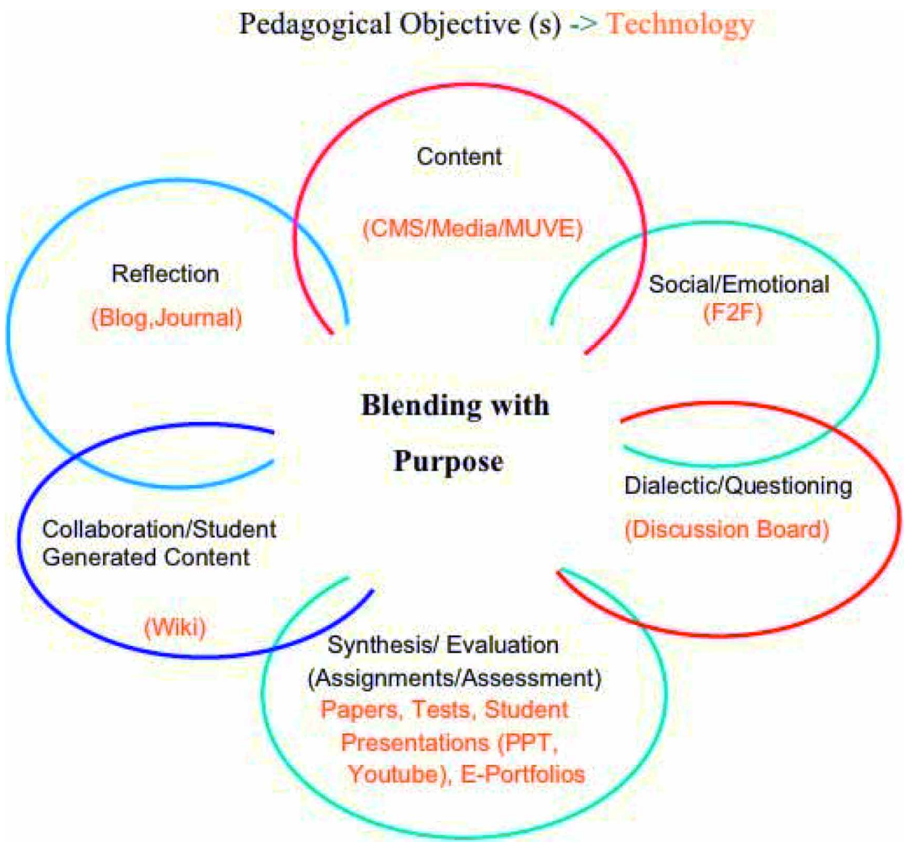
A significant component of this model is that teachers need to carefully consider their objectives and understand how to apply the technologies and approaches that will work best for their students. There are six pedagogical objectives used in the model shown in Figure 1: content, social/emotional contexts, dialectic/questioning activities, synthesis/evaluation tools, collaboration/student-generated content, and reflection opportunities. Learning management systems and other online tools provide a number of mechanisms for assisting teachers meet these objectives.

2.5. Teachers' Conceptions of Blended Learning

Considerable research has been carried out into teachers' conceptions of face-to-face teaching (Paul Ramsden, 2003; Saljo, 1979; Trigwell, Prosser, & Taylor, 1994) and what impact this may have on the way university teachers carry out their teaching. Entwistle (2005) suggests that there are relationships between teachers' conceptions of teaching (including their beliefs about teaching) and their approaches to teaching. An understanding of teachers' conceptions is therefore likely to help in the process of understanding and improving teaching (Prosser, Trigwell, & Taylor, 1994). Kember and Kwan (2000) identified two main approaches to teaching: 'content centred', in which teachers focus on the content to be taught; and 'learner centred' where teachers focus on the learning process.

As this literature review shows, there are thirteen studies focussed on teachers' conceptions, beliefs and experiences of blended learning and their approaches to both design and teaching in face-to-face and online settings. Teachers' conceptions of blended learning have been investigated with five studies reported research into teaching with e-learning (R. A. Ellis, Steed, et al., 2006; Gonzalez, 2009; Lameras, Paraskakis, & Levy, 2008; McConnell & Zhao, 2006; Roberts, 2003). From these five studies, one had been conducted in a 'distance education' setting (Gonzalez, 2009) and one reported conceptions of blended teaching (R. A. Ellis, Steed, et al., 2006). A couple of studies have investigated teachers' "beliefs", which are considered different from "conceptions" according to the literature (Elizabeth Stacey & Wiesenberg, 2007; Steel, 2009). The six remaining studies focussed on teachers' conceptions and experiences of working with learning management systems (Gedik, Kiraz, & Ozden, 2013; Jokinen & Mikkonen, 2013; King & Arnold, 2012; McShane, 2004; Napier, Dekhane, & Smith, 2011; Ocak, 2011).

Figure 1. Blending with purpose: The multimodal model (Source: A. Picciano, 2009, p.11)



Picciano's (2009) Blended with Purpose Multimodal framework comprises of six objectives: content; socially and emotionally; dialectic/questioning; collaboration; synthesis/evaluation and reflection. These six objectives affect teachers' approaches to both design and teaching in face-to-face and online settings. Much of the research in one objective impacts the other objectives.

First, the Blending with Purpose Multimodal framework suggests that delivering content is one of the main objectives of teaching and there are many ways in which content can be delivered and presented to students. Blended learning allows teachers an ongoing opportunity to experiment with new approaches to learning and introduce new types of educational technology into their teaching such as the Web and learning management systems. Learning management systems enable the delivery of a variety of media including text, video and audio. In providing and presenting content, the Blending with Purpose Multimodal framework suggests that multiple technologies and media be utilised. Research results suggest the teachers' conceptions of blended learning as a way to provide information to students by way of lecture notes, online learning resources and links to external websites (McConnell & Zhao, 2006; Oh & Park, 2009; Roberts, 2003).

McConnell and Zhao (2006) research examined the ways in which Chinese higher education teachers think about e-learning and e-teaching, and the ways in which they implement e-learning in a qualitative study. From twenty-four interviews they found a set of categories of conceptions:

1. The centrality of the learner (p.516);
2. Online co-operative learning (p.517);
3. Network learning (p.518);
4. Student learning (p.518);
5. Infrastructure and access (p.519).

Their research findings suggest that face-to-face instruction using lectures were the preferred method of teaching with each teacher acknowledging the "sheer power of the lecture in the Chinese higher education system" (p.519). These results are supported by another study that examined faculty involvement in blended instruction and their attitudes towards the instructional method. Oh's (2009) quantitative study involved one hundred and fifty-one universities classified by the Carnegie Foundation. One hundred and thirty-three faculty members completed a survey and reported that the most commonly selected instructional delivery format used by faculty was "face-to-face instruction with supplementary online instructional components" (p.333). These results suggest that e-learning is conceived by teachers as not a good way to deliver course content to students with teachers preferring face-to-face methods.

In addition, Robert's (2003) phenomenographic study investigated the use of e-learning for teaching and the extent and nature of Web use for teaching and learning in a Scottish university. From a Web-based survey and interviews with seventeen teachers three conceptions of teaching using the Web were discovered, as well as a set of strategies to describe the approaches taken by lecturers. Conceptions of teaching using the web that were discovered are:

1. The web as a source of subject information (p.145): in this conception the Web is used the medium used to distribute information to students. Teachers upload learning materials such as lecture notes and direct students to websites to retrieve information;
2. The web is used for individual and independent self-paced learning (p.146): students use the Web to complete subject activities;
3. The web is used for group analysis, decision making and dialogue (p.147): the Web is used for students to interact with one another and create communities of inquiry (Garrison & Arbaugh, 2007).

These conceptions are consistent with McConnell and Zhao (McConnell & Zhao, 2006) definition of networked learning and Picciano's definition of content (A. Picciano, 2009) where teachers place material online and students are expected to learn at their own pace. At the University of Central Florida, learning to use technology to modify their teaching methods was cited as one of the outcomes that faculty liked most about teaching on the Web (Dziuban & Moskal, 2001). The fundamental principles underlying networked learning are learner-centred where the learning is outcome-focused and requires engagement, group collaboration and the creation of communities of inquiry (Garrison & Arbaugh, 2007).

Research results from this study are consistent with previous research outcomes from Kember and Khan (2000) who suggested that teachers rely on 'content-centred' approaches to transmit information to students. Like Roberts and McConnell and Zhao, Gonzalez also found teachers' conceptions focused on access to learning materials and information transfer. Gonzalez's (2009) phenomenographic study investigated what university teachers think eLearning is good for in their teaching. From interviews with seven teachers from the Faculty of Health Sciences three conceptions using eLearning were identified:

1. For individual access to learning materials and information, and for individual assessment (p.312);
2. For learning-related communication (p.312);

3. For networked learning (p.312).

Gonzalez (2009) found that university teachers "having a 'content-centred' approach to teaching can be defined as 'informative-individual learning focused'; while those university teachers having a 'transitional or learner-centred' approach can be defined as 'communicative-networked learning focused'" (2009, p. 311).

Similar to the 'content-centred' conceptions found in the above studies, outcomes from Lameras, Paraskakis and Levy (2012) showed that teachers conceived eLearning as a way to transfer information to students where learning resources were uploaded for students to use on their own. This enables students to learn at their own pace. Lameras, Paraskasis and Levy (2012) qualitative study investigated Greek university teachers' conceptions of and approaches to teaching using digital technology in blended settings. Their interviews with twenty-five Computer Science teachers identified four categories that describe the use of virtual learning environments as a means of supporting:

1. Information transfer (p.145);
2. Application and clarification of concepts (p.145);
3. Exchange and development of ideas, and resource exploration and sharing (p.145);
4. Collaborative knowledge-creation, and development of process awareness and skills (p.145).

The first and second category of conceptions support the content-centred approaches of the virtual management system and are supported by research carried out by McConnell and Zhao as well as Roberts (McConnell & Zhao, 2006; Roberts, 2003).The third and fourth category of conceptions support the learner-centred of the virtual management system and are supported by research carried out by Ellis, Steed and Applebee as well as McConnell and Zhao (R. A. Ellis, Steed, et al., 2006; McConnell & Zhao, 2006).

Second, the Blended with Purpose Multimodal framework suggests that email and electronic communications enable collaboration between students. Research results indicate teachers' conceptions of 'eLearning as a way to engage in communication-collaboration-knowledge building' (Gonzalez, 2010) and seen to engage students in discussion, developing understanding and building knowledge (R. A. Ellis, Steed, et al., 2006). In addition, blended learning is conceived as a way of engaging students in learning activities that may lead to higher-level learning experiences (Garrison & Kanuka, 2004).

In their qualitative study, Ellis, Steed and Applebee (2006) investigated the conceptions of blended learning and teaching by teachers in two campus-based Australian universities, and the relationships between these conceptions to their approaches to integrating online and face-to-face environments. From their interviews with twenty-two teachers they identified four conceptions of blended teaching:

1. Blended teaching as helping students develop and apply new concepts (p.324);
2. Blended teaching as developing student understanding through aligning media to intended learning outcomes (p.324);
3. Blended teaching as providing students with information (p.325);
4. Blended teaching as replacing part of the responsibility of being a teacher (p.326).

The researchers found that teachers recognised a connection between students achieving their learning outcomes and the role of technology in blended settings helping students develop higher order thinking. Garrison and Kanuka (2004) argued that blended environments can support and transform universities by building a Community of Inquiry (Garrison & Arbaugh, 2007) and develop higher order thinking.

Third, the Blending with Purpose Multimodal framework suggests that the social and emotional needs of students should be considered by teachers when designing blended learning courses (McShane, 2004; Elizabeth Stacey & Wiesenberg, 2007). Stacey and Weisenberg (2007) study investigated teachers' beliefs about teaching face-to-face and online in two case studies of ten Australian and twelve Canadian university teachers. From an online open-ended questionnaire about teaching philosophies and approaches together with the Teaching Perspective Inventory which measures teachers beliefs. They found that twenty-two teachers regarded themselves as more teacher-centred in face-to-face settings and more learner-centred in online settings. The Australian teachers had a preference for teaching face-to-face because they believed that it enabled them to build better relationships with their students. In contrast, the Canadian teachers had a stronger preference for teaching online because they believed the mode could support multiple perspectives.

These conceptions are supported by research carried out by McShane's (2004) case study that investigated the personal experiences of five Australian lecturers who teach using an online learning management system (Web CT or Top Class) to organise the online components of their subjects. Five themes emerged across the individual case studies:

1. Enhanced relationships with students (p.8);
2. Planning and teaching becomes very conscious tasks (p.9);
3. Expansion, extension, augmentation (time and space) (p.10);
4. Scrutiny and reflexivity (p.11);
5. The centrality of learning (p.12).

McShane (2004) found that university teachers perceived their teaching approaches where no different when they were teaching face-to-face to when they were teaching online. These findings were inconsistent with studies identified in this literature that show that teachers' approaches can differ considerably when changing modes of teaching.

The fourth objective from the Blending with Purpose Multimodal framework suggests that dialectic/questioning is an important activity that allows faculty to explore what students know and to refine their knowledge. For dialectic and questioning activities, a well- organised discussion board activity generally seeks to present a topic or issue and have students respond to questions, provide their own perspectives while also evaluating and responding to the opinions of others (Steel, 2009). Research results indicate that teachers are advised to take deliberate action once courses begin towards creating a community of inquiry (Garrison & Arbaugh, 2007) such as monitoring and responding to online discussion board postings (Conrad, 2005).

Steel (2009) investigated the relationship between teacher beliefs and their learning designs for learning management systems in large undergraduate classes in her qualitative study. Three award winning university teachers from an Australian university were interviewed. The research identified "strong affective components" (p.414) of the teachers' belief systems that demonstrate a commitment to engage with their students, build learning communities and use technologies to support social justice and equity. Faculty who have taught blended learning courses have observed that students do a better job of writing, learning course material, mastering concepts, and applying what they have learned compared to traditional face-to-face courses (Aycock, Garnham, & Kaleta, 2002). This viewpoint is captured in a comment from a faculty member at the University of Wisconsin who teaches blended courses, "My students have done better that I have ever seen; they are motivated, enthused and doing their best work" (p.3).

The fifth objective from the Blending with Purpose Multimodal framework suggests that students receive feedback from teachers regarding their academic progress. Learning management systems provide a number of mechanisms for assisting teachers to assess their student's learning and provide feedback. Major methods include electronic tests, assignments and portfolios (Gedik et al., 2013; Jokinen & Mikkonen, 2013; King & Arnold, 2012). In sum, learning management systems provides an on-going record that can be referred to over and over again by both students and teachers. Gedik, Kiraz and Ozden (2013) qualitative study investigated instructor experiences relating to the design, development and implementation processes of a blended course. They found several themes emerged: arousal of student's interest and participation, flexibility, time conservation, improvement of interaction, collaboration and communication opportunities and the ability to track student's progress.

In another qualitative study, King and Arnold (2012) explored five professors who teach in blended learning environments and examined whether course preparation and design, communication and motivation are taken into consideration when designing their courses. All the professors used a learning management system for the online component. From a survey and interviews with five professors from the college of education at a Mid-western research university, four factors were found to contribute to the success of blended learning courses:

1. **Course Preparation (p.51):** The professors prepared their blended courses in various ways and used technology, such as Skype, wikis and blogs in addition to the learning management system;
2. **Course Design (p.52):** The professors used the content feature of the learning management system to post course documents and assignments which support the content-centred approach of teaching (Kember & Kwan, 2000);
3. **Communication (p.53):** The importance of communicating with students in a timely manner is consistent with research findings in blended learning Ho, Lu and Thurmaier (Ho et al., 2006). The professors used the discussion board in various ways. One professor required the students to complete weekly journals that were viewed by student and professor only enabling a confidential dialogue and the student's time to reflect on what they had learnt;
4. **Motivation (p.53):** These results are supported by research carried out by Aycock, Garnham and Kaleta (Aycock et al., 2002).

According to King and Arnold (King & Arnold, 2012) "preparing for a blended learning course requires more discipline and preparation time than a traditional face-to-face course" (p.51). The literature records challenges to the use of blended learning environments in other studies. The commonly found issues were increased time commitment and workload (Edginton & Holbrook, 2010; Gedik et al., 2013; King & Arnold, 2012; Napier et al., 2011). The increased time commitment involved in designing a blended course is regarded as the number one challenge by faculty (Dziuban & Moskal, 2001). This view is echoed in Napier (2011) research (discussed below) where several success factors for teaching and designing blended learning courses were identified:

1. Play to your strengths;
2. Utilize technology;
3. Build a classroom without walls;
4. Provide tutoring and on-line support;
5. Creatively manage out-of-class time.

Napier (2011) examined the perceptions of instructors teaching blended learning courses at a small public liberal arts college and found that instructors invest more time becoming familiar with available technology, creating in-class activities and reflecting on course structure. These results are also supported by research carried out by Edginton and Holbrook (2010) who found that teachers teaching blended learning courses can expect to invest more time becoming familiar with available technology and creating in-class activities. These research results contradict Garrison and Vaughan's (2008) argument. They argued that, blended learning environments can ease the workload. Similarly, all faculty members involved in a blended learning program at the University of Wisconsin, Milwaukee stated that they will continue to teach blended learning courses as they believe that their time was wisely invested in improving the learning environment for both students and faculty members (Aycock et al., 2002).

Jokinen and Mikkonen (2013) qualitative study described teachers' experiences of planning and implementing teaching and learning in a blended learning based nursing programme. Nine themes emerged from the data including: collaborative planning; integration; student group; face-to-face teaching; online learning; learning activities; teaching and learning methods; learning in and about work; and confirming competences (2013, p. 526).

These researchers found that teachers experienced the blended learning approach positively despite challenges from the viewpoint of planning and design. According to the study careful planning is required by teachers to ensure the combination of face-to-face learning and learning in practice with technology-mediated learning activities. These findings are supported by previous studies of Salmon (2005) as well as Heinze and Proctor (2004). Moreover, while planning for blended learning, teachers should include a variety of learning activities to meet the needs of different learners (A. Picciano, 2009).

Lastly, the Blending with Purpose Multimodal framework suggests that the ability to share one's reflection with others can be most beneficial however this objective is the least researched objective. Pedagogical activities that require students to reflect on what they are learning and to share their reflection with their teachers and fellow students are viewed very positively. Blogs and blogging, whether as group activities or for individual journaling activities, are appropriate tools for students reflecting on what is being learned. Ocak (2011) qualitative study examined problems and challenges faculty members encountered in blended learning environments and found class discussions that take place on discussion boards or blogs and provide teachers with an electronic record that can be reviewed over and over again to examine how students have participated and progressed over time.

These predominantly qualitatively studies draw attention to the importance of teachers' conceptions and beliefs of teaching in face-to-face and online settings.

3. METHOD

A comprehensive literature review was conducted to locate papers on teachers' perceptions on blended learning using search engines and educational databases such as Academic Search Elite, ProQuest, ERIC (Education Resources Information Centre), and Google Scholar. The keywords used were blended learning, blended learning environments, blended teaching, online teaching, eLearning, teacher perceptions, teachers conceptions (as well as combinations of these). Literature related to teachers working across face-to-face and online environments were included in this review.

Selecting only those papers, which specifically focussed on blended learning in higher education, and reported the results of empirical research, further refined this search. Conference papers and dissertations were not included. References from the articles included in the review were examined in order to identify other relevant studies. Following this literature search a database including approximately ninety-seven titles was created using EndNote.

There are four published texts (Bonk & Graham, 2006; Littlejohn & Pegler, 2007; A. G. Picciano et al., 2013; E. Stacey & Gerbic, 2009); there were few publications, which directly discussed teacher's perspectives on blended teaching.

4. DISCUSSION

Blended learning research on teachers' conceptions, beliefs and experiences of teaching in face-to-face and online settings reflects all six objectives of the Blending with Purpose Multimodal framework but student-generated content and reflection were not used to their fullest capacity. Teachers focused mainly on content, social/emotional aspects of blended learning courses for their students, and synthesis/evaluation tools. The studies in this literature review contained faculty-driven rather than student-generated content, as was suggested by Picciano (2009) as part of the design of the multimodal model. This literature review shows the importance of teachers' conceptions, beliefs and experiences and their approaches to both designing and teaching in face-to-face and online settings including learning management systems. In addition, relationships between conceptions and approaches found in previous research have been confirmed. Research results indicate that teachers use multiple approaches including face-to-face methods and online technologies that address the learning needs of a variety of students from different generations, personality types and learning styles.

Even though these studies have been conducted in different settings and by different researchers, many similarities in research results can be seen. Research results indicate that teachers merge several objectives of the Blending with Purpose Multimodal framework together to create learning experiences. Teachers utilise multiple approaches and technologies as a way to transfer information to students. Learning resources are uploaded for students to use on their own and teachers provide information to students in the form of lecture notes, online resources and websites. This enables students to learn at their own pace. Teachers can engage in communications and learning activities with students including email, blogs and discussion boards. Electronic communications enable collaboration between students. Teachers develop pedagogical activities that require students to reflect on what they are learning and to share their reflection with their teachers and fellow students are viewed very positively. Teachers use discussion to present a topic or issue and have students respond to questions, provide their own perspectives while also evaluating and responding to the opinions of others.

The research in blended learning so far has focused more on what teachers need to know in order to integrate technology into their teaching (Mishra & Koehler, 2006) rather than on personal support tools to enable students to use blended learning environments effectively and to learn efficiently. Most studies have been conducted as case studies. Yin (2009) argued that “a case study investigates a contemporary phenomenon within its real-life context” (p.13). Even though the case study has this advantage, this research area needs other research methods. The Blending with Purpose Multimodal framework used in this paper can be used as a conceptual framework to examine the effectiveness of blended learning courses. The Blending with Purpose Multimodal framework shows what objectives teachers should consider when designing blended learning courses.

As this literature review shows, teachers' conceptions and approaches to both design and teaching using blended learning environments is still a developing issue. More research is also needed to gain a more comprehensive understanding of teachers' perceptions and problems that these teachers face when integrating pedagogy and content knowledge into blended learning environments, the strategies they employ to address these problems, and how they use the blended learning tools (e.g., learning management systems) to overcome these challenges. Discovering what type of pedagogical and technology changes are being made to blended learning courses, being able to identify design problems, and finding solutions to design and development issues are extremely important to blended learning. The Blending with Purpose Multimodal framework (A. Picciano, 2009) should also be compared to other frameworks to discover to what extent pedagogical frameworks are helping teachers to integrate pedagogy and content knowledge into blended learning environments.

REFERENCES

Amrein-Beardsley, A., Foulger, T. S., & Toth, M. (2007). Examining the Development of a Hybrid Degree Program: Using Student and Instructor Data to Inform Decision-Making. *Journal of Research on Technology in Education*, *39*(4), 27. doi:10.1080/15391523.2007.10782486

Arbaugh, J., Godfrey, M. R., Johnson, M., Pollack, B. L., Niendorf, B., & Wresch, W. (2009). Research in online and blended learning in the business disciplines: Key findings and possible future directions. *The Internet and Higher Education*, *12*(2), 71–87. doi:10.1016/j.iheduc.2009.06.006

Arbaugh, J. B. (2002). Managing the on-line classroom. *The Journal of High Technology Management Research*, *13*(2), 203–223. doi:10.1016/S1047-8310(02)00049-4

Aspden, L., & Helm, P. (2004). Making the Connection in a Blended Learning Environment. *Educational Media International*, *41*(3), 245–252. doi:10.1080/09523980410001680851

Aycock, A., Garnham, C., & Kaleta, R. (2002). Lessons learned from the hybrid course project. *Teaching with Technology Today*, *8*(6), 9–21.

Biggs, J. (1999). *Teaching for quality learning at university: what the student does*. Buckingham: Society for Research into Higher Education.

Bliuc, A.-M., Goodyear, P., & Ellis, R. A. (2007). Research focus and methodological choices in studies into students' experiences of blended learning in higher education. *The Internet and Higher Education*, *10*(4), 231–244. doi:10.1016/j.iheduc.2007.08.001

Bonk, C., & Graham, C. (2006). *The Handbook of Blended Learning: Global Perspectives, Local Designs*. San Francisco, CA: Pfeiffer.

Bouhnik, D., & Marcus, T. (2006). Interaction in distance,Äêlearning courses. *Journal of the American Society for Information Science and Technology*, *57*(3), 299–305. doi:10.1002/asi.20277

Brabazon, T. (2002). *Digital hemlock: Internet education and the poisoning of teaching*. Sydney: UNSW Press.

Chamberlin, S., & Moon, S. (2005). Model-eliciting activities: An introduction to gifted education. *Journal of Secondary Gifted Education*, *17*(1), 37–47.

Chen, W., & Looi, C. (2007). Incorporating online discussion in face to face classroom learning: A new blended learning approach. *Australasian Journal of Educational Technology*, *23*(3), 307.

Coates, H., James, R., & Baldwin, G. (2005). A critical examination of the effects of learning management systems on university teaching and learning. *Tertiary Education and Management*, *11*, 19–36.

Collis, B., Bruijstens, H., & van Veen, J. K. d. (2003). Course redesign for blended learning: Modern optics for technical professionals. *International Journal of Continuing Engineering Education and Lifelong Learning*, *13*(1), 22–38.

Concannon, F., Flynn, A., & Campbell, M. (2005). What campus-based students think about the quality and benefits of e-learning. *British Journal of Educational Technology*, *36*(3), 501–512. doi:10.1111/j.1467-8535.2005.00482.x

Conrad, D. (2005). Building and maintaining community in cohort-based online learning. *Journal of Distance Education*, *20*(1), 1.

De Lange, P., Suwardy, T., & Mavondo, F. (2003). Integrating a virtual learning environment into an introductory accounting course: Determinants of student motivation. *Accounting Education*, *12*(1), 1–14. doi:10.1080/0963928032000064567

De Witt, C., & Kerres, M. (2003). A didactical framework for the design of blended learning arrangements. *Journal of Educational Media*, *28*(2/3), 101–114. doi:10.1080/1358165032000165653

Delialioglu, O., & Yildirim, Z. (2008). Design and development of a technology enhanced hybrid instruction based on MOLTA model: Its effectiveness in comparison to traditional instruction. *Computers & Education*, *51*(1), 474–483. doi:10.1016/j.compedu.2007.06.006

Demetriadis, S., & Pombortsis, A. (2007). E-lectures for flexible learning: A study on their learning efficiency. *JOURNAL OF EDUCATIONAL TECHNOLOGYAND SOCIETY*, *10*(2), 147.

Dzakiria, H., Wahab, M. S. D. A., & Rahman, H. D. A. (2012). Blended learning (BL) as pedagogical alternative to teach business communication course: Case study of UUM executive diploma program. *Turkish Online Journal of Distance Education (TOJDE), 13*(3).

Dziuban, C., & Moskal, P. (2001). Evaluating distributed learning at metropolitan universities. *EDUCAUSE Quarterly*, *24*(4), 60–61.

Edginton, A., & Holbrook, J. (2010). A blended learning approach to teaching basic pharmacokinetics and the significance of face-to-face interaction. *American Journal of Pharmaceutical Education*, *74*(5), 88. doi:10.5688/aj740588 PMID:20798797

Ellis, R., & Calvo, R. (2004). Learning through discussions in blended environments. *Educational Media International*, *41*(3), 263–274. doi:10.1080/09523980410001680879

Ellis, R. A., Goodyear, P., Prosser, M., & O'Hara, A. (2006). How and what university students learn through online and face-to-face discussion: Conceptions, intentions and approaches. *Journal of Computer Assisted Learning*, *22*(4), 244–256. doi:10.1111/j.1365-2729.2006.00173.x

Ellis, R. A., Steed, A. F., & Applebee, A. C. (2006). Teacher conceptions of blended learning, blended teaching and associations with approaches to design. *Australasian Journal of Educational Technology*, *22*(3), 312.

Entwistle, N. (2005). Learning outcomes and ways of thinking across contrasting disciplines and settings in higher education. *Curriculum Journal*, *16*(1), 67–82. doi:10.1080/0958517042000336818

Garrison, D. R., & Anderson, T. (2003). *E-learning in the 21st century: A framework for research and practice*: Routledge.

Garrison, D. R., Anderson, T., & Archer, W. (1999). Critical inquiry in a text-based environment: Computer conferencing in higher education. *The Internet and Higher Education*, *2*(2), 87–105. doi:10.1016/S1096-7516(00)00016-6

Garrison, D. R., & Arbaugh, J. B. (2007). Researching the community of inquiry framework: Review, issues, and future directions. *The Internet and Higher Education*, *10*(3), 157–172. doi:10.1016/j.iheduc.2007.04.001

Garrison, D. R., & Kanuka, H. (2004). Blended learning: Uncovering its transformative potential in higher education. *The Internet and Higher Education*, *7*(2), 95–105. doi:10.1016/j.iheduc.2004.02.001

Garrison, D. R., & Vaughan, N. (2008). *Blended learning in higher education; Framework, principles, and guidelines* (Vol. 23).

Gedik, N., Kiraz, E., & Ozden, M. Y. (2013). Design of a blended learning environment: Considerations and implementation issues. *Australasian Journal of Educational Technology*, *29*(1).

Gerbic, P. (2011). Teaching using a blended approach - what does the literature tell us? *Educational Media International*, *48*(3), 221–234. doi:10.1080/09523987.2011.615159

Ginns, P., & Ellis, R. (2007). Quality in blended learning: Exploring the relationships between on-line and face-to-face teaching and learning. *The Internet and Higher Education*, *10*(1), 53–64. doi:10.1016/j.iheduc.2006.10.003

Ginns, P., Prosser, M., & Barrie, S. (2007). Students perceptions of teaching quality in higher education: The perspective of currently enrolled students. *Studies in Higher Education*, *32*(5), 603–615. doi:10.1080/03075070701573773

Gonzalez, C. (2009). Conceptions of, and approaches to, teaching online: A study of lecturers teaching postgraduate distance courses. *Higher Education*, *57*(3), 299–314. doi:10.1007/s10734-008-9145-1

Gonzalez, C. (2010). What do university teachers think eLearning is good for in their teaching? *Studies in Higher Education*, *35*(1), 61–78. doi:10.1080/03075070902874632

Graetz, K. A., & Goliber, M. J. (2002). Designing collaborative learning places: Psychological foundations and new frontiers. *New Directions for Teaching and Learning*, *2002*(92), 13–22. doi:10.1002/tl.75

Graham, C. R. (2006). Blended Learning Systems. Definitions, current trends and future directions. In C. J. Bonk & C. R. Graham (Eds.), The Handbook of Blended Learning: Global Perspectives, Local Designs (pp. 3-21). San Franscisco: Pfeiffer.

Graham, C. R., Allen, S., & Ure, D. (2003). Blended learning environments: A review of the research literature. *Unpublished manuscript, Provo, UT*.

Graham, C. R., Allen, S., & Ure, D. (2005). Benefits and challenges of blended learning environments. In M. Khosrow-Pour (Ed.), *Encyclopedia of information science and technology* (pp. 53–259). Hershey, PA: Idea Group. doi:10.4018/978-1-59140-553-5.ch047

Heinze, A., & Procter, C. (2004). *Reflections on the use of blended learning*.

Hermann, N., Popyack, J. L., Char, B., & Zoski, P. (2004). *Assessment of a course redesign: Introductory computer programming using online modules*.

Ho, A., Lu, L., & Thurmaier, K. (2006). Testing the reluctant professor's hypothesis: evaluating a blended-learning approach to distance education. *Journal of Public Affairs Education*, 81-102.

Jefferies, P., Grodzinsky, F., & Griffin, J. (2003). Advantages and problems in using information communication technologies to support the teaching of a multi-institutional computer ethics course. *Journal of Educational Media*, *28*(2-3), 191–202. doi:10.1080/1358165032000165644

Jokinen, P., & Mikkonen, I. (2013). Teachers' experiences of teaching in a blended learning environment. *Nurse Education in Practice*, *13*(6), 524–528. doi:10.1016/j.nepr.2013.03.014 PMID:23608218

Jones, N., & Lau, A. M. S. (2010). Blending learning: Widening participation in higher education. *Innovations in Education and Teaching International*, *47*(4), 405–416. doi:10.1080/14703297.2010.518424

Jones, S., Johnson-Yale, C., Millermaier, S., & Pérez, F. S. (2008). Academic work, the Internet and US college students. *The Internet and Higher Education*, *11*(3-4), 165–177. doi:10.1016/j.iheduc.2008.07.001

Julian, E., & Boone, C. (2001). Blended learning solutions: Improving the way companies manage intellectual capital: An IDC whitepaper. IDC; Retrieved February 16, 2005.

Kaleta, R., Skibba, K., & Joosten, T. (2007). *Discovering, designing, and delivering hybrid courses. Blended Learning: Research Perspectives*. Needham, MA: The Sloan Consortium.

Kanuka, H. (2008). *Understanding e-learning technologies-in-practice through philosophies-in-practice* (pp. 91–118). The Theory and Practice of Online Learning.

Kanuka, H., & Kelland, J. (2008). Has e-learning delivered on its promises? Expert opinion on the impact of e-learning in higher education. *Canadian Journal of Higher Education*, *38*(1), 45–65.

Kember, D., & Kwan, K.-P. (2000). Lecturers' approaches to teaching and their relationship to conceptions of good teaching. *Instructional Science*, *28*(5), 469–490. doi:10.1023/A:1026569608656

King, S. E., & Arnold, K. C. (2012). Blended Learning Environments in Higher Education: A Case Study of How Professors Make It Happen. *Mid-Western Educational Researcher*, *25*(1), 44–59.

Knight, S. (2009). *Effective practice in a digital age*. Bristol, UK: JISC Innovation Group, University of Bristol.

Kupetz, R., & Ziegenmeyer, B. (2005). Blended Learning in a Teacher Training Course: Integrated Interactive E-Learning and Contact Learning. *ReCALL*, *17*(2), 179–196. doi:10.1017/S0958344005000327

Lameras, P., Levy, P., Paraskakis, I., & Webber, S. (2012). Blended university teaching using virtual learning environments: Conceptions and approaches. *Instructional Science*, *40*(1), 141–157. doi:10.1007/s11251-011-9170-9

Lameras, P., Paraskakis, I., & Levy, P. (2008). *Conceptions of teaching using virtual learning environments: preliminary findings from a phenomenographic inquiry*. Paper presented at the 6th International Conference on Networked Learning, May.

Lapadat, J. C. (2002). Written interaction: A key component in online learning. *Journal of Computer-Mediated Communication*, *7*(4).

Laurillard, D. (2002). *Rethinking university teaching: a conversational framework for the effective use of learning technologies*. London: RoutledgeFalmer. doi:10.4324/9780203304846

Liaw, S.-S., Huang, H.-M., & Chen, G.-D. (2007). An activity-theoretical approach to investigate learners,Äô factors toward e-learning systems. *Computers in Human Behavior*, *23*(4), 1906–1920. doi:10.1016/j.chb.2006.02.002

Littlejohn, A., & Pegler, C. (2007). *Preparing for Blended Learning. Milton Park*. Abingdon, Oxon: Routledge.

Lock, J. V. (2006). A new image: Online communities to facilitate teacher professional development. *Journal of Technology and Teacher Education*, *14*(4), 663–678.

Masalela, R. K. (2009). Potential benefits and complexities of blended learning in higher education: The case of the University of Botswana. *TOJDE/ Turkish Online*. *Journal of Distance Education*, *10*(1), 66–82.

McConnell, D., & Zhao, J. (2006). *Chinese higher education teachers' conceptions of e-Learning: Preliminary outcomes.* Paper presented at the Proceedings of the 23rd Annual Ascilite Conference: Who's Learning? Whose technology? McShane, K. (2004). Integrating face-to-face and online teaching: academics' role concept and teaching choices. *Teaching in Higher Education*, *9*(1), 3–16.

Mishra, P., & Koehler, M. J. (2006). Technological Pedagogical Content Knowledge: A Framework for Teacher Knowledge. *Teachers College Record*, *108*(6), 1017–1054. doi:10.1111/j.1467-9620.2006.00684.x

Molesworth, M. (2004). Collaboration, reflection and selective neglect: Campus-based marketing students' experiences of using a virtual learning environment. *Innovations in Education and Teaching International*, *41*(1), 79–92.

Mortera-Gutierrez, F. (2006). Faculty Best Practices Using Blended Learning in E-Learning and Face-to-Face Instruction. *International Journal on E-Learning*, *5*(3), 313–337.

Motteram, G. (2006). Blended education and the transformation of teachers: A long term case study in postgraduate UK Higher Education. *British Journal of Educational Technology*, *37*(1), 17–30. doi:10.1111/j.1467-8535.2005.00511.x

Napier, N. P., Dekhane, S., & Smith, S. (2011). Transitioning to Blended Learning: Understanding Student and Faculty Perceptions. *Journal of Asynchronous Learning Networks*, *15*(1), 20–32.

Ocak, M. A. (2011). Why are faculty members not teaching blended courses? Insights from faculty members. *Computers & Education*, *56*(3), 689–699. doi:10.1016/j.compedu.2010.10.011

Oh, E., & Park, S. (2009). How are universities involved in blended instruction? *Journal of Educational Technology & Society*, *12*(3), 327–342.

Oliver, M., & Trigwell, K. (2005). Can'Blended Learning'Be Redeemed? *E-Learning and Digital Media*, *2*(1), 17–26.

Palloff, R. M., & Pratt, K. (1999). *Building learning communities in cyberspace: effective strategies for the online classroom*. San Francisco: Jossey-Bass Publishers.

Picciano, A. (2009). Blending with purpose: The multimodal model. *Journal of the Research Center for Educational Technology*, *5*(1), 4–14.

Picciano, A. G., Dziuban, C. D., & Graham, C. R. (2013). *Blended learning: Research perspectives* (Vol. 2). United States of America: The Sloan Consortium.

Piccoli, G., Ahmad, R., & Ives, B. (2001). Web-Based Virtual Learning Environments: A Research Framework and a Preliminary Assessment of Effectiveness in Basic IT Skills Training. *Management Information Systems Quarterly*, *25*(4), 401–426. doi:10.2307/3250989

Prendergast, G. (2004). *Blended collaborative learning: online teaching of online educators*. Global Educator.

Prensky, M. (2001). Digital natives, digital immigrants Part 1. *On the horizon*, *9*(5), 1–6. doi:10.1108/10748120110424816

Prensky, M. (2006). Adopt and adapt. *Edutopia*, *1*(9), 42–45.

Prensky, M. (2010). *Teaching Digital Natives*. London, United Kingdom: SAGE Ltd.

Prosser, M., Trigwell, K., & Taylor, P. (1994). A phenomenographic study of academics' conceptions of science learning and teaching. *Learning and Instruction*, *4*(3), 217–231. doi:10.1016/0959-4752(94)90024-8

Ramsden, P. (1991). A performance indicator of teaching quality in higher education: The Course Experience Questionnaire. *Studies in Higher Education*, *16*(2), 129–150. doi:10.1080/03075079112331382944

Ramsden, P. (2003). *Learning to teach in higher education*. New York: RoutledgeFalmer.

Roberts, G. (2003). Teaching using the web: Conceptions and approaches from a phenomenographic perspective. *Instructional Science*, *31*(1-2), 127–150. doi:10.1023/A:1022547619474

Rodriguez, M. A., & Anicete, R. C. R. (2010). Students' Views of a Mixed Hybrid Ecology Course. *MERLOT Journal of Online Learning and Teaching*, *6*, 791–798.

Saljo, R. (1979). *Learning in the learner's perspective. I. Some common-sense conceptions*. ERIC Clearinghouse.

Salmon, G. (2002). *E-tivities: the key to active online learning. London*. UK: Falmer Press, Limited.

Salmon, G. (2005). Flying not flapping: A strategic framework for e-learning and pedagogical innovation in higher education institutions. *ALT-J*, *13*(3), 201–218. doi:10.1080/09687760500376439

Saundercook, J., & Cooper, P. (2003). *4th annual technology and student success in higher education. A research study on faculty perceptions of technology and student success*. Toronto, ON: McGraw-Hill Ryerson.

Sharpe, R. (2006). *The undergraduate experience of blended e-learning: a review of UK literature and practice*. UK: The Higher Education Academy York.

Sharpe, R., & Benfield, G. (2005). The student experience of e-learning in higher education. *Brookes eJournal of Learning and Teaching, 1*(3).

Shivetts, C. (2011). *E-Learning and Blended Learning: The Importance of the Learner--A Research Literature Review* (Vol. 10, pp. 331–337). Association for the Advancement of Computing in Education.

Singh, H. (2003). Building effective blended learning programs. *EDUCATIONAL TECHNOLOGY-SADDLE BROOK THEN ENGLEWOOD CLIFFS NJ*, *43*(6), 51–54.

Skill, T. D., & Young, B. A. (2002). Embracing the hybrid model: Working at the intersections of virtual and physical learning spaces. *New Directions for Teaching and Learning*, *2002*(92), 23–32. doi:10.1002/tl.76

Stacey, E., & Gerbic, P. (2009). Introduction to blended learning practices. In Effective blended learning practices: Evidence-based perspectives in ICT-facilitated education (pp. 1-20).

Stacey, E., & Wiesenberg, F. (2007). A study of face-to-face and online teaching philosophies in Canada and Australia. *The Journal of Distance Education/Revue de l'Éducation à Distance, 22*(1), 19-40.

Steel, C. (2009). Reconciling university teacher beliefs to create learning designs for LMS environments. *Australasian Journal of Educational Technology*, *25*(3), 399–420.

Tang, M., & Byrne, R. (2007). Regular versus Online versus Blended: A Qualitative Description of the Advantages of the Electronic Modes and a Quantitative Evaluation. *International Journal on E-Learning*, *6*(2), 257–266.

Trigwell, K., Prosser, M., & Taylor, P. (1994). Qualitative differences in approaches to teaching first year university science. *Higher Education*, *27*(1), 75–84. doi:10.1007/BF01383761

Verkroost, M. J., Meijerink, L., Lintsen, H., & Veen, W. (2008). Finding a balance in dimensions of blended learning. *International Journal on E-Learning*, *7*(3), 499–522.

Vignare, K. (2007). Review of literature, blended learning: Using ALN to change the classroom–will it work. Blended Learning: Research Perspectives (pp. 37-63).

Waxman, H. C., Huang, S. Y. L., & Wang, M. C. (1997). Investigating the classroom learning environment of resilient and non-resilient students from inner-city elementary schools. *International Journal of Educational Research*, *27*(4), 343–353. doi:10.1016/S0883-0355(97)90016-1

Webster, J., & Hackley, P. (1997). Teaching Effectiveness in Technology-Mediated Distance Learning. *Academy of Management Journal*, *40*(6), 1282–1309. doi:10.2307/257034

Welker, J., & Berardino, L. (2006). Blended Learning: Understanding the Middle Ground between Traditional Classroom and Fully Online Instruction. *Journal of Educational Technology Systems*, *34*(1), 33–55. doi:10.2190/67FX-B7P8-PYUX-TDUP

Wu, J.-H., Tennyson, R. D., & Hsia, T.-L. (2010). A study of student satisfaction in a blended e-learning system environment. *Computers & Education*, *55*(1), 155–164. doi:10.1016/j.compedu.2009.12.012

Yin, R. K. (2009). *Case study research: Design and methods* (Vol. 5). Sage publications, INC.

This work was previously published in the International Journal of Innovation in the Digital Economy (IJIDE), 6(3); edited by Ionica Oncioiu, pages 46-73, copyright year 2015 by IGI Publishing (an imprint of IGI Global).

Chapter 2
Flipping STEM Learning:
Impact on Students' Process of Learning and Faculty Instructional Activities

Dianna L. Newman
SUNY Albany, USA

Kenneth A. Connor
Rensselaer Polytechnic Institute, USA

Meghan Morris Deyoe
SUNY Albany, USA

Jessica M. Lamendola
SUNY Albany, USA

ABSTRACT

The call for reform in education, based on the recognition of an increased role of technology, as well as the rapid advancement of technology types and uses, requires major changes to traditional methods of teaching. The purpose of this chapter is to present the results of the use of a flipped classroom approach in a higher education STEM course. The chapter includes information on the development and structure of the flipped classroom, the role of video lectures and active learning in supporting flipped instruction, the value of prior experience as a concomitant variable, and the benefits and limitations of the approach. Examination of findings supports this new method of instruction and learning; however, some student hesitance to move beyond traditional instruction suggests a need to implement the approach as a continuum, beginning with segments, then moving to a blended technique, with final transition into a totally flipped classroom. This process supports instructor development and student buy-in while allowing for formative assessment of resources and increasing of student efficacy.

INTRODUCTION

The need for educational reform is well recognized (Tucker, 2012), and plans for change are in place all over the nation, at all levels and all sites—Pre-K-12 schools, institutions of higher education, states' department of education, and federal offices that support education (United States Department of Education, 2010). These plans for reform include not just what we teach but how we teach. The ultimate goal of this systemic change in education is twofold:

DOI: 10.4018/978-1-4666-8246-7.ch002

to improve our nation's economic growth and to cultivate the collaboration skills necessary for international problem-solving (United States Department of Education, 2010).

As we strive to reach this goal, we must also deal with the changing context. Because of rapid gains in both the amount of information and sources for information transmittal, today's students come to learning with a very different skillset than did students who attended school just a decade ago. In addition, there is a very different recognition of what skills need to be acquired for future success in society. On a micro-level, students' future skills must include knowing how to problem-solve, how to successfully work both alone and on collaborative teams, how to think independently yet access diverse external resources, and how to adjust to an ever changing environment (Keengwe, Onchwari, & Onchwari, 2009; Salomon, 2002). On a macro-level, all students must be able to support and add to a highly knowledgeable workforce, heavily based in Science, Technology, Engineering, and Math (STEM).

The call for change in education, based on the recognition of this increase in the role of technology and the rapid advancement of technology types and uses, requires major modifications to traditional methods of teaching and the expected outcomes. Students must not only learn, but also learn how to learn. Increased engagement of students is paramount; in helping students learn how to learn, students must actively construct, and want to construct a flexible knowledge base. Research tells us that increased engagement can be promoted through instructional strategies using visual stimulation, experiential/authentic learning, technology integration, and community-based learning (Brown, Hansen-Brown, & Conte, 2011; Newman, Clure, Deyoe, & Connor, 2013; Newman & Gullie, 2009). Adaptations of these techniques as well as new instructional strategies, particularly in STEM classrooms, are needed; especially strategies that cultivate a student-centered learning environment that promotes proficiency and expertise in subject matter, dissuades the passive learning of teacher-centered direct instruction, and develops the ability to continue lifelong learning of both content and application (Newman et al., 2013). The flipped classroom approach, when integrated with increased hands-on application, is one instructional method currently being explored as a means of meeting the demand for twenty-first century classrooms to provide active and engaging knowledge construction.

The purpose of this chapter is to present the results of the use of a flipped classroom approach in a higher education STEM course. The chapter includes information on the structure of the flipped classroom, the role of video lectures in supporting flipped instruction, and the benefits and limitations of the approach.

BACKGROUND

Research suggests that the growth in technology-related jobs will grow from 50 to 77% over the next decade, making it crucial for educators to prepare students for these jobs (Tucker, 2012). This need calls for an integrated approach to content and technology that will foster knowledge, application, and the ability to continue learning. Brown and colleagues (2011) note that emphasizing a productive interconnected learning environment promoting content and technology skills not only supports, but enhances students' learning, particularly when that setting involves a flexible, but personalized collaborative scenario. This type of student-centered, technology-based, active learning relies on students wanting to take control of their learning; this includes setting their own goals, monitoring their own progress, and facilitating their own and others' critical thinking and problem solving skills (Zimmerman, 1995). Many secondary schools have adopted technology as a way to support and cultivate students' interests and to help develop the skills needed for success in society. The implementation of what are now called *flipped classrooms*, piloted by Bergmann and Sams, two high school chemistry teachers in Colorado, is an innovative technique that enhances content-based learning, while offering more time for individualized practice and skills acquisition (Simba Information, 2011).

In its most progressive use, a flipped classroom relies on technology to introduce students to concepts and content outside of the formal educational setting. This digitally supported introduction, usually occurring before practice, is the new out-of-class homework. Instead of listening to a lecture in class and practicing on their own outside of class, basic transmittal of concepts and instruction take place outside the classroom and in-class instructional time is now used for active experimentation (both autonomous and collaborative) that promotes critical thinking. This in-class application provides time and opportunities for students, and instructors to interact on direct use and concept application, building on and enhancing what is learned and reinforced via outside lectures (Bull, Ferster, & Kjellstrom, 2012; Fulton, 2012; Simba Information, 2011; Strayer, 2012). Flipping the classroom, moving lectures outside and practice, experimentation, and rehearsal inside, allows instructors more time to promote and monitor student understanding through direct questioning, by facilitating collaborative activities, and providing one-on-one attention as needed (Bull et al., 2012; Carpenter & Pease, 2012; Pape, Sheehan, & Worrell, 2012; Rycik, 2012). These flipped classroom practices support the use of integrated constructivist and constructionist-based approaches to learning and practices; methods that have been shown to yield greater student inquiry and the acquisition of more practical knowledge of content, which in turn, have been shown to produce greater proficiency and expertise (Clinton & Rieber, 2010; Guthrie, 1952; Vygotsky, 1978).

Higher education, especially STEM education, is now beginning to reconsider and revise uses of already extant characteristics similar to those used in the flipped approach developed for secondary education. For instance, many post-secondary sites are already using the Internet as a means of supporting learning, thereby offering students the flexibility in scheduling and diversity in courses needed to pursue an accredited degree (Phillips et al., 2007). A variety of educational technological resources have emerged to support this effort. For example, learning management systems, such as Blackboard's™ Learning Management System, are highly utilized in higher education along with other open-source communication and information sharing methods. Additionally, educators are implementing and refining the use of an array of multimedia approaches that supplement traditional classroom-based activities such as online discussion, active links, simulations, synchronous communication, tutorials, and videoconferencing (Cook, Garside, Levinson, Dupras, & Montori, 2010; Donahue & Crosby, 2013). The acceptance of implementing these techniques within instructional practices has not been as difficult as first feared. Because these types of technology also are being implemented at K-12 levels to enhance instruction, many students come to higher education settings expecting instruction to reflect these methods. As a result, the use of already well-accepted technology resources when providing content should facilitate the transition to technology supported flipped classrooms for both students and instructors (Cheng, 2006; Swan, 2011).

Another already extant characteristic that can easily be adapted in STEM higher education is the use of problem-solving tasks. Hands-on, constructivist activities already have been found to promote positive, long-term learning outcomes (Newman et al., 2013; Rodd & Newman, 2009; Won Hur & Anderson, 2013) when serving as the main instructional strategy in STEM classrooms. Unfortunately, it also has been shown that these approaches often are cut or shortened because of the perceived need to use class time to provide knowledge transfer via lecture and overview of textbook material (Newman & Gullie, 2009). The flipped classroom strives to eliminate the classroom conflict between lecture and hands-on assignments by allowing students, via technology, to hear and review basic content knowledge outside the classroom and thus, to engage in active learning inside the classroom (Chirinian, 2012). This flipping of the classroom structure allows the instructors and the students time during class to focus on activities that cultivate creativity, critical thinking, discovery-based problem solving, and skills in communication (Chirinian, 2012; Loyens, Rikers, & Schmidt, 2008; Splan, Shea Porr, & Broyles, 2011).

The following case study provides an in-depth look at the implementation of a flipped classroom in a higher education STEM class, developed across three terms and replicated across two semesters. Video lectures, along with linked multimedia resources served as the major technological support for the transmittal of basic content and preliminary demonstrations.

CASE STUDY

Setting

As part of a large-scale Engineering Research Center's (ERC)[1] educational activities, faculty are investigating the role of alternative instructional approaches that support constructivist/constructionist learning in STEM fields. As one of the approaches under review, a flipped classroom is now being implemented in an undergraduate engineering course.

Electronic Instrumentation is a survey course serving students pursuing engineering and science majors other than electrical engineering. The course includes direct hands-on application of theoretical concepts; it typically consists of two sections of 50-70 students that meet twice a week (two hours each session). Originally, the course had a common two hour lecture offered each week with separate lab times staffed by teaching assistants. Beginning in 2010, video lectures and supporting materials covering important theories, concepts, and demonstrations related to the course were created and placed online for students to view on their own time in place of the in-class lecture; use of class time was refocused to emphasize hands-on, experiential practice of the course material using student-directed learning in groups of two and four. Under the new model, the instructor and teaching assistants (two to three per section) serve as facilitators within this hand-on learning time, and technology supplements of videos and linked resources are available to students to use outside to direct or support their in-class work.

Student feedback from initial evaluations of pilot use in Fall 2010, Spring 2011, and Fall 2011 assisted in material development. Additional video materials were developed in 2011-12 and all video lectures were made available on *YouTube* for greater accessibility. Student perceptions of student-directed group learning and video lectures and classroom observations of the implementation of group learning, collected during spring 2012 and fall 2012 semesters are summarized in this chapter.

Participants in the fully implemented case reported here include students (n=138) enrolled in the course during the spring and fall (replicate) semesters of 2012, as well as instructional staff. The students were primarily mechanical engineering majors in their third/fourth year of post-secondary study. Over three-quarters of the students were male (83%); three-quarters self-reported their ethnic origin as White. Scores on the Index of Learning Styles (Felder & Silverman, 1988) revealed that students in both the pilot (Spring 2012) and replicate (Fall 2012) semesters were primarily sensing (75%), visual (86%), and sequential (66%) learners, indicating that they preferred to learn using their physical senses (i.e., through hands-on experience and explicit instruction) via visual diagrams, demonstrations or modeling, pictures, graphs, etc. in a scaffolded, hierarchical (sequential) knowledge building manner.

The following data sources were used to collect information on the implementation of the flipped classroom:

- Pre and post-student surveys,
- Observations of in-class settings, and
- Student and faculty interviews.

Pre and post-course surveys of students enrolled in the flipped course were administered in the first and last week of each semester, respectively; items assessed students' overall perceptions of group learning, including the frequency of learning settings (e.g., how often students worked independently, with a partner or group of four for homework, studying, and during class time) and the primary decision-maker for regulating learning activities, as well as the use of online videos in place of in class lectures (e.g., frequency of use, perceptions of use, benefits and barriers toward use). Independent evaluator classroom observations took place throughout the semester to validate students' involvement in active learning within the collaborative group work setting including student-student interactions, teacher-student interactions, and group dynamics and the self-regulation processes of goal setting and progress monitoring. Interviews of students, independent of faculty input, were collected post-course to assess overall perceptions of the learning experience, especially the use of the flipped classroom and online videos as lectures.

Building a Flipped Classroom

As in all case studies, the instructional context and philosophy behind the change reveals important patterns. In this case, building a flipped classroom was a process, not an instantaneous endeavor. With the explosion in the population of engineering students in the last decade, in order to continue a philosophy of learning supported by the studio approach to learning (i.e., lectures and labs occur fluidly as one and is enhanced with the use of mobile studio technology) while also maintaining consistent and sufficient interaction and feedback with 150+ students during active learning, the instructor decided to flip the class. In 2009-10, while consulting and collaborating with colleagues at multiple universities, the instructor began the development and piloting of a series of video lectures on electronic engineering that would support flipping of specific curriculum units. Developed using *Jing* software, each revised unit represented key components of content and skills knowledge and were five minutes in length after development and editing; the development process took anywhere from 5-10 hours to record what was two hours of lecture material. After developing the video lectures, they and supporting materials were uploaded and available for use online via Blackboard's ™ Learning Management System and the course website as deemed appropriate by faculty and/or instructional staff in 2010. To assist in the transfer of knowledge to diverse groups of students, the videos were designed to meet the needs of multiple instructional uses (i.e., limited access, repeat access, sequenced access, and general availability) and student learning (i.e., more than one resource—multiple power points, online handouts of notes for each experiment, and online reading material from multiple websites).

As part of the initial piloting of the flipped classroom units, student use of the out-of-class video lectures was examined to determine students' actual access and sequencing of the videos and whether the videos met diverse learning preferences of students. Results indicated that the videos that delivered quiz review content were accessed, on average, more times (28 times, Fall 2010; 36 times, Spring 2011; 24, Fall 2011) than the videos explaining experiment related concepts (20 times, Fall 2010; 29 times, Spring 2011; 10

times, Fall 2011) across the three semesters. These uses suggested that the videos that covered course content, which was perceived as directly relevant to assessment, were valued more by students than were the videos that covered the content pertinent to in-class experiments and related activities. Student interviews confirmed student perceptions of using the flipped lecture format for concept review and understanding in framing and rehearsing information (e.g., "I used videos that focused on example problems to prepare for our quizzes and tests," "[I use online lectures to] go over sample exam problems," and "when studying for exams, these videos were a perfect way to quickly and efficiently review the most important topics expected on the exam").

As the flipped classroom was further implemented, initial student feedback also identified specific barriers to accessing the online video resources that reflected student assumption that information would be available independently, immediately, and non-sequentially. For instance, students noted one significant barrier was the need to download each video individually; the process was *time consuming* and *frustrating* (Connor, Berry, Chouikha, Newman, Deyoe, Anaya, & Brubaker, 2011). Additional barriers included difficulty accessing specific parts of the video to get to information students needed or wanted (Connor, et al., 2011). In addition, students reported redundancy in using continuity lead-ins and did not perceive a need for it. As a result of this feedback, the videos were uploaded on *YouTube,* a format with which most students had prior experience and greater comfort level in using, and functions were established that allowed for easier access where videos could be watched individually, in segments, or in sequence as one long lecture. New videos were developed that addressed topics in a more focused manner that connected with content across assignments. The instructor also added search tags within the *YouTube* channel to assist in finding information by topic. In addition, the course instructor restructured the course webpage to provide even more of a user-friendly format for students and has developed a continuous pattern of updating material for the students.

Because students in this class were not electrical engineering majors, typically background knowledge and interest waned in learning the material and students needed external support. As a result, through collaboration with faculty at multiple universities who teach subjects in electrical engineering, learning strategies, grounded in Bloom's Taxonomy, were developed and implemented that would allow students to achieve and addressed topics at three levels: basic ideal theory, simulations, and hands-on experiments, and subsequently develop a useful systems model combining lessons learned at each level. Guided note supplements were developed to provide additional information on assignments, specific documents and videos were linked on the website to show students the process involved in conducting higher level thinking in engineering.

Methods for monitoring use and support for self-directed learning also were addressed. In terms of the active learning aspect of the flipped classroom, original verification of student learning occurred as part of a check-off procedure wherein the teaching assistant (TA) or the instructor signed off on completed assignments. This type of assessment, however, decreased the value of learning to learn, the purpose of implementing the flipped classroom. The original checklist assessment was enhanced by implementing a rubric for TAs and the instructor to follow when checking for understanding. The rubric now requires students to discuss their work by answering specific questions that gauge the students' level of learning; these rubrics are provided ahead of time, so students know what to expect. The instructor also has implemented a questioning aspect based on the teaching strategy of "Think, Pair, Share" (i.e., students think about and come up with an answer to a question, pair with a partner and share their thoughts) into the labs to facilitate their thinking on important concepts while they worked on assignments, and also served as a form of formative assessment. Using this approach, in the beginning of class, students work together in groups of four to answer questions on the material from the lab assignments and video lectures. This questioning process helps check for student understanding and allows the instructor to provide additional information on the topics and have a brief discussion on the topics during a 3-5 minute lecture halfway through class time. These strategies also now give the students the in-class time they perceived was important to have in addition to the video lectures for their understanding of concepts.

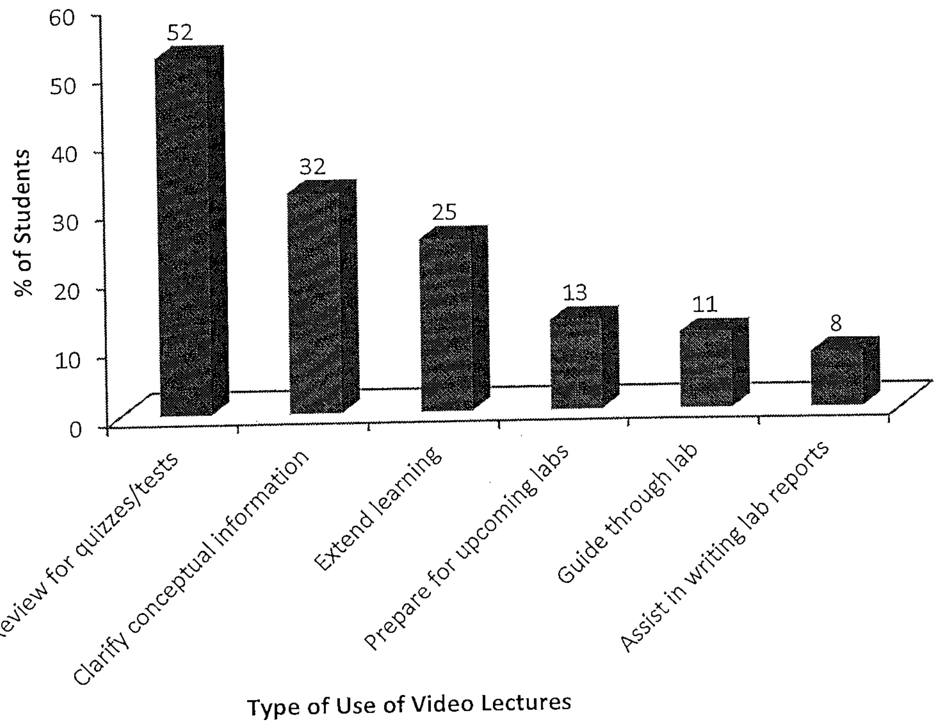
The Role of Technology: An Aid for Knowledge Rehearsal and Enhancement

As noted previously, the majority of students evidenced learning styles that were sensing, visual, and sequential. As a result, during development, the format of the flipped lectures was aligned with students' learning preferences to include observing and interpreting visual and graphic representations of information rather than interpretation of printed text about concepts and ideas. In addition, the flipped online lectures were delivered using a combination of voice, text, and graphical representations of course content, appropriate for an overall preference for visual learning.

When asked how they used these videos and other resources, students indicated the online video lectures were accessed primarily for extension or rehearsal of knowledge in the content area (See Figure 1). When asked for specific examples, they noted "It [video lectures] was good for studying," "It [video lectures] allowed for reviewing a lecture multiple times," and "Clarified concepts before quizzes." Students reported that they occasionally watched the online videos prior to the corresponding lab as a way to prepare for the assignment, but most viewed them at a later date to rehearse or focus learning. In general, students comments reflected the basic principles behind the flipped classroom—external access to basic content allowed for increased active engagement in class (e.g., "[Watching the videos provided them with] more time to focus on experiments during lab time," and "Class time was more productive"). Most reported using the video lectures "post-hoc" to consolidate the experiences they had during the hands-on lab and to place these experiences in a theoretical context, that is, most importantly, they flipped knowledge acquisition in a constructivist mode by first experiencing the learning in class and then framing the learned material in theory via the video lectures outside of class.

Participating in and valuing a flipped classroom did appear to be a learned process for these students, reflecting a need to establish a methodological comfort level. A majority of the students enrolled in the course did not perceive that the use of online videos made the course any more difficult than a traditional lecture-based course. Over time, as instructor experience increased, student preferences for lectures also shifted. At the end of the Spring 2012 pilot course, most students still reported a preference to attend a formal lecture rather than watch online videos; however, students in the Fall 2012 replication class reported a decrease in their preference in attending a weekly lecture, wanting instead to use online videos. These findings suggest that as replicated use occurs by a faculty member, students demonstrate an emerging acceptance of the flipped classroom approach. This may be related to instructor comfort level with the use of a flipped approach as well as students' prior experience and their "word-of-mouth" expectations of the classroom. However it should be noted that, after the second full replication while most now wanted online videos, over half (60%) of the students reported that they were still not comfortable using the video lectures for learning (see Table 1). There may be several reasons for this continual hesitance. When queried more specifically, many students reported an overall low competency level in actual use of the videos for learning (i.e., the process of selecting

Figure 1. Frequency of online video use
**Numbers represent percentages of participants who responded "often"/"most of the time."*



and running videos and deciding when to close); they did not know how to transfer or convey this new information because the tool was not part of their learning repertoire. Their responses to how, if ever, they had used video learning pedagogy in other courses, indicated prior use related to didactic learning approaches (e.g., for rehearsal, supplemental or enhanced learning goals), not for the primary mode of transferring new content (e.g., constructivist acquisition of knowledge). These prior experiences appear to have served as a barrier to use of videos in a constructivist, flipped approach.

As did their prior use, perceptions of the role of the current flipped classroom in promoting student-centered learning and providing increased opportunity for direct interaction with the instructor varied across students. One-third (33%) of the students strongly supported the process noting that the use of the video lectures enabled self-directed learning (e.g., "I could choose what I needed to review and when," "Allowed explanation multiple times," "watch[ed] at my own pace/schedule," and "I could pause the videos and listen again"). The majority of students (79%), however, did not perceive use of the online lectures to allow for increased interaction with the instructor. They wanted the comfort of lectures and the possibility of direct questioning of instructors during transferal of facts along with the questioning available during the hands-on experience. The need to verify learning via questioning, usually provided through instructor contact during lectures, was specifically noted (e.g., "I couldn't ask questions or get clarification right away," "Lack of interaction with professor [during videos]"). This need for more ability to question may be a result of prior learning experiences or increased student expectations in the new approach; as more opportunities to question were provided, more

*Table 1. Perceptions of online video usage**

Statement	% Post (n=138)
I prefer a formal weekly lecture instead of online videos.	66
Taking a course using online videos was more difficult than taking a traditional lecture-based course.	40
I (will be) was comfortable when using online videos for learning.	38
Taking a course with online videos allowed me to self- direct my learning.	33
Taking a course with online videos provided more opportunity to learn content during class/lab.	20
Taking a course with online videos allowed for increased interaction with the instructor during class/lab.	19
I am the type that learns well with online videos.	18
The skills I developed through online video resources are valued by companies I am likely to work for.	16

*Numbers represent percentages of participants who responded "Strongly Agree"/"Agree" on a 6 point Likert-type survey.

were sought. Observations documented that the instructor and the TAs were present during the scheduled hands-on practice time and were fully engaged and effective in using the practice time in class to address student queries or comments whereas in the past lecture class/lab arrangement there was less direct questioning time.

The Role of Active Learning

Despite students' mixed perceptions of the process, positive outcomes related to hands-on collaborative learning via the use of a technology supported flipped classroom were supported. Students' self-reported learning responses and external observations confirmed the presence of a student-centered, collaborative active learning environment within the flipped classroom. As demonstrated in Table 2, students predominantly worked in dyads or teams of four (by merging dyads). Almost all (92%) of the students reported that they regularly worked with a dyad partner, reinforcing skills related to sharing and communicating information needed to complete a task. In addition, almost half the students experienced the additional collaboration skills needed for larger team efforts; 44% had at least one experience of working with two or more partners, and 37% experienced multi-team interactions when their dyad merged with other teams to complete tasks. Data indicated that students' regulation of learning outside of the classroom remained primarily self-directed and autonomous; 70% of students worked independently on "homework" that now included watching videos and accessing online resources. However, it is noteworthy that 30% of the students did move their collaborative partnership outside the classroom and shared "homework" tasks. This extension to outside preparation was primarily contained within the dyad partnership. Some portions of this collaborative effort also continued into preparation for assessment tasks; 26% of the students maintained their dyad collaboration even when preparing for tests and quizzes.

The freedom to redesign the physical classroom when moving to a flipped classroom also is important to note. Class observations and student responses revealed that the lab "looked" like a professional setting with problem-solving teams working on assigned tasks or problems. This ability to mock up or model professional roles helps to establish professional values needed when in the work place. The majority of the students indicated their collaborative team predominantly decided together on the specific activities required to regulate learning, including goal development, division of tasks, completion of lab write-ups,

*Table 2. Frequency of learning settings**

	Post (n=138)
Students worked independently	
In class setting	14
For homework	70
When studying for tests and quizzes	80
Students worked with 1 partner	
In class setting	92
For homework	32
When studying for tests and quizzes	26
Students worked with 2 or more partners	
In class setting	44
For homework	5
When studying for tests and quizzes	7
Students and their partners worked with other teams	
In class setting	37
For homework	2
When studying for tests and quizzes	3

*Numbers represent percentages of students who responded "often" or "most of the time."

*Table 3. Primary decision-maker by activity**

Activities	Decision-maker	
	Instructor (n=138)	My team as a group (n=138)
Setting the content of the lab.	92	4
Establishing short-term goals.	20	53
Dividing the tasks.	0	76
Documenting progress.	2	59
Deciding to move on to the next task.	2	73
Completing the lab write-ups.	0	82

*Numbers represent the percent of students who reported the decision-maker for each activity.

etc.; all of these skills are needed for workplace problem-solving (See Table 3). Students were aware of the value of this part of the learning process, noting that the new structure enabled them to collaborate and share ideas as though in a real professional setting. The one activity, however, that students did not want to incorporate was the instructor's role in determining the content about which students were to learn. Most acknowledged this as part of the instructor's "expertise" role, but many also noted that this directive also resembled a professional setting where a manager or executive would pose problems that employees would have to solve in a team approach.

Once again, instructor familiarity and students' expectations may play a role in task division. When the approach was replicated in the fall term, an increase was found in students' responses regarding the amount to which the team divided up tasks (72% Spring 2012 increased to 80% Fall 2012), documented their progress (51% increased to 66%), and completed lab write-ups (increased from 83% to 86%). When specifically queried on their perceptions of group learning, the majority of students in the replication study noted their preference for group learning, as opposed to instructor-directed learning, as well as a higher level of comfort when working in a group; a skill again noted by the students to be of value for their future professions. These constructivist characteristics of learning, and their emerging duplication outside the classroom into their homework setting, further confirms the increased value students learned to place on active, student-centered knowledge generating experiences provided by the flipped classroom.

The Role of Prior Experience

Previous research has shown that prior experience is a concomitant variable that influences student outcomes relating to STEM learning and should be considered when designing and developing new initiatives in pedagogy (Newman, Clure, Deyoe, & Connor, 2012; Newman, Clure, Deyoe, & Connor, 2013). As briefly discussed earlier in the chapter, similar findings were found within the flipped classroom setting. Following is a more in-depth discussion of this important variable. Those students with prior experience in participating in a flipped classroom environment were more comfortable and appreciative of the opportunity to learn content via in-class constructivist activities. They also perceived that the flipped classroom allowed for more interaction with the instructor. There was, however, no difference in the use of online video lectures and other resources for learning between students who had prior experience with a flipped classroom and those who did not; both sets of students indicated they used the online videos to review and to clarify conceptual information after the constructivist experience.

Important variations in their own perceptions of learning via a flipped classroom approach were noted when differentiating for prior experience with the process, but the difference varied by the complexity of learning goals. Although all responses were relatively high, those students without prior flipped classroom experience tended to report even higher levels of preparation in content specific domains than did those with prior experience in constructing knowledge. For instance, in terms of course specific knowledge, those with no prior experience reported higher or better preparation than those with prior experience in: 1) using and applying specific math, science, and engineering knowledge to their assigned tasks; 2) designing and conducting specific experiments and analyzing and interpreting data; and 3) designing specific components on assignments and solving specific problems.

Students with prior flipped classroom experience, however, noted much higher preparation in skills reflective of more complex engineering ability and professionalism. Those with prior experience viewed themselves as more prepared than did those with no prior experience in being able to:

- Formulate and then solve general engineering problems;
- Work on single disciplinary and multi-disciplinary teams;
- Understand ethical responsibilities and address global and societal issues; and
- Take into account cultural values and contemporary issues in their professional work.

Students with no prior experience in flipped classrooms using constructivist approaches were significantly lower in their perception of being able to perform these types of tasks.

As noted earlier, although all students noted positive responses in preparedness of specific tasks and those with prior experience had more confidence in conducting generalized tasks, all students maintained a preference for some form of a formal weekly lecture. They appeared to value the practical applications and acquisition of skills, but still wanted some type of "expert face-to-face" transfer of knowledge that would validate the information. Students' predilection for concept learning via formal lecture suggests that this new approach, in which students collaboratively build knowledge, takes time to change students' predisposed mindset on how to learn.

Benefits, Limitations, and Solutions for Flipped Learning

Stated advantages of the online video lectures corresponded to students' reported use. The greatest and most frequently noted benefit was unrestricted access to the video lectures and linked resources for review, enhanced learning, and framing of knowledge (see Table 4). When specifically queried, student provided explicit benefits related to the ability to access the lectures at any time that reflected the promotion of knowledge rehearsal, greater allowance of hands-on practice of concepts, and the facilitation of self-paced learning (e.g., "I

Table 4. Benefits and limitations of video lectures

	Student Responses
Benefits	• Helped when studying for tests/quizzes • Unlimited access/could re-watch • Work at own pace • Provided more class/practice time • Extended the topic
Limitations	• Lost motivation/attention • No way to ask questions • No feedback from professor • Took more time
Suggestions	• Make videos more accessible • Use only lectures • Provide lectures and videos • Make videos more exciting/shorter/ more examples • Make videos mandatory

was more prepared for lab," "made it easier to study for tests," "allows flexibility in scheduling my time," "it allowed me to learn at my own pace," "more time to focus on experiments during lab time," and "clarified concepts for me before quizzes").

As noted previously, although many students had prior experience with using video lectures, they continued to express limitations with student-centered, self-directed learning and learning promoted via the flipped classroom. The most frequent limitation noted was a reported decreased interaction with the instructor (i.e., less than they had in traditional lecture settings); they noted they "Would rather have personal interaction with the professor," "couldn't ask questions [during video lectures]," and "[spent] lots of time involved outside of class, with less involvement from the professor [during video lecture]." This may reflect an expectation of instructional delivery found in the traditional teacher-directed classrooms in the STEM domain promoted by previous experiences. As noted earlier however, students actually had more time for direct questions, but the questions now focused on direct practice and application.

The perceived limitation of less interaction with the instructor and/or lack of validation of expert transfer was further documented when students were queried as to what changes they would make to the flipped classroom. Responses included, "Provide in-class lectures in addition to the video lectures," "Make it one lecture and one video" and "I would use them as supplements, not as the base for learning." Students also noted specific ways to streamline their ability to access the resources that reflected their need for sequence (e.g., "Make the titles of the videos logical in such a way that they are easy to search for and share while on YouTube," and "Organize chronologically instead of alphabetically"). These responses appeared to reflect students' prior experience with self-directed learning and their technological ease of use in utilizing *YouTube*. Those with more experience were more comfortable and better able to flip their learning process and access to information. Several students commented that they did not have to spend as much time studying the formal content (e.g., the videos and resources) because of the active, collaborative learning the class time provided; they noted that learning content while "doing" and using the resources to help them understand the "why" of physically working with electronic components and they rehearsed the "how and why" content via videos. One student stated,

When I was building a circuit, I didn't really have to study because I had learned by building and could see what each circuit did.

Several students indicated that the class time was helpful in motivating them to learn because they were able to learn concepts and theories in concrete, practical ways (e.g., "[Use of hands-on materials was] more motivating because it is [a] more practical application to learn," "[Lab] allowed me to see it rather than read it on a page," and "[lab work helped me in] comparing [electrical] components to real life").

Several students acknowledged the combined limitations and benefits of both methods and were explicit in expressing a need for a more blended approach to instruction, suggesting an integration of the "flipped classroom" approach and direct instruction techniques until they adjusted to the new learning techniques. Instructors and teaching assistants perceived part of the students' lack of comfort to relate to the use of increased student self-monitoring and self-structured learning; students found it easier and more in their comfort zone if they had a more faculty-directed approach (e.g., making the online lectures a requirement and monitoring the students' use of the tools with a brief 10-minute review period at the beginning of each lab and/or including two to three questions for students to answer as they watch the videos and then bring to lab for brief discussion). Use of a blended approach was supported by student comments across semesters indicating that lack of guidance on when to use the videos as well as lack of instructor monitoring of video use were drawbacks to using video lectures outside of class for learning. Many students did not want to be responsible for monitoring their own learning time and mode. They wanted specific directions reflecting requirements of use (e.g., "It was very difficult to figure out when to watch specific videos. Schedule them and group them into folders, so we know what to watch," or "Make it required, as I have not watched all the videos, which could hinder my grade"). Faculty noted that although this instilled the importance of the online lectures to the learning process, it would not support growth of students' self-direction and the learning of professional responsibility. Again, it should be noted that what might be a limitation for those with no prior experience was frequently a benefit for those with experience.

FUTURE RESEARCH IMPLICATIONS

The implementation of the flipped classroom reveals several implications for further research. Although this type of learning is becoming increasingly commonplace as a means of meeting the needs of today's students, most participants are still used to traditional methods of learning and may offer some resistance to instruction provided this way, particularly in STEM areas where underlying content is expected to be rule and procedure-based. Future research should focus on the impact of implementing the flipped classroom as a "continuum" process, ranging from didactic-led to a blended approach to a flipped classroom-only setting to determine if a slower transition can ease student anxiety toward learning via these new methods. Longitudinal research in this area may be beneficial for determining if the same issues occur when students have been introduced to flipped classroom learning at younger ages. Future studies also should focus on the delivery method of the content, alternate types and roles of technology, and differences in outcomes based on the technology and methods used.

Further research should focus on the impact of flipped classrooms on individual learning, and provide a foundation for more research on group variables. The active experimentation and real world experiences of the flipped classroom's in-class setting provide the basis of learning through constructionism and constructivism (Kafai & Resnick, 1996). Using flipped classrooms as the instructional model to support constructivist learning means that learners are responsible for their own learning, thus strengthening self-regulatory skills needed in professional settings (Loyens et al., 2008). In addition, this student-centered learning is often conducted in collaborative student groups. Inquiry is needed on both the process and products related to collaborative learning embedded within flipped instruction.

CONCLUSION

The use of a technology supported flipped classroom is an alternative way to engage students in active learning that will promote critical thinking and problem solving skills necessary for success in the 21st century. In this chapter, we focus on one type of flipped classroom, used in a higher education STEM class, developed across three terms and replicated across two semesters to document benefits and limitations to the approach, the role of the video lectures in the approach, and the process of active learning within the classroom.

Both students and faculty perceived benefits to this model. Students viewed the online video lectures as a resource that reinforced and expanded their conceptual understanding of the course material, but did not see the videos as a validated way of transferring new content. They still wanted access to the instructor for direct transfer of basic content and skills. Although in reality, the approach allowed them more access to instructor expertise, there appeared to be a need for continued confirmation of concept understanding that they only perceived as being met if it was a face-to-face transfer. Many students noted that unrestricted access to the online lectures facilitated knowledge rehearsal, increased hands-on practice by freeing up class time, and helped to develop self-regulated learning. Students found the use of the online video lectures to be most helpful when studying for quizzes and tests, particularly noting the capability of re-watching the videos and reconstructing what they wanted/needed to cover.

Half of the students indicated they did not find learning from online lectures more difficult than learning from traditional lectures; however, when asked about barriers to learning, the majority of students were consistent with their preference for traditional lectures, and were not comfortable using the online lectures as their primary forum for what they perceived to be the transfer of content. Other specific limitations or concerns to using the online videos included the delivery of information and the structure of the listing of the videos on *YouTube*. Comments from many students suggested that blending the flipped and traditional classroom approach might be beneficial in providing some of the structure with which they are familiar while continuing to promote and transition to self-regulated learning in the flipped classroom. These issues increase the importance of the role of technology in supporting and forming a blended transitional flipped classroom.

Despite the continuation of the need for the traditional affirmation of expertise, the students indicated the value of gaining experience in collaborative and problem-solving skills that are to be expected when they are on-the-job. The value of this collaborative hands-on approach offered by a flipped classroom was further verified as students gained confidence in their ability to function as a team and to use team monitoring of progress. Approximately one-third of the students transferred this outside the required flipped setting and continued to use these skills elsewhere. The ability of technology to provide flexibility in synchronous and asynchronous instructor/student interaction could be harnessed to address these communication concerns. Additional multimedia uses including just-in-time audio and video recordings of demonstrations and group work could be developed.

Student expectations of and prior experience with what is considered an appropriate instructional setting also appears to play a role in the acceptance of flipped classrooms. As noted, during the second replication, students, even though new to the class, were more accepting of the approach. This may be related to instructor comfort level, but also might indicate a higher level of student experience. As the use of flipped classrooms expand in secondary education settings, and as more use is experienced in post-secondary education settings, students' comfort levels and prior experience will shift. These shifts may be further related to changes in motivation, expectation, and students' learning style preferences. As the use of flipped classrooms increases, as student and faculty expectation and comfort levels are met, it can be expected that even greater evidence of constructivist learning will be evidenced.

REFERENCES

Brown, C. J., Hansen-Brown, L. J., & Conte, R. (2011). Engaging millennial college-age science and engineering students through experiential learning communities. *Journal of Applied Global Research*, *4*(10), 41–58.

Bull, G., Ferster, B., & Kjellstrom, W. (2012). Inventing the flipped classroom. *Learning and Leading with Technology*, *40*, 10–11.

Carpenter, J. P., & Pease, J. S. (2012). Sharing the learning. *Kappan Magazine*, *94*, 36–41.

Cheng, Y. B. (2006). New paradigm of learning and teaching in a networked environment: Implications for ICT literacy. In L. T. Wee Hand & R. Subramaniam (Eds.), *Handbook of Research on Literacy in Technology at the K-12 Level*. Hershey, PA: IDEA Group, Inc. doi:10.4018/978-1-59140-494-1.ch001

Chirinian, A. (2012, December 6). *Time to consider the flipped STEM classroom*. Retrieved from http://www.teachstemnow.com/?s=time+to+consider+the+flipped+STEM+classroom

Clinton, G., & Rieber, L. P. (2010). The studio experience at the University of Georgia: An example of constructionist learning for adults. *Educational Technology Research and Development*, *58*, 755–780. doi:10.1007/s11423-010-9165-2

Connor, K. A., Berry, F. C., Chouikha, M. F., Newman, D. L., Deyoe, M. M., Anaya, G., & Brubaker, W. (2011). *Using the mobile studio to facilitate non-traditional approaches to education and outreach.* Paper presented at the Annual Meeting of the ASEE Conference. Vancouver, Canada.

Cook, D. A., Garside, S., Levinson, A. J., Dupras, D. M., & Montori, V. M. (2010). What do we mean by web-based learning? A systematic review of the variability of interventions. *Medical Education*, *44*, 765–774. doi:10.1111/j.1365-2923.2010.03723.x PMID:20633216

Donahue, P. J., & Crosby, M. E. (2013). Developing a culturally-rich interactive model for mlearning. In J. Keengwe (Ed.), *Pedagogical applications and social effects of mobile technology integration* (pp. 206–224). Hershey, PA: IGI Global. doi:10.4018/978-1-4666-2985-1.ch012

Felder, R. M., & Silverman, L. K. (1988). Learning and teaching styles in engineering education. *English Education*, *78*(7), 674–681.

Fulton, K. (2012). Upside down and inside out: Flip your classroom to improve student learning. *Learning and Leading with Technology*, *39*, 12–17.

Guthrie, E. R. (1952). *The psychology of learning* (*Revised ed*). Boston, MA: Harper Bros.

Kafai, Y. B., & Resnick, M. (1996). Introduction. In Y. B. Kafai & M. Resnick (Eds.), *Constructionism in practice: Designing, thinking, and learning in a digital world*. Mahwah, NJ: Lawrence Erlbaum Associates, Inc.

Keengwe, J., Onchwari, G., & Onchwari, J. (2009). Technology and student learning: Toward a learner-centered teaching model. *AACE Journal*, *17*(1), 11–22.

Loyens, S. M. M., Rikers, R. M. J. P., & Schmidt, H. G. (2008). Relationships between students' conceptions of constructivist learning and their regulation and processing strategies. *Instructional Science*, *36*, 445–462. doi:10.1007/s11251-008-9065-6

Newman, D., Clure, G., Deyoe, M. M., & Connor, K. (2012). *Using technology in a studio approach to learning: The importance of learner characteristics.* Paper presented at the Annual Meeting of the EdMedia World Conference. Austin, TX.

Newman, D., Clure, G., Deyoe, M. M., & Connor, K. (2013). Using technology in a studio approach to learning: Results of a five year study of an innovative mobile teaching tool. In J. Keengwe (Ed.), Pedagogical applications and social effects of mobile technology integration (114-132). Hershey, PA: IGI Global.

Newman, D., & Gullie, K. (2009). *Using constructivist methods in technology-supported learning: Evidence of student impact.* Paper presented at the Annual Meeting of the American Educational Research Association. San Diego, CA.

Pape, L., Sheehan, T., & Worrell, C. (2012). How to do more with less lessons from online learning. *Learning and Leading with Technology*, *39*, 18–22.

Phillips, R., McNeill, M., Gosper, M., Woo, K., Preston, G., & Green, D. (2007). Staff and student perspectives on web-based lecture technologies: Insights into the great divide. In *Proceedings of the Australasian Society for Computers in Learning in Tertiary Education (ASCILITE) Conference*. Retrieved from http://www.ascilite.org.au/conferences/singapore07/procs/phillips.pdf

Rodd, J., & Newman, D. (2009). *The impact of multi-media on learning specific to user characteristics.* Paper presented at the Annual Conference of the American Evaluation Association. Orlando, FL.

Rycik, J. A. (2012). Building capacity for reform. *Secondary Education News & Views*, *40*, 80–82.

Salomon, G. (2002). Technology and pedagogy: Why don't we see the promised revolution? *Educational Technology*, *42*(2), 71–75.

Simba Information. (2011, November 28). Flipped classroom offers new learning path. *Electronic Education Report*, *18*, 1–3.

Splan, R. K., Shea Porr, C. A., & Broyles, T. W. (2011). Undergraduate research in agriculture: Constructivism and the scholarship of discovery. *Journal of Agricultural Education*, *9*, 56–65. doi:10.5032/jae.2011.04056

Strayer, J. F. (2012). How learning in an inverted classroom influences cooperation, innovation and task orientation. *Learning Environments Research*, *15*, 171–193. doi:10.1007/s10984-012-9108-4

Swan, K. (2011). Technology and information literacy. *Journal of Information Fluency*, *1*(1), 4–9.

Tucker, C. R. (2012). Blended learning in grades 4-12. Thousand Oaks, CA: Corwin.

United States Department of Education. (2010). *Transforming American education: Learning powered by technology.* Retrieved from http://www.ed.gov/sites/default/files/netp2010-execsumm.pdf

Vygotsky, L. S. (1978). *Mind in society: The development of higher psychological processes*. Cambridge, MA: Harvard University Press.

Won Hur, J., & Anderson, A. (2013). iPad integration in an elementary classroom: Lesson ideas, successes, and challenges. In J. Keengwe (Ed.), Pedagogical applications and social effects of mobile technology integration (pp. 42-54). Hershey, PA: IGI Global.

Zimmerman, B. J. (1995). Self-regulation involves more than metacognition: A social cognitive perspective. *Educational Psychologist*, *30*, 217–221. doi:10.1207/s15326985ep3004_8

ADDITIONAL READING

Ash, K. (2012). Educators view ‘flipped’ model with a more critical eye. *Education Week*, *32*, S6–S7.

Beaudoin, C. R., & Johnston, P. (2011). The impact of purposeful movement in algebra instruction. *Education*, *132*, 82–96.

Bourne, J., Harris, D., & Mayadas, F. (2005). Online engineering education: Learning anywhere, anytime. *Journal of Engineering Education*, *94*(1), 131–146. doi:10.1002/j.2168-9830.2005.tb00834.x

Brecht, D. H., & Ogilby, S. M. (2008). Enabling a comprehensive teaching strategy: Video lectures. *Journal of Information Technology Education Innovations in Practice*, *7*, 71–82.

Brown, J. S. (2006). New learning environments for the 21st century: Exploring the edge. *Change*, 18–24. doi:10.3200/CHNG.38.5.18-24

Brunsell, E., & Horejsi, M. (2013). Flipping your classroom in one take. *Science Teacher (Normal, Ill.)*, *80*(3), 8.

Chu, K. C., & Leung, D. (2003). Flexible learning via web-based virtual teaching and virtual laboratory systems. *The Journal of Technology Studies*, *29*(2), 1–6.

Chumley-Jones, H. S., Dobbie, A., & Alford, C. L. (2002). Web-based learning: Sound educational method or hype? A review of the evaluation literature. *Academic Medicine*, *77*, S86–S93. doi:10.1097/00001888-200210001-00028 PMID:12377715

Connor, K. A. (2012). Goodbye, podium: An engineering course puts theory into practice. *The Chronicle of Higher Education*.

del Alamo, J. A., McLean, B. C., Harison, J., Mishuris, G., Chang, V., & Hui, L. (2002). The MIT microelectronics weblab: A web-enabled remote laboratory for microelectronic device characterization. In *World Congress on Networked Learning in a Global Environment, Berlin (Germany)*.

Flumerfelt, S., & Green, G. (2013). Using lean in the flipped classroom for at risk students. *Journal of Educational Technology & Society*, *16*(1), 356–366.

Foertsch, J., Moses, G., Strikwerda, J., & Litzkow, M. (2002). Reversing the lecture/homework paradigm using eTEACH web-based streaming video software. *Journal of Engineering Education*, *91*(3), 267–274. doi:10.1002/j.2168-9830.2002.tb00703.x

Fransen, J., Weomberger, A., & Kirschner, P. A. (2013). Team effectiveness and team development in CSCL. *Educational Psychologist*, *48*(1), 9–24. doi:10.1080/00461520.2012.747947

Fulton, K. (2012). The flipped classroom: Transforming education at Byron high school. *T.H.E. Journal*, *39*, 18–20.

Goodwin, B., & Miller, K. (2013). Evidence on flipped classrooms is still coming in. *Educational Leadership*, *70*(1), 78–80.

Gosper, M., McNeill, M., Woo, K., Phillips, R., Preston, G., & Green, D. (2007). Web-based lecture recording technologies: Do students learn from them? Retrieved from http://researchrepository.murdoch.edu.au/12208/

Hannafin, R. D., & Savenye, W. C. (1993). Technology in the classroom: The teacher’s new role and resistance to it. *Educational Technology*, *33*(6), 26–31.

Harl, B., Gubeljak, N., Kegl, M., & Predan, J. (2012). Development of courseware modules for engineering mechanics education. *Technical Gazette*, *19*(2), 269–272.

Heiden, J. P. (2012). *The lived experiences of 24/7 connectivity on secondary educators.* (Doctoral dissertation). Retrieved from Dissertations and Theses. (3523379)

Herreid, C. F., & Schiller, N. (2013). Case studies and the flipped classroom. *Journal of College Science Teaching*, *42*(5), 62–66.

Ifamuyiwa, S. A., & Akinsola, M. K. (2008). Improving senior secondary school students' attitude towards mathematics through self and cooperative-instructional strategies. *International Journal of Mathematical Education in Science and Technology*, *39*, 569–585. doi:10.1080/00207390801986874

Koretsky, M., Kelly, C., & Gummer, E. (2011). Student perceptions of learning in the laboratory: Comparison of industrially situated virtual laboratories to capstone physical laboratories. *Journal of Engineering Education*, *100*(3), 549–573. doi:10.1002/j.2168-9830.2011.tb00026.x

McDaniel, S., & Caverly, D. C. (2010). Techtalk: The community of inquiry model for an inverted developmental math classroom. *Journal of Developmental Education*, *34*(2), 40–41.

McNeill, M., Woo, K., Gosper, M., Phillips, R., Preston, G., & Green, D. (2007, 8-11 July). Using web-based lecture technologies - advice from students. Paper presented at the *In Enhancing Higher Education, Theory and Scholarship, Proceedings of the 30th HERDSA Annual Conference*, Adelaide. Retrieved September 23, 2012, from http://www.cpd.mq.edu.au/teaching/wblt/dissemination.htm

Nielsen, L. (2012). Five reasons I'm not flipping over the flipped classroom. *Technology & Learning*, *32*, 46.

Otting, H., Zwaal, W., Tempelaar, D., & Gijselaers, W. (2010). The structural relationship between students' epistemological beliefs and conceptions of teaching and learning. *Studies in Higher Education*, *35*, 741–760. doi:10.1080/03075070903383203

Sams, A., & Bergmann, J. (2013). Flip your students' learning. *Educational Leadership*, *70*(6), 16–20.

Shin, D., Yoon, E. S., Lee, K. Y., & Lee, E. S. (2002). A web-based, interactive virtual laboratory system for unit operations and process systems engineering education: Issues, design and implementation. *Computers & Chemical Engineering*, *26*, 319–330. doi:10.1016/S0098-1354(01)00749-9

Stefanovic, M., Matijevic, M., Cvijetkovic, V., & Simic, V. (2010). Web-based laboratory for engineering education. Web-based laboratory for engineering education. *Computer Applications in Engineering Education*, *18*, 526–536. doi:10.1002/cae.20222

Strayer, J. F. (2007). *The effects of the classroom flip on the learning environment: A comparison of learning activity in a traditional classroom and a flip classroom that used an intelligent tutoring system.* (Unpublished doctoral dissertation). Ohio State University, Ohio.

Tudge, J. R. H., & Hogan, D. M. (1999). Implications of Vygotsky's Theory for Peer Learning. In A. M. O'Donnell & A. King (Eds.), *Cognitive Perspecitves on Peer Learning* (pp. 39–65). Mahwah, NJ: Lawrence Erlbaum Associates.

Ullman, E. (2013). Tips to help you flip your classroom. *Educator's Update*, *55*(2), 1–5.

Winters, F. I., & Alexander, P. (2011). Peer collaboration: The relation of regulatory behaviors to learning with hypermedia. *Instructional Science*, *39*, 407–427. doi:10.1007/s11251-010-9134-5

KEY TERMS AND DEFINITIONS

Active Experimentation: Application of concepts in real world contexts.

Asynchronous Communication: One-sided communication where one party sends a message to another; electronically this can include discussion boards, e-mail, streaming video or podcasts, etc.

Constructionism: The idea that effective learning occurs when students actively build concrete artifacts that applies to the content; stems from experiential learning.

Constructivist Learning: Learning theory that refers to the idea that students construct knowledge through their own experiences.

Flipped Classroom: Classroom that uses in-class time for concept application or "homework" and time outside of class to learn the concepts through electronic lectures, PowerPoint slides, podcasts, etc.

Self-Directed Learning: When individual learners are motivated to take on decisions related to their own learning.

Student-Centered Learning: A form of learning where students are responsible for their learning; the instructor is a facilitator.

Synchronous Communication: Interaction between parties that occurs in the present time.

ENDNOTES

1 NSF Engineering Research Centers Program, Grant #0120642, 0607081

This work was previously published in Promoting Active Learning through the Flipped Classroom Model edited by Jared Keengwe, Grace Onchwari, and James N. Oigara, pages 113-131, copyright year 2014 by Information Science Reference (an imprint of IGI Global).

Chapter 3
Blended Learning to Support Alternative Teacher Certification

Anika Ball Anthony
The Ohio State University, USA

Belinda G. Gimbert
The Ohio State University, USA

Rebecca A. Parker
The Ohio State University, USA

ABSTRACT

This chapter reviews literature on the use of e-learning to complement and extend preservice and inservice teacher education. It also provides an in depth example of the design and implementation of blended learning for supporting alternative teacher certification. In light of the example, research findings are summarized. The second part of the chapter provides a discussion on the following strategies that led to the successful use of blended learning in alternative teacher certification and explains how applying them can contribute to effective uses of blended learning in other settings: a) leveraging a network of partners, b) designing blended learning to address needs of multiple learners and organizational entities, c) balancing standardization and customization, and d) conducting evaluation and engaging in continuous improvement.

INTRODUCTION

The educational system has been described as disjointed and consisting of loosely coupled systems that have little impact and relation to one another (Meyer & Rowan, 1977; Weick, 1976). However, in recent years, online environments and embedded technologies have served as resources for aligning individuals who work in various capacities across educational systems. Capitalizing on affordances of emerging technologies, individuals and groups can convene in shared spaces for collective work to support student learning (Greenhow, Robelia, & Hughes, 2009), facilitate data-driven decision-making (Kowalski, Lasley, & Mahoney, 2007), enable knowledge-building communities (Scardamalia & Bereiter, 1991), and support teacher learning (Zhang, 2009). Such online learning

DOI: 10.4018/978-1-4666-8246-7.ch003

environments are opportunities for tightening linkages across systems. This work is beginning to take place in preservice and inservice teacher education, where research suggests that e-learning can be effectively employed to meet a variety of learning and practical needs (Fishman, Marx, Best, & Tal, 2003; Whitehouse, Breit, McCloskey, Ketelhut, & Dede, 2006).

Blended learning that combines face-to-face instruction and e-learning is increasingly being used in teacher education for training, induction, and professional development (Barab, MaKinster, & Scheckler, 2004; Dukes & Jones, 2007; Whitehouse, et al., 2006). Blended learning can be implemented in a variety of ways, such as e-learning being supplemental to traditional face-to-face instruction, e-learning replacing face-to-face activities, or as traditional and online offerings that are available to learners on demand (Stacey & Gerbic, 2009).

The objective of this chapter is to explain how blended learning has been used to support alternative teacher certification, which is an emerging aspect of teacher preparation. The chapter summarizes how blended learning was employed in this effort and relays results of research studies. The chapter also describes strategies that enabled the successful design, development, implementation, and continuous improvement of blended learning in this capacity. It also highlights potential directions for future research.

BACKGROUND

Alternative Teacher Certification

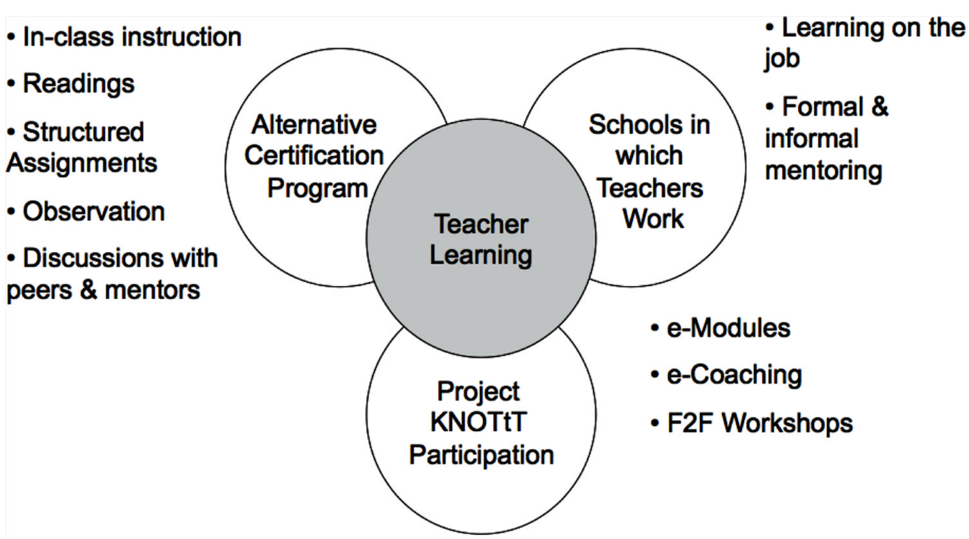
Alternative certification is one aspect of teacher preparation where blended learning can be used to support new teachers due to a shortened teacher preparation time and concerns that have been raised about teacher mentoring programs. Over the past 25 years approximately half a million teachers have been credentialed through alternative or "nontraditional" state-approved programs across the 50 U.S. states and the District of Columbia. The expansion of alternative teacher preparation that began in the late 1980s in New Jersey, California, and Texas has continued into the 21st century. Currently, about 600 program providers annually certify about 62,000 teachers through state-defined alternative routes to teacher certification (Feistritzer, 2009). School districts, educational service agencies, universities, four-year colleges, two-year community colleges, for-profit and nonprofit organizations, and partnerships of these entities deliver these programs. Also included are national programs like Troops to Teachers, which serves military personnel moving into teaching positions, and Teach for America, which focuses on new college graduates who did not major in education (Boyd et al., 2008; Darling-Hammond, Holtzman, Gatlin, & Heilig, 2005; Feistritzer & Haar, 2008; Haberman, 2006; Rosenberg & Sindelar, 2005). Combined, these alternative programs are designed to prepare teachers who have the knowledge, dispositions, and self-efficacy to effectively teach students while addressing staffing needs (Chin & Young, 2007; Clewell & Vilegas, 1999; Feistritzer, 2009; Gimbert, Cristol, & Sene, 2007; Guarnio, Santibanez, & Daley, 2006).

Mentoring is a form of professional development that is often provided to beginning teachers to help address knowledge needs, influence teachers' perspectives (U.S. Department of Education, 2002), and support teacher retention (Chin & Young, 2007; Feiman-Nemser, 1996; Smith & Ingersoll, 2004). Despite the potential for job-embedded mentoring, research suggests that teachers who enter the profession through alternative routes often report feeling isolated, overwhelmed, and unprepared for the realities of teaching (Carter & Keiler, 2009; Darling-Hammond, Chung, & Frelow, 2002; Gratch, 1998; Isaacs et al., 2007). In particular, teachers have reported a need for additional help with classroom management and motivating students, making effective use of limited instructional planning time, differentiating instruction, and learning to work with minority student populations (Bradbury & Koballa, 2007; Chesley, Wood, & Zepeda, 1997; King & Bey, 1995; Utsumi & Kizu, 2006). E-learning can potentially supplement alternative certification and school district mentoring programs by providing teachers access to organizational outsiders who can help them develop knowledge, skills and self-efficacy.

Project KNOTtT

Project KNOTtT is a multi-state initiative for building capacity among universities, school districts, state departments of education, and non-profit organizations to support the preparation of alternatively certified teachers in Kansas, Nevada, Ohio and Texas. Project KNOTtT was funded in 2007 by a five-year Transition to Teaching grant through the U.S. Department of Education's Office of Innovation and Improvement. The project was designed to supplement preservice training and district support that teachers trained through alternative routes receive. KNOTtT partners work independently and collectively to recruit, prepare, support, and retain teachers of record in high need, hard-to-staff school districts. Project KNOTtT aims to support the ongoing work of alternative certification programs, as well as teachers who enter the teaching profession through alternative routes. Drawing on the communities of practice (CoP) framework (Wenger, 1998), KNOTtT can be described as a CoP that is informed by and that intersects with other communities. Teachers who participate in Project KNOTtT have opportunities to learn across a number of contexts: (1) the alternative certification programs in which they enroll, (2) the schools in which they teach, and (3) participation in Project KNOTtT (Figure 1). Through enrollment in an alternative certification program, teachers receive in-class instruction, are assigned readings about teaching and learning, are directed to complete structured assignments, are granted opportunities to observe instruction, and interact with and learn from fellow interns and program mentors. Upon successful completion of an alternative certification program, teachers continue learning on the job through professional learning experiences, reflection, and formal and informal mentoring.

Figure 1. Contexts of teacher learning in relation to project KNOTtT participation



Project KNOTtT Blended Learning Environment

One of several mechanisms Project KNOTtT uses to support local partners' teacher preparation efforts is the KNOTtT blended learning environment, which combines elements of traditional face-to-face instruction and online instruction across a variety of contexts. These contexts include face-to-face training sessions conducted during on-site visits, face-to-face national meetings that provide a venue for KNOTtT partners to collaboratively plan and improve program quality, and the KNOTtT website. The KNOTtT website is an online learning community that provides a space for teacher candidate learning and collaboration among KNOTtT partners. Through program participation in Project KNOTtT, alternatively certified teachers receive instruction in the areas of mathematics, science, social studies, English/language arts, foreign language, English as a second language, and special education. The intended learning outcomes are for teachers to acquire the knowledge and skills to pass their state's teacher certification exams, to increase teacher self-efficacy to teach in complex school settings, and to contribute to the capacity of alternative certification programs to prepare teachers to teach in high need hard-to-staff schools. Blended learning is distributed across the following components:

- **Face-to-Face Workshops:** Face-to-face workshops on content-specific instruction or general teaching strategies are conducted during on-site visits with partnering alternative certification programs one to three times per year.
- **E-Modules:** The Project KNOTtT website hosts e-Modules, which provide teachers programmed instruction on content and skills that will be covered on their state certification exams.
- **E-Coaching:** Teachers also visit the website to attend online synchronous e-Coaching sessions that are offered two to three times a month. E-coaching is coaching that is conducted using telecommunication technologies and devices such as telephones, chat rooms, instant messaging, and Bluetooth earpieces (Costello-Dougherty, 2008; Rock et al., 2009; Rossett & Marino, 2005). Benefits of e-Coaching include the ability for one coach to support multiple individuals while also addressing practical constraints related to location, scheduling, and costs. During Project KNOTtT's e-Coaching sessions, coaches introduce a topic and model teaching within the content area. Coaches pose questions for the participating teachers to attempt to solve on their own. Coaches also use the poll feature of the video-conferencing environment to assess teachers' understanding and provide real-time feedback. Teachers who are not able to attend a group e-Coaching session or who desire to review material covered during the session can visit the Project KNOTtT website to view archived sessions.

Project KNOTtT Blended Learning Research

Project KNOTtT evaluation and research studies suggest that the blended learning environment effectively supported teacher learning and helped build alternative certification program capacity. In response to a 2010 annual survey, 86% of teachers reported that e-Coaching was moderately to very moderately responsive to their needs as new teachers, and 88% reported that the e-Coaches were moderately to very helpful. Previous research suggests that a blended learning environment can be just as effective as a traditional training program in preparing teachers to pass state licensure exams

(Gimbert, Moore, & Sahin, 2008), that online professional development can have a positive impact on teacher knowledge (O'Dwyer et al., 2010), and that online courses can promote contextual learning opportunities for teachers (Mackey, 2009).

Two studies were conducted to examine the relationship between Project KNOTtT blended learning participation and teachers' gain in self-efficacy over the course of their first year of teaching. Self-efficacy was selected as a focus of inquiry because efficacious teachers believe in their capacity to organize and execute successful teaching tasks, even in highly complex settings. Additionally, teacher self-efficacy has been described as one of the most powerful teacher attributes (Guskey, 1987; Knoblauch & Woolfolk Hoy, 2008), and it has been linked to teacher retention (Glickman & Tamashiro, 1982). A pilot study conducted during the 2009-10 school year revealed that teachers who attended at least six e-Coaching sessions reported a gain in self-efficacy. Furthermore, teachers who appeared to benefit the most from using e-Coaching were those who began the school year with lower levels of self-efficacy than their peers (Anthony, Gimbert, Fultz, & Parker, 2011).

A second study was conducted that combined data from two cohorts of alternatively certified teachers, one that began teaching in autumn 2009 and another that began in 2010 (Anthony, Gimbert, & Fultz, 2013). Teachers were provided access to professional development through Project KNOTtT blended learning, yet had varying levels of attendance in the e-Coaching online component. One group attended six or more sessions, another group attended one to five sessions, and a third group chose not to attend although their alternative certification program required attendance. Again, results showed that teachers who attended six or more e-Coaching sessions began the school year with lower levels of self-efficacy than those who attended five or fewer e-Coaching sessions. Furthermore, teachers who attended six or more e-Coaching sessions reported significant gains in self-efficacy over their first year of teaching, whereas teachers who attended five or fewer sessions did not report significant gains. Open-ended survey responses revealed that teachers who attended a greater number of e-Coaching sessions provided more positive comments about how the online component supported their efforts to grow professionally. They described the participation as complementary to their other professional learning experiences such as their alternative certification program training and support they received from a teacher mentor. However, teachers who attended few sessions described the online component as a good way to "brush up" on the content and to prepare for the exam. Teachers also voiced concern about the time commitment required to participate. They reported that they were already overwhelmed with demands of working as a beginning teacher and that the online portion was an extra burden. Some teachers even reported that they preferred the e-Modules to e-Coaching because they could quickly go online with minimal disruption to their schedules and avoid interaction with others.

Combined, study findings suggest that simply requiring teachers to attend e-Coaching did not translate to teachers' equal e-Coaching use or similar self-efficacy outcomes. Although teachers who did not pass their certification exam were required by their alternative certification program to attend e-Coaching, not all teachers complied with this requirement. Thus, teachers had varying levels of e-Coaching attendance. Teachers who participated in e-Coaching the most began the school year with lower levels of self-efficacy than teachers who attended zero to five sessions. Findings suggest that programmatic efforts to use blended learning to support teachers should be accompanied with policies and incentives that encourage use, along with scheduling adjustments that reserve time for teachers' frequent and meaningful use of the online component of blended learning.

BLENDED LEARNING IN TEACHER EDUCATION

Challenge

Despite some evidence that e-learning can complement face-to-face instruction to support teacher learning, ever-expanding options for the technologies that can be integrated into teacher education, along with an increase in options of blended learning models, present a challenge for decision makers. Given the many forms blended learning can take, it is difficult to determine whether an instance of blended learning that was effective in one setting will also be effective in another. Thus, research is needed that not only demonstrates effectiveness, but studies that also provide insights into design and implementation considerations.

Given the challenge of designing blended learning experiences for increasingly diverse structures of teacher education, while at the same time tools and models for blended learning continue to expand, those charged with making decisions about blended learning may find themselves in a position where the research cycle has not kept pace with such rapid growth. Because program planners may not always be able to draw on research to inform their decisions, they must draw on conceptual understandings of design and institutional support for program implementation. The sections that follow describe success strategies that led to the effective use of blended learning in the context of Project KNOTtT. Such strategies can be applied to the use of blended learning in other teacher education settings.

Success Strategies

Network of Partners: The work of designing, developing, implementing, evaluating, and continuously improving blended learning was not left to the responsibility of an instructor attempting to manage all of this on his or her own. Instead, this work was planned and conducted by a network of institutions that were a part of Project KNOTtT and that together supported the successful use of blended learning for beginning teachers.

Members of the core Project KNOTtT team at The Ohio State University included the project director, senior project manager, IT specialists, researchers, and project staff. The core project team worked with an instructional design firm and hired subject matter experts to help design the e-Modules. E-Coaches also planned and conducted e-Coaching sessions. The core team trained program partners and teachers on using the KNOTtT learning management system and worked with researchers to evaluate the use and effectiveness of blended learning to support teachers.

Alternative certification program coordinators gave input on teacher candidates' particular needs, which contributed to the initial design of e-Modules, e-Coaching, and occasional face-to-face sessions planned and led by the KNOTtT core project team. Program sites were well positioned to monitor teachers' e-Coaching attendance, and depending on state requirements and timing of teachers' certification exams, to encourage teachers still needing to pass exams to participate in e-Coaching.

Each partner site contributed unique knowledge and expertise to the development of the Project KNOTtT website, which supported all partners. In the absence of working with partners, the core Project KNOTtT team may have succeeded in designing the online components of blended learning; however, the partners were integral to ensuring buy-in at the local level and integrating the online components with face-to-face aspects of their teacher training and mentoring programs.

The project manager from the Project KNOTtT core team convened monthly meetings with alternative certification program coordinators and e-Coaches to debrief on how upcoming sessions could be tailored to meet the specific needs of teachers at local sites. During e-Coaching sessions with teachers, the KNOTtT project manager or an alternative certification program coordinator assisted the e-Coach during coaching sessions, helping to monitor teachers' questions and ensure that the session ran smoothly. Additionally, a series of annual meetings were held with members of the KNOTtT core team and program partners to ensure communication and evaluation.

Instructional Design for Multiple Learners and Entities: A rigorous instructional design process informed Project KNOTtT's attempt at blended learning. Blended learning was designed to support teachers as learners to increase their content knowledge and their sense of self-efficacy as well as to support alternative certification programs. The coordinated efforts of the Project KNOTtT core team and partners enabled the design of the blended learning environment to extend beyond e-learning technologies to also attend to the broader social structures of the various partners.

The learning environment was designed to meet the needs of multiple groups of teacher learners: (a) future teacher interns who must pass state licensure exams in order to enroll in alternative certification, (b) teacher interns who successfully completed alternative certification program training, yet still needed to pass state certification exams, and (c) novice inservice teachers who earned certification and could benefit from additional opportunities to learn pedagogical content knowledge and classroom management strategies.

One way the KNOTtT core team managed the scope of the project was to work with designers to incrementally scale up the online components. This allowed time for corrections and opportunities to learn lessons as more teachers accessed the project website over time. During Year 1, a core team of e-Coaches with content expertise in mathematics was assembled to work with instructional designers to pilot the design and implementation of the e-Modules and e-Coaching. Additionally, IT designers and systems administrators developed a website and learning management system that could be accessed by alternative certification candidates and partner sites. During Year 2, the e-Modules and e-Coaching were elaborated to provide online content in special education and principles of learning and teaching. Additionally, e-Coaches received training on the use of the video conferencing system and the KNOTtT website capabilities. In Year 3, the e-Modules and e-Coaching design teams added training resources in physics, chemistry, biology, Earth and space science, and middle school mathematics.

Furthermore, the e-Coaching sessions were expanded, with as many as three sessions in different areas offered per week. During this time, project leaders and partners paid close attention to identifying and addressing barriers to use of the online sessions. In Year 4, bilingual and Spanish e-Modules and e-Coaching were added, as were resources for pedagogical training and English/language arts. Throughout the staged approach, designs of e-Modules and e-Coaching were informed by content standards, content covered on teacher certification exams, e-Coaches' experiences as teachers and trainers, as well as conversations held between the design team and leaders at local program sites.

Balance between Standardization and Customization: The Project KNOTtT blended learning environment balanced the delivery of content that could be standardized across settings, as well as opportunities to customize learning unique to needs at each partner site. Although the structure of alternative teacher certification varied greatly across the states of Kansas, Nevada, Ohio and Texas, in three of the states, teachers were required to pass the Praxis exams for certification. And, in the state of Texas, teachers were expected to pass the TExES exams. Thus, the e-Module design team was able to standardize the content and delivery of the modules to align with the two exams. Once granted access to the website, teachers from nearly any U.S. state could access KNOTtT to review content-specific resources to prepare for certification exams.

Due to differences across state requirements and program policies, it was important that each program be allowed to customize teachers' blended learning experiences. One way of facilitating this was through face-to-face teacher preparation experiences developed by local alternative certification programs. Additionally, members of the KNOTtT core team worked with partner sites to design specific face-to-face offerings to complement alterative program courses. Customization was also supported through the use of e-Coaching. Each e-Coaching session was planned through input provided by alternative certification program staff. Several times a year, Project KNOTtT development team members met with program directors and coordinators to discuss how KNOTtT resources could further support programs and beginning teachers. The KNOTtT project manager also convened a monthly meeting with e-Coaches and alternative certification program coordinators in order to obtain information about practice challenges teachers faced so that each e-Coaching session could be tailored to address relevant teaching challenges.

Project KNOTtT e-Coaching was not designed to enable coaches to use videoconferencing or video recordings to observe participating teachers as they worked in their classrooms. Thus, coaches relied heavily on input from alternative certification program coordinators and participating teachers, their own knowledge of content covered on the certification exams, as well as their own prior experiences as teachers to determine how best to support teacher learning. E-Coaches continually asked teachers to provide information about areas in which they struggled and where they felt they could use extra support. Coaches then built on the feedback to prepare for upcoming e-Coaching sessions.

Teachers' experiences with Project KNOTtT blended learning were further customized by local alternative certification program policies and strategies for providing space and time for teachers to make use of the online components. For example, some program sites chose to weave KNOTtT as an integral part of their program by scheduling group sessions for teachers to sit together in a meeting room to attend e-Coaching. Other strategies program sites used for integration included allowing e-Coaching participation to count toward teachers' additional professional development hours, requiring teachers who had not yet completed their certification exam to attend e-Coaching sessions, increasing awareness about KNOTtT among teachers not required to attend sessions, and withholding tuition reimbursements until teachers successfully passed certification exams. One alternative certification program also assigned candidates in their program homework that required them to log in and make use of the online resources provided by Project KNOTtT.

Evaluation and Continuous Improvement: The fourth and final strategy that led to the successful use of blended learning for alternative teacher certification was evaluation and continuous improvement conducted throughout the life of the project. Evaluation efforts were formal and informal. Formal evaluation efforts consisted of examining the extent to which teachers utilized the online offerings and how they were integrated into teachers' face-to-face learning experiences. Evaluation also investigated teachers' impressions of the value of KNOTtT participation and examined teachers' sense of self-efficacy as an outcome measure. Research findings stressed the importance of programs working to ensure that teachers make use of online learning resources that can complement and extend face-to-face instruction to support their learning.

Informal evaluation also occurred over the life of the project through frequent dialogue between members of the KNOTtT core team and partner sites. During monthly e-Coaching meetings, such conversations led to incremental improvements in e-Coaching delivery. During annual planning meetings, ideas were shared on how subsequent blended learning efforts could be improved through design and implementation changes. The informal evaluation efforts led to the realization by members of the KNOTtT core team that because e-learning lacks non-verbal communication cues, the online environment calls for skills such as moving at a slower pace, monitoring wait time for responses, and succinctly presenting information. The core project team also found that conducting face-to-face sessions with each partner site was critical in establishing relationships and designing resources to meet the needs of various program partners. One of the positive aspects of planning meetings and providing teacher resources online was the increased ability to reach and manage a large group of 100 or more individuals. Through the use of video conferencing polling features, meeting facilitators and e-Coaches could quickly see whether the majority of participants grasped a concept. Additionally, as described in a previous section, program partners drew on insights gathered through informal evaluation to consider how to make more intentional efforts to integrate the KNOTtT face-to-face and online teacher training resources into local programs.

As a result of evaluation efforts, project partners identified several untapped opportunities for further blending online and face-to-face teacher preparation activities. Suggestions included placing a greater emphasis on using e-Coaching for pedagogy, which may encourage teachers to continue using the service after passing certification exams. In addition, partners recommended that e-Coaching sessions focus on helping teachers build collegial relationships within and across school buildings. Partners also suggested closer coordination with candidates' assigned mentor teachers and involving principals. A final suggestion was to establish consistent branding between local districts and Project KNOTtT in an effort to change teachers' impression that Project KNOTtT is an extra requirement, as opposed to a resource for their continued professional growth.

FUTURE RESEARCH DIRECTIONS

The research studies summarized in this chapter established a link between the amount of teachers' participation in the e-learning component of blended learning and teacher self-efficacy. Teachers who began the school year with lower-levels of self-efficacy were more likely to use the online components. Additionally, this same group of teachers reported a gain in self-efficacy by the end of their first year of teaching. Future research can examine whether blended learning participation can support gains in self-efficacy for all novice teachers, or whether it is only effective for those who begin the school year with lower levels of self-efficacy.

Although there is a growing body of research that documents the extent to which blended learning can effectively be used to support teaching and learning in a variety of contexts, given the ever-expanding possibilities for integrating technology, more research is needed that documents decision making associated with blended learning variations. For example, how are decisions made about how to balance e-learning or face-to-face aspects of blended learning in education?

While much research may focus on the interaction between student learners and blended learning components, more research is beginning to focus on implementation issues and the institutional support necessary for supporting blended learning. This chapter, however, shared details on an effort to use blended learning across a network of partners to support alternative teacher certification and induction. Future research can examine how blended learning is being used to support the learning of school leaders.

CONCLUSION

This chapter summarized some of the ways e-learning can be used to complement and extend teacher education. Through relaying an example of blended learning in alternative teacher education, authors explained how leveraging insights from Project KNOTtT's partners supported design and implementation. Partners provided insights into the needs of teachers as learners, as well as the needs of teacher preparation programs. Together, members of the core project team and partners engaged in evaluation and continuous improvement to refine blended learning and to consider ways to further support teacher learning. As technologies continue to evolve, along with goals and structures for teaching and learning, partnerships can be valuable resources for program improvement. Effective use of blended learning required not only changes to the computer technologies employed, but also changes in partner sites' structures and processes. This work emphasizes that blended learning can present many design challenges and opportunities. Thus, the mere presence of blended learning is not a panacea for education (Njenga & Fourie, 2010). Instead, programs that intend to benefit from blended learning should provide organizational support to learners to ensure participation and lead to positive outcomes (Park & Choi, 2009; Southern Regional Education Board, 2006).

ACKNOWLEDGMENT

This publication is supported by the Transition To Teaching federal grant funded through the No Child Left Behind Act of 2001. The opinions expressed herein do not necessarily reflect the position of the U.S. Department of Education, and no official endorsement by the U.S Department of Education should be inferred.

REFERENCES

Anthony, A. B., Gimbert, B. G., & Fultz, D. M. (2013). Blended learning for alternatively certified teachers: Relationship between e-coaching participation and self-efficacy. *Journal of Technology and Teacher Education*, *21*(3), 277–299.

Anthony, A. B., Gimbert, B. G., Fultz, D. M., & Parker, R. A. (2011). Examining the relationship between e-coaching and the self-efficacy of novice teachers seeking certification through alternative routes. *Journal of the National Association for Alternative Certification*, *6*(1), 46–64.

Barab, S. A. MaKinster, J. G., & Scheckler, R. (2004). Designing system dualities: Characterizing an online professional development community. In S. A. Barab, R. Kling, & J. Gray (Eds.), Designing for virtual communities in the service of learning (pp. 53-90). New York: Cambridge University Press.

Boyd, D., Grossman, P., Hammerness, K., Lankford, H., Loeb, S., McDonald, M., & Wyckoff, J. (2008). Surveying the landscape of teacher education in New York City: Constrained variation and the challenge of innovation. *Educational Evaluation and Policy Analysis*, *30*(4), 319–343. doi:10.3102/0162373708322737

Bradbury, L. U., & Koballa, T. R. Jr. (2007). Borders to cross: Identifying sources of tension in mentor-intern relationships. *Teaching and Teacher Education*, *24*(8), 2132–2145. doi:10.1016/j.tate.2008.03.002

Carter, J. H., & Keiler, L. S. (2009). Alternatively certified teachers in urban small schools: Where policy reform meets the road. *The Urban Review*, *41*(5), 437–460. doi:10.1007/s11256-008-0117-7

Chesley, L. S., Wood, F. H., & Zepeda, S. J. (1997). Meeting the needs of alternatively certified teachers. *Journal of Staff Development*, *18*(1), 28–32.

Chin, E., & Young, J. W. (2007). A person-oriented approach to characterizing beginning teachers in alternative certification programs. *Educational Researcher*, *36*(2), 74–83. doi:10.3102/0013189X07299192

Clewell, B. C., & Vilegas, A. M. (1999). Creating a nontraditional pipeline for urban teachers: The pathways to teaching careers models. *The Journal of Negro Education*, *68*(3), 306–317. doi:10.2307/2668103

Costello-Dougherty, M. (2008, August/September). A match made in cyberspace: The next generation of teachers will seek virtual support. *Edutopia*.

Darling-Hammond, L., Chung, R., & Frelow, F. (2002). Variation in teacher preparation: How well do different pathways prepare teachers to teach? *Journal of Teacher Education*, *53*(4), 286–302. doi:10.1177/0022487102053004002

Darling-Hammond, L., Holtzman, D. J., Gatlin, S. J., & Heilig, J. V. (2005). Does teacher preparation matter? Evidence about teacher certification, Teach for America, and teacher effectiveness. *Education Policy Analysis Archives*, *13*(42), 1–50.

Dukes, L., & Jones, B. (2007). Mentoring alternative certification teachers: Implementing an online collaborative consultation community. *Journal of the National Association for Alternative Certification*, *2*(2), 23–33.

Feiman-Nemser, S. (1996). Teacher mentoring: A critical review. Washington, DC: ERIC Clearinghouse on Teaching and Teacher Education. (ERIC Document Reproduction Service, No. ED 397060).

Feistritzer, C. E. (2009). Teaching while learning: Alternative routes fill the gap. *EDGE*, *5*(2), 1–15.

Feistritzer, C. E., & Haar, C. K. (2008). *Alternate routes to teaching*. Upper Saddle River, NJ: Prentice Hall.

Fishman, B., Marx, R., Best, S., & Tal, R. (2003). Linking teacher and student learning to improve professional development in systemic reform. *Teaching and Teacher Education*, *19*(6), 643–658. doi:10.1016/S0742-051X(03)00059-3

Gimbert, B. G., Cristol, D., & Sene, A. M. (2007). The impact of teacher preparation on student achievement in algebra in a 'hard-to-staff' urban preK-12-university partnership. *School Effectiveness and School Improvement: An International Journal of Research. Policy & Practice*, *18*(3), 245–272.

Gimbert, B. G., Moore, M. H., & Sahin, F. (2008). *A comparison of nontraditionally and traditionally prepared teachers' performance on a pedagogical content knowledge test in Ohio: The impact of a blended preparation process.* Paper presented at the Annual Meeting of the American Educational Research Association. New York, NY.

Glickman, C., & Tamashiro, R. (1982). A comparison of first-year, fifth-year, and former teachers on efficacy, ego development, and problem solving. *Psychology in the Schools*, *19*(4), 558–562. doi:10.1002/1520-6807(198210)19:4<558::AID-PITS2310190426>3.0.CO;2-F

Gratch, A. (1998). Beginning teacher and mentor relationships. *Journal of Teacher Education*, *49*(3), 220–227. doi:10.1177/0022487198049003008

Greenhow, C., Robelia, B., & Hughes, J. E. (2009). Learning, teaching, and scholarship in a digital age: Web 2.0 and classroom research: What path should we take now? *Educational Researcher*, *38*(4), 246–259. doi:10.3102/0013189X09336671

Guarnio, C. M., Santibanez, L., & Daley, G. A. (2006). Teacher recruitment and retention: A review of the recent empirical literature. *Review of Educational Research*, *76*(2), 173–208. doi:10.3102/00346543076002173

Guskey, T. (1987). Contextual variables that affect measures of teacher efficacy. *The Journal of Educational Research*, *81*(1), 41–47.

Haberman, M. (2006). What makes a program alternative certification? An operational definition. *Journal of the National Association for Alternative Certification*, *1*(1), 5–11.

Isaacs, M., Elliot, E., McConney, A., Wachholz, P., Greene, P., & Greene, M. (2007). Evaluating quality methods of filling the teaching gap: Results of a pilot study with early career teachers. *Journal of the National Association for Alternative Certification*, *2*(2), 5–22.

King, S. H., & Bey, T. M. (1995). The need for urban teacher mentors: Conceptions and realities. *Education and Urban Society*, *28*(1), 3–10. doi:10.1177/0013124595028001001

Knoblauch, D., & Woolfolk Hoy, A. (2008). Maybe I can teach those kids. The influence of contextual factors on student teachers' efficacy beliefs. *Teaching and Teacher Education*, *24*(1), 166–179. doi:10.1016/j.tate.2007.05.005

Kowalski, T., Lasley, T., & Mahoney, J. (2007). *Data driven decisions and school leadership*. Harlow, UK: Allyn & Bacon.

Mackey, J. (2009). Virtual learning and real communities: Online professional development for teachers. In E. Stacey & P. Gerbic (Eds.), *Effective blended learning practices: Evidence-based perspectives in ICT-facilitated education* (pp. 163–181). Hershy, PA: IGI Global. doi:10.4018/978-1-60566-296-1.ch009

Meyer, J. W., & Rowan, B. (1977). Institutionalized organizations: Formal structure as myth and ceremony. *American Journal of Sociology*, *83*(2), 340–363. doi:10.1086/226550

Njenga, J. K., & Fourie, L. C. H. (2010). The myths about e-learning in higher education. *British Journal of Educational Technology*, *41*(2), 199–212. doi:10.1111/j.1467-8535.2008.00910.x

O'Dwyer, L. M., Masters, J., Dash, S., De Kramer, R. M., Humez, A., & Russell, M. (2010). *E-learning for educators: Effects of on-line professional development on teachers and their students*. Chestnut Hill, MA: Technology and Assessment Study Collaborative.

Park, J.-H., & Choi, H. J. (2009). Factors influencing adult learners' decision to drop out or persist in online learning. *Journal of Educational Technology & Society*, *12*(4), 207–217.

Rock, M. L., Gregg, M., Howard, P. W., Ploessl, D. M., Maughn, S., Gable, R. A., & Zigmond, N. P. (2009). See me, hear me, coach me. *JSD*, *30*, 24–31.

Rosenberg, M. S., & Sindelar, P. T. (2005). The proliferation of alternative routes to certification in special education: A critical review of the literature. *The Journal of Special Education*, *39*(2), 117–127. doi:10.1177/00224669050390020201

Rossett, A., & Marino, G. (2005, November). If coaching is good, then e-coaching is. *T+D,* 46-49.

Scardamalia, M., & Bereiter, C. (1991). Higher levels of agency for children in knowledge-building: A challenge for the design of new knowledge media. *Journal of the Learning Sciences*, *1*(1), 37–68. doi:10.1207/s15327809jls0101_3

Smith, T. M., & Ingersoll, R. (2004). What are the effects of induction and mentoring on beginning teacher turnover? *American Educational Research Journal*, *41*(3), 681–741. doi:10.3102/00028312041003681

Southern Regional Education Board. (2006). *Standards for quality online courses*. Retrieved from http://publications.sreb.org/2006/06T05_Standards_quality_online_courses.pdf

Stacey, E., & Gerbic, P. (2009). Introduction to blended learning practices. In E. Stacey & P. Gerbic (Eds.), *Effective blended learning practices: Evidence-based perspectives in ICT-facilitated education* (pp. 1–20). Hershy, PA: IGI Global. doi:10.4018/978-1-60566-296-1.ch001

U.S. Department of Education. (2002). The condition of education 2002, table 33-34. Washington, DC: National Center for Education Statistics.

Utsumi, L., & Kizu, J. (2006). Mentoring alternative certification teachers: Perceptions from the field. *Journal of the National Association for Alternative Certification*, *1*(1), 48–67.

Weick, K. E. (1976). Educational organizations as loosely coupled systems. *Administrative Science Quarterly*, *21*(1), 1–19. doi:10.2307/2391875

Wenger, E. (1998). *Communities of practice: Learning, meaning, and identity*. Cambridge, MA: Cambridge University Press. doi:10.1017/CBO9780511803932

Whitehouse, P. L., Breit, L. A., McCloskey, E. M., Ketelhut, D. J., & Dede, C. (2006). An overview of current findings from empirical research on online teacher professional development. In C. Dede (Ed.), *Online professional development for teachers* (pp. 13–30). Cambridge, MA: Harvard Education Press.

Zhang, J. (2009). Towards a creative social web for learners and teachers. *Educational Researcher*, *38*(4), 274–279. doi:10.3102/0013189X09336674

ADDITIONAL READING

Barnard, L., Lan, W. Y., To, Y. M., Paton, V. O., & Lai, S.-L. (2009). Measuring self-regulation in online and blended learning environments. *The Internet and Higher Education*, *12*(1), 1–6. doi:10.1016/j.iheduc.2008.10.005

Bonk, C. J., & Graham, C. R. (Eds.). (2006). The handbook of blended learning: Global perspectives, local designs. San Francisco: Pfeiffer.

López-Pérez, M. V., Pérez-López, M. C., & Rodríguez-Ariza, L. (2011). Blended learning in higher education: Students' perceptions and their relation to outcomes. *Computers & Education*, *56*(3), 818–826. doi:10.1016/j.compedu.2010.10.023

Webster-Wright, A. (2009). Reframing professional development through understanding authentic professional learning. *Review of Educational Research*, *79*(2), 702–739. doi:10.3102/0034654308330970

West, R. E. (2009). What is shared? A framework for understanding shared innovation within communities. *Educational Technology Research and Development*, *57*(3), 315–332. doi:10.1007/s11423-008-9107-4

KEY TERMS AND DEFINITIONS

Alternative Teacher Certification: Nontraditional, state-approved route to teacher certification that began in the late 1980s. Providers of such programs may include school districts, education service agencies, universities, four-year colleges, two-year colleges, for-profit and nonprofit organizations, or partnerships of these entities.

Blended Learning: Educational experiences that combine elements of traditional face-to-face instruction with online instruction. In such conditions, e-learning may be used as a supplement to traditional face-to-face instruction, e-learning may replace face-to-face instruction, or learners may be offered a range of online and traditional experiences and instructional resources from which they can select a desired learning path.

Coaching: A common strategy used in corporate settings to help individuals identify and address personal development and professional learning needs. Coaching is similar to mentoring in that an individual seeks assistance from an experienced advisor who can assist with improving professional practice. Mentors are typically senior organizational insiders in job positions similar to mentees, whereas coaches are carefully-selected organizational outsiders who can help an individual meet performance goals while minimizing concerns about privacy and organizational politics.

E-Coaching: Coaching that is conducted using telecommunication technologies and devices such as telephones, chat rooms, instant messaging, and Bluetooth earpieces. Benefits include coach-learner synchronous interaction, the ability for one coach to support multiple individuals while also addressing practical constraints related to location, scheduling, and costs. E-coaching sessions can also be recorded and archived for subsequent viewing.

E-Modules: Units that use a combination of text, graphics, audio, and video to deliver programmed instruction. The content is relayed to the learner in a standardized fashion and may include the use of assessments to check for understanding.

Instructional Design: A systemic process for developing learning experiences intended to address deficiencies in knowledge and skills.

Needs Assessment: A process to identify gaps in learning and to determine whether instructional design can help address learning gaps.

Professional Development: Training to improve employees' practice and job performance. The training model is time efficient, yet often decontextualized from everyday practice and occurs in discrete and finite episodes.

Professional Learning: Ongoing efforts to provide professionals authentic learning experiences that are informed by professionals' own assessments of situations in which they feel they learn best. Learning experiences are situated within a community and are likely to result in practice changes.

This work was previously published in Practical Applications and Experiences in K-20 Blended Learning Environments edited by Lydia Kyei-Blankson and Esther Ntuli, pages 225-237, copyright year 2014 by Information Science Reference (an imprint of IGI Global).

Chapter 4
Blended and Online Learning in Virtual K-12 Schools

Alex Kumi-Yeboah
Dalton State College, USA

ABSTRACT

Since 2000, there has been an increasing rate of online learning directed toward K-12 schools in the United States. The need for online courses has become evident as schools are searching for ways to meet student's learning needs. Online and blended courses provide options for schools with limited curricular offerings, scheduling conflicts, or find it difficult to provide highly qualified teachers. In the 2010/2011 school year, it was estimated that approximately 1.5 million students in K-12 schools across the United States were enrolled in an online course (Wicks, 2010). However, a literature search indicates that not much is known about K-12 blended and online learning instruction in virtual K-12 schools. Various issues such as types of instructional delivery, optional management skills, current trend of blended learning, the academic impact on K-12 education are critical areas for teachers and administrators to consider (iNACOL, 2011). This chapter seeks to demonstrate the growing trend of blended and online learning in the United States, analyze instructional implications of blended and online learning to students, discuss major obstacles to blended and online learning in K-12 schools, address possible solutions, and provide recommendations for further studies.

INTRODUCTION

Blended learning is a type of online learning that includes the use of learning tools such as virtual teaching, self-paced Web-based courses, electronic performance support systems, and knowledge management systems (Singh, 2003). Virtual online learning in K-12 school(s) is a form of distance learning, where teachers and students are separated by geographical distance and the class is conducted using different electronic communication methods such as video conferencing, online chat, synchronous conferencing, web conferencing, blogs, emails, and social networks (Wicks, 2010). According to Watson (2010), the millennial generation students in K-12 schools today are children of a digital age and are typically far more comfortable with technology than their parents and teachers. K-12 online learning is another branch of instructional delivery that is growing rapidly and

DOI: 10.4018/978-1-4666-8246-7.ch004

Table 1. A Sampling of States with a Prominent Virtual School in 2012

State Virtual School	Course Enrollments	Annual Growth	Ratio to State Population
Florida Virtual School	303,329	+17%	38.7
New Hampshire Virtual Learning Academy	15,558	+35%	24.2
North Carolina Virtual Public School	97,170	+10%	22.6
Idaho Digital Learning	17,627	+22%	21.6
Alabama ACCESS	44,332	+31%	20.2
Montana Digital Academy	6,797	+49%	15.5
South Carolina Virtual School	15,831	+41%	7.5
Georgia Virtual School	20,876	+45%	4.4
Michigan Virtual School	19,822	+12%	3.7

Source: State high school population, http://nces.ed.gov/programs/statesprofile/

evolving in many different directions. It is merging with face-to-face instruction to augment time as well meet the needs of all students (Watson, 2010). The International Association for K-12 Online Learning (iNACOL) 2012 annual report indicates that students enrolled in K-12 virtual online schools have increased significantly and in addition 39 states offers state-led blended and online education programs at the K-12 level (see Table 1 and Table 2) (Watson, Murin, Vashaw, Gemin, & Rapp, 2010). For example, Florida has the largest number of virtual students with over 220,000 course enrollments in 2009/2010 academic year (Watson et al., 2010). The current trend of social media and increased use of technology among the youth makes online learning an option for teachers to consider using to support the teaching learning process (iNACOL, 2011). It is estimated that 44 states offer blended and online education opportunities for K-12 students through either state supplemental program, full-time online programs or both (Watson, Gemin, & Ryan, 2008).

According to iNACOL (2012) annual report, the main reasons why many school districts provide fully online learning or blended (hybrid) learning to their students is to provide courses that are not available at their schools as well as provide opportunities for students to recover course credits from classes missed or failed. In most urban schools, blended learning and online learning become an alternative option to increase student graduation rate and credit recovery for students in the adult education and drop-out prevention programs (Watson, 2010). Watson (2011) reports that the increasing growth of K-12 online schools are attributed to: (a) provide opportunities for students to take credit recovery classes especially for urban

Table 2. Sample of States with State Virtual Schools that have Remained or Become Small in 2012

State Virtual School	Course Enrollments	Annual Growth	Ratio to State Population
Connecticut Virtual Learning Center	2,049	-7%	1.2
Illinois Virtual School	2,795	-7%	.4
Texas Virtual School Network	12,419	-27%	.9
Kentucky Virtual Schools	1,700	-1%	.9

Source: State high school population, http://nces.ed.gov/programs/statesprofile/

schools; and (b) enroll in advanced placement courses in English, mathematics, social studies, and science (Watson, 2011). Again, K-12 students are motivated by online learning and have the maturity and self-discipline to work independently and have the propensity to succeed on online courses (Hilz et al., 2004). It is important for teachers in K-12 schools, educators, researchers, and policy makers to get information on blended and online learning in K-1 schools. This chapter seeks to demonstrate background information on blended and online learning in the United States; analyze and synthesize instructional implications of blended and online learning to students; allow discussions on major obstacles to blended and online learning in K-12 schools; address possible solutions, and recommendations for further studies.

BACKGROUND

K-12 Blended Learning Models

According to Smith, Clark and Blomeyer (2005), it is estimated that in 2005, one in 100 students in the United States K-12 public school took at least one course online or combined (blended or fully online). Blended learning mixes various event-based activities, including face-to-face instruction, live e-learning, and self-paced learning (Singh, 2003). Blended learning is sandwiched between fully face-to-face and online instruction (Graham, Allen, & Ure, 2005; Watson et al, 2010). In most cases, blended learning is used interchangeably with hybrid learning. Blended learning can be delivered in a variety of ways such as structured and unstructured learning. A structured blended learning program occurs when the content is organized. It encourages students to be actively engaged and allows the instructor to track student use of the program, manage access to the next stage on the basis of completion or assessment, and follow up with another form of communication to students who are not completing work (Hoyle, 2003). In unstructured blended learning, students have opportunity to interact and collaborate with other students with less monitoring. They are able to collaborate on group projects or discussions that promote student-centered learning (Hoyle, 2003). Further, blended learning utilizes both offline and online settings. The offline setting involves instruction delivery in a traditional face-to-face classroom while instruction in the online setting consists of the use of the Internet. Blended learning utilizes the atmosphere of both offline and online setting. Offline learning happens in a more traditional classroom setting. Offline learning offerings are managed through an online learning system. An example of this type of blending learning includes a learning program that provides study materials and research resources over the Web, while providing instructor-led, classroom training sessions as the main medium of instruction, this is also known as asynchronous and synchronous learning (Singh, 2003).

Synchronous and asynchronous learning are both types of Internet communication tools that can be utilized in blended and online learning to fulfill the technology requirement. Synchronous learning or events happen at the same time for everyone, but can be online to include the use of online meetings, virtual classrooms, Web seminars or conferencing or IM chats and broadcasts coaching, and instant messaging conference calls or offline (students listening to a lecture in a classroom) while asynchronous learning means students can learn the same content (pre-recorded lecture, notes posted online, Web-based simulation) at different times. It can also be offline, i.e., students visiting the same museum exhibit at different times. It can occur as an instructor-led classrooms and lectures, hands-on activities in the classroom, laboratories, workshops, and field trips (Singh, 2003). This means that an asynchronous learning environment provides students with teaching materials and tools for registration, instruction, and discussions outside of the classroom scenario and incorporates the ability to maintain communication with tutors and other students outside of rigid educational timetables. It makes an extensive use of software and the Internet, using technology packages like blackboard, e-mail, or chat rooms. Students have access to post, read and respond to subject instruction, queries and messages all within the same shared space.

According to Bremer (1998), asynchronous discussion has the potential of helping K-12 students who do not participate and collaborate with their peers within the traditional classroom. Students have the ability to work at their own pace and control the pace of instructional information in the classroom (Bremer, 1998). According to Stockley (2005), blended learning is a type of online learning that describes learning or training events or activities in various forms. The main purpose of blended learning model is to pair the best features of face-to-face teaching with the best options of online learning to promote active and independent learning. The hybrid model has components of instructional technologies that combine lecture or laboratory content into new online learning activities, such as case studies, tutorials, self-testing exercises, simulations, and online group collaborations (NJIT, 2005). Hybrid courses involve a great amount of technology. They also greatly increase the independence of the student by allowing him/her to work at his/her own pace outside of the typical classroom. The success of blended learning in K-12 schools can be attributed to the interactive capabilities of the Internet use and face-to-face teaching (Garrison & Cleveland-Innes, 2003; Swan, 2001).

Blended and Online Learning in K-12 Schools

According to Picciano and Seaman (2007), about three-fourths of U.S. students take either fully online or blended (combination of on-and off-line) courses, with majority of students enrolled at the high school level. Online and virtual K-12 schools have become popular as a result of the flexibility to its content and instruction. This is due to the following (a) assembling and disseminating instructional content more efficiently; b) increasing the availability of learning experiences for those who cannot or choose not to attend traditional schools; and c) increasing student-instructor ratios while achieving learning outcomes equal to those of traditional classroom instruction (Riel & Polin, 2004; Schwen & Hara, 2004).

Virtual online education at the K-12 level is offered as full-time comprehensive schools, combination of traditional face-to-face and online programs, charter and private schools as well in e-learning programs within the school and hybrid courses. Virtual online learning is administered at the state, school district, and private sector levels (Watson, 2011). K-12 online programs are funded in different forms such as state's government, grants, scholarships, student tuition, and school-based courses subscribed by students. Presently 40 states have fully implemented virtual schools or state-led initiatives with 30 states including Washington D.C. offering full-time online schools (iNACOL Report, 2012). Current trends in social media and access to technology provides opportunities in online learning for K-12 students in about 48 states and Washington, D.C. (Watson et. al, 2010). The International Association for K-12 Online Learning (iNACOL) reported that about 1.5 million students took one or more online courses in 2010 (Wicks, 2010). For example, states of Alabama, Florida, and Michigan have all made online learning experience part of their graduation requirements (Watson et al., 2010). Furthermore, Singh (2001) explains that blended learning is making an increasing way into elementary, middle, junior high, and high schools around the country resulting from the flexibility of time for students and teachers. Again the present shortfall of budget and increasing student population has called for more online and blended learning to satisfy student needs. Belanger (2005) contends that students who are involved in online learning during the middle school years are more likely to keep their academic grades higher than those who are not exposed to online learning.

Oakes and Casewit (2003) further explain that the best practices in blended learning includes:

- Create a structured core curriculum of learning activities that are taught using a variety of instructional methods;
- Support an environment in which students can learn smaller parts and work their way up to more complex ideas;
- Create a classroom in which students can learn informally;
- Provide technological support and for students; and
- Provide an easy to use environment.

According to Oakes and Casewit (2003), the above best practices provide an important management and operational academic support for students who will opt for blended learning. Cavanaugh, Gillan, Kromrey, Hess, and Blomeyer (2005) reported that there were no statistically significant differences in achievement between online and conventional courses. They reviewed the results of 14 studies published between 1989 and 2004 that compared online courses with face-to-face courses with critical look at the internal experimental validity. Tallent-Runnels et al. (2006) reported that there were no differences between learning outcomes of the traditional and online instruction of K-12 students after a review of the achievement in online courses across variables of age and subjects. A meta-analysis study conducted by the U.S. Department of Education (2008) examined 51 independent effect size measures that compared studies on K-12 online and traditional face-to-face education between 1996 and 2008. The study found that students in online instruction performed academically better than those in the traditional face-to-face instruction. Additionally, there are differences in online programs with regards to grade levels, type of students, and programs. However, most online programs showed common characteristics using qualified teachers, digital course content, and learning management software to deliver education to meet a significant proportion of student needs (Watson, 2007).

Watson (2007) conducted a study about K-12 online learning that reviewed an extensive literature about policies on online learning. Result shows that there was a significant relationship between types of students served, grade level, and program of study. Rockman et al. (2007) conducted a study that evaluated the effectiveness of Spanish classes offered to middle schools (seventh and eighth grades) in West Virginia Virtual School. The study was comprised of 463 students in 21 schools. The purpose of the study was to compare student's class performance in combined face-to-face instruction and blended learning and virtual schools with regard to school size and average language arts achievement. Result indicates that there was a significant difference between students in the face-to-face instruction and those in the virtual program. Students in the blended learning program performed better than those in the face-to-face instruction program. O'Dwyer, Carey, and Kleiman (2007) investigated the learning outcomes of students in an online Algebra 1 class and students in the traditional instruction with regard to mathematics ability, environment, and size using quasi-experimental design. Researchers developed multiple choice tests questions for both students in the combined face-to-face and virtual schools. Result shows that online students outperformed better than those in the traditional classrooms.

Englert et al. (2007) investigated the effectiveness of a Web-based writing support program. Participants included 35 elementary school students in a special education class across five urban schools. Students were divided into treatment and control groups. Students in the treatment group used Web-based program in writing performance. Control group students used writing tools in a traditional instruction. Students in the Web-based support program performed better with an effect size +0.74 than those in the traditional face-to-face instruction. Wang et al. (2006) investigated middle school students in a virtual biology course using formative online self-assessment and traditional tests. The study used a quasi-experimental design. Students in the virtual biology course performed higher than those in the traditional tests.

There are many instructional online activities that can be used by K-12 students engaged in blended learning. The following websites will be useful for both teachers and students at the K-12 level.

http://pbskids.org/zoom/games/kitchenchemistry *(Zoom Kitchen Chemistry)*: This website enable students to learn and conduct real-life practical experiment at home using kitchen tools as apparatus. Students have the opportunity to explore virtual kitchen and can perform online experiments to solve a puzzle as well as get a reward. The site provides opportunities for students to study science (chemistry) outside the classroom using technology.

http://starchild.gsfc.nasa.gov *(StarChild):* This site provides information about space and the solar system for K-12 students. It is anexcellent web resource student to study introductory astronomy. The site is divided into two levels and other sections. The first level consists of activities on solar system, basic information on the universe, and glossary of science terms. Level two consists of movies and videos on the solar system, the universe and vocabularies of key terms. The site has a section termed "in the classroom" that consists of the teacher center which provides information and activities found in StarChild that can be used to engage, excite, and educate students in the classroom. Another advantage of this site is that it can be used in other languages to help English as a Second Language Learners (ESOL) to learn science online. Finally, the sites provide information about other websites on space and the solar system that could help kids to study and learn science online. Some of the websites within this site are:

1. The Nine Planets http://nineplanets.org/
2. The Space Place http://spaceplace.jpl.nasa.gov
3. Astronomy for Kids http://www.kidsastronomy.com/index.htm and
4. Amazing Space http://oposite.stsci.edu/pubinfo/education/amazing-space/

http://nlvm.usu.edu/en/nav/vlibrary.html *(National Library of Virtual Manipulatives)*: This site provides information to about how to use manipulatives to teach mathematics at the K-12 level. As a virtual library, students can use java applets to do hands-on experience to solve math problems.

http://www.readingmatrix.com/directory/pages *(The Reading Matrix)*: This site has resources in reading, comprehension for beginning and intermediate readers, reading matrix blogs, and proofreading. Students have an opportunity to practice comprehension and vocabulary questions as well as use the interactive activity games at home.

*National Geographic for Kids (*http://www.nationalgeographic.com/kids*)*: This site contains games, cartoons, current events news, photos, videos, countries, and information of various animals and communities around the world. This site will be a great resource for social studies at the K-12 level. The site provides opportunities for students to research about the history, geography, and environmental issues that affect their communities, states, nation and the world.

In sum, online and blended learning may be considered one of the most important instructional models in the current technological dispensation at the K-12 education. The literature has provided information about the models/curriculum that instructors could use to teach in the blended and online learning environments. Students in K-12 schools are at pace with current technology in the classroom and the content of delivery. Literature has shown that students performed significantly better in online instruction than those in the traditional face-to-face instruction. The literature addresses the situation to determine which of the instructional methods will best suit students and teachers in the teaching learning process in K-12 schools.

BENEFITS OF K-12 BLENDED LEARNING TO STUDENTS

Blended learning allows teachers to focus on the best teaching strategies and innovative ideas they have to implement for students' success in the classroom. Teachers have the ideal opportunity to monitor students' academic progress as well as vary their instructional strategies to suit the needs of all students. Blended learning provides students the best learning environment in the teaching learning process. Students have an easy access to contact teachers for assistance after class (face-to-face instruction) in the online section. This is an advantage for students to understand concepts they learn. The online version of blended learning affords students the opportunity to demonstrate their learning abilities through the use of computer-based resources. For example, discussion forums are great for students who feel shy to participate in the traditional face-to-face instruction. Further, blended learning provides an opportunity for students who do not participate in face-to-face instruction to gain complete confidence in online discussions (Cavanaugh, 2008; Christensen & Horn, 2008; Christensen, Johnson, & Horn, 2008; Kearsley & Shneiderman, 1998; Moe & Chubb, 2009; Wilson, 2010; Wise & Rothman, 2010). The online course component of blended learning has the potential to improve students' learning outcomes as compared to the traditional teaching methods such as lecturing and note-taking. Students have the flexibility of participating in class either online or face-to-face instruction that may suit their learning style (Twigg, 2003). Blended learning helps students to engage in active learning which leads them to develop deeper learning. This is achieved through the use of discussion forum, use of blogs and chats, video conferencing, online interactive activities/simulation, and online assessment with feedback. Online learning allows students to experience simulations and visualizations that challenge them to extend abstract information to concrete concepts (Eastman & Swift, 2002).

Blended learning programs facilitate situated understandings, multiple perspectives and transfer through immersive experiences and activities (Dede, 2009; Gee, 2010). For Instance, In Vermont, Middlebury College and K-12 Inc developed an interactive language programs to provide experience for K-12 students through an immersive technologies such as 3D games and social networking. The majority of online learning programs at the K-12 levels support the learning needs of students such as English as second language learners, students with disabilities and gifted students. These students have the opportunity to participate in the online instruction (discussion forum or online chat) with less difficulty. They can use chat room, IM or e-mail to work together to complete a project. Additionally, the use of modules in online learning environment and free access to learning resources allow students to progress at different levels and promotes differentiated learning that is, teachers are able to design instruction based on student needs. As a result of the diverse background of students in the classrooms around United States students stand to benefit tremendously from the dual component of blended learning (Archambault et al., 2010; Christensen & Horn, 2008; Waldeck, 2007; Watson & Gemin, 2008).

Online learning offers K-12 students feedback and communication about their performance. Communication tools such as discussion boards and chat rooms in online learning can be effective in inter-team collaboration as well as in teacher-student communication. The use of online assessment at the K-12 level allows efficient data collection about individual and group performance that would be difficult to collect in the traditional classroom. For instance, online quizzes and tests give students and teachers instant feedback about their scores. Teachers do not have to go through the long process of calculating grades or quizzes. Assessment in blended learning works in such a way that parents, teachers and students all have access to grade promote transparency (Dennen, 2005; Rice, Dawley, Gazel, & Florez, 2008). Online assessments come with accessibility and support systems that is universally designed to meet the need of students with disability and English language learners (Almond et al., 2010; Kopriva, 2009; Rose & Meyer, 2000; Russel, Hoffmann, & Higgins, 2009).

Blended learning provides ample time for teachers to effectively use their instruction time for more students at a particular place. It has the potential for increasing the number of students served by the teacher. Because teachers can serve large number of students at a particular time to save space and time. Students have access to online resources such as dictionaries, encyclopedia, and research in the course of the teaching-learning process. For instance, expelled students or students on suspension who are required not to attend the traditional classroom as a consequence but still can have access to material to prevent falling behind academically (Moe & Chubb, 2009; Repetto, Cavanaugh, Wayer, & Liu, 2010). Again, students who have opted to be home-schooled with instruction in subjects their parents feel unable to teach learn those subjects and assist with the aid of resources accessible to them online. Students who have been hospitalized or handicapped and cannot attend or travel to the traditional face-to-face classroom will have access to resources, work through the class content while receiving treatment. The use of blogging in the blended and online learning has a high impact on instructional implications in the high school. It helps students exchange ideas about literary activities such as think-aloud postings, literature circle group responses, and round table discussions. Example is where students at Hunderdon Central Regional High School in Flemington, New Jersey used blogging to discuss "The Secret Life of Bees" by Sue Mon Kidd in an American Literature class (Bull & Kajder, 2003; Toto, 2004). The use of blogging as an online instructional tool helps students in K-12 schools improve on their writing in terms of planning, drafting, revising, editing, proofreading, and presenting as well as grammar skills. It promotes collaboration and offers an opportunity for students to become deep learners and acquire critical thinking skills as well as to reflect on what they learn as compared to learning in the traditional classroom. Students have the means to deliberate on concepts they learn in class and apply it to real world situations (Toto, 2004).

Through blended learning, students develop skills of analyzing, reflecting and critical thinking through active response to Internet resources. This allows students in K-12 schools to define their positions in the context of other people's opinions on a particular issue. It is important for teachers to recognize the role of technology in the curriculum taking into consideration the current wave of growth and awareness of technology use by students in the classroom. For instance, students who participate in blended learning gain advanced technological competencies such as online quiz, online chats, forum discussions, and efficient use of multimedia and hypertext tools (Oblender, 2002; Oravec, 2002).

Instructional Implications on Student Learning

With the use of blended learning, at the K-12 level, teachers will be able to alter the learning environment for students to work collaboratively in learning communities online. For example, Teachers may add significant curriculum content resources that could be difficult to comprehend outside of the Internet or online. For example, in a study conducted by DeLacey and Leonard (2002), indicated that blended learning promotes student interaction and satisfaction in courses that incorporated blended learning. Furthermore, the use of blended learning allows pacing and attendance in the classroom. In blended learning instruction students have the advantage to choose their own time to study. Again, if a student is absent to class, he/she may have an opportunity to view and access to missed materials at the same time that the rest of the class does, even though the student cannot be physically in the classroom. This provides an opportunity for the student to stay on track and not fall behind. This is an advantage to students with disabilities or students who may not able to attend class as a result of sickness or injuries. Another impact of blended and online learning on students at the K-12 level is that teachers may have more available time to monitor progress and provide support to students who may lag behind. Blended learning courses provide physical resources that are not available in courses that are presented completely online, including language, technology and science laboratories (Oblender, 2002).

Blended and online learning has an element of self-paced modules that allows students to review content materials at any time to be able to understand a concept or to work ahead for those students who learn at a faster pace (Alvarez, 2005). The self-pacing classroom nature of blended learning allows a higher completion rate for students than those in the fully online situations because it gives students varying options to choose from such as online discussion forum, online chats, use of video, and other hypermedia tools (Flavin, 2001). Blended learning allows teachers through the use of Internet and other technologies in the classroom to structure their instruction to meet the learning needs of all students and teaching styles of teachers (Alvarez, 2005). Alvarez (2005) stated that

the online environment is not the ideal setting for all types of learning. Classrooms are not perfect either… That's why so many teachers and corporate trainers are concentrating their efforts on integrating internet-based technologies and classrooms to create blended learning environments. It just makes good sense.

Combining different delivery modes has the potential to balance out and optimize the learning program development and deployment costs and time. A fully online content could be expensive to produce (requiring multiple resources and skills), however, combining online collaborative and mentoring sessions with self-paced materials, such as generic off-the-shelf WBT, documents, case studies, recorded e-learning events, text assignments, and PowerPoint presentations (requiring quicker turn-around time and lower skill to produce) may be more effective (Singh, 2003).

Blended and online learning provides an opportunity for at-risk students to receive peer-to-peer interactions needed for collaboration to provide them a sense of responsibility. Also the presence of the instructor is more frequent, and results in more meaningful dialogue between teachers and students (Newlin & Alvin, 2002). A typical example is that of the Mannheim Township Virtual High School in Pennsylvania, where a hybrid online and traditional course model increased the graduation rate to a 99% (Oblender, 2002). Another important aspect of blended learning in K-12 schools is that teacher availability extends beyond the confines of the school day and the school building with expanded learning opportunities for all students. Students have time and availability to contact teachers through telephone, email, and other online sources for academic help at any particular time and space (Morehead & Labeau, 2004).

Finally, blended and online learning has the potential to reduce the amount of space to serve larger number of students in densely populated school districts. For example, the Albuqerque's eCADEMY provides about 80% online and 20% on-site instruction to K-12 students (Watson, 2010). Building cost of eCADEMY is reduced to about one-seventh and serves half of the student's population on-site. Another example is that of Carpe Diem Collegiate High School and Middle School in Yuma, Arizona, where labor cost was reduced into half as a result of blended learning (Watson, 2010). Only six certified full-time teacher in addition to support staff serves about 274 students. The school has only five traditional classrooms and the capital expenditure per student is reportedly less than half that of any school building in the same area (Staker, 2011).

MAJOR OBSTACLES TO K-12 BLENDED LEARNING

Blended learning at the K-12 level is not without any challenges. Considering the fact that most blended learning programs are at its initial stage, the development of a successful blended learning program comes with major challenges such as teacher training, cost of delivery, copy right issues, lack of social interaction among students, teachers, and policy issues. A major challenge to blended learning is the security concerns with regards to incorporating e-learning in the K-12 curriculum surrounding the use of the Internet. Many concerns have been raised by parents on the security of online learning by K-12 students, making them to refuse to sign off on allowing their child unrestricted use of computers while they are at school. School districts spend sizeable amount of their budget to install filters and firewalls that attempt to block unsuitable sites, but they are not always successful. As a result of the No Child Left Behind and Race to the Top mandates, most school districts are shifting their resources to teacher effectiveness and student test performance and shifting funding from expanding computer access for students to needing more computers for bookkeeping purposes.

According to Watson (2010), funding of online learning for students at the K-12 level in several states is a major issue to deal with in some school districts. Watson (2010) further explains that it is due to the fact that online schools sometimes draw students across district lines, and funding often follows the student. Thus, students leave “home” school district for the online school, resulting in a drop in funding for that school district. Another challenge to blended and online learning is having all students’ equal access to online instruction. Income gaps have created situations where some students have access to a computer, basic software, and the Internet. However, for students in poor inner-city and rural areas, access to computers and Internet is a major challenge (Watson, 2010). More so, online courses can pose challenges for students with learning or physical disabilities. It may be difficult for some students with learning or physical disabilities to access Internet use independently without any help from teachers or parents. It is evident that certain students with learning or physical disabilities may not be able use technology and communication tools involved in blended and online learning at the K-12 level to (include online discussions, blogging, chats, and simply the use of emails or telephone). Lack of qualified instructional technology staff is a major challenge to managing successful blended learning program. A typical example is that of shortage or lack of IT staff in states like Louisiana, Georgia, and Florida (Project Tomorrow, 2010). Not many instructional staff have been offered trainings on technology or how to teach online and in 2010, only 12% of new teachers reported receiving college or university training on online education (Dawley, Rice, & Hinck, 2010). Again, only four percent of students aspiring to be teachers at the K-12 level indicated in the Project Tomorrow survey that they have received training on how to teach online classes in their instructional methods courses (Project Tomorrow, 2010).

Additionally, the rising growth in online education has outpaced education policy in several states (Watson, 2010). For example, in many states such as Florida, Alabama, Georgia, Ohio, and California; online programs are guided and overseen by rules and regulations created for traditional schools. According to Watson (2010), in 2001, the National Association of State Boards of Education stated "In the absence of firm policy guidance, the nation is rushing pell-mell toward an ad hoc system of education that exacerbates existing disparities and cannot assure a high standard of education across new models of instruction."

Another challenge of blended and online learning is that of content knowledge and lack of awareness by policymakers and educators. There are situations where educators and policymakers are fully unaware of the basics information on how blended/online education programs operate, the curriculum content of online courses or programs, and how students can learn online as compared to traditional face-to-face instruction. Despite many successes of blended and online learning programs, it should be pointed out that there are concerns about the quality of online learning and issue of accountability. Few research exists about the accountability and quality of blended learning in K-12 schools, thus research in K-12 online education is minimal (Dillion & Tucker, 2011). For example, a meta-analysis and review of online learning studies by the U.S. Department of Education concluded that limited number of published studies exists on K-12 online education (USED, 2010). There is lack of knowledge that identifies the elements of pedagogy and best practices in teaching online education. For example, not much is known about the best practices of online learning at the K-12 level that will augment student academic progress (Black, Ferdig, & Dipetro, 2008).

SOLUTIONS AND RECOMMENDATIONS

According to Patrick and Powell (2009), to reduce the challenges facing K-12 online education, it is important to transform teaching and learning by redesigning traditional classroom approaches, promote quality teaching, and enhance quality of learning experiences. It could be beneficial for colleges of education to partner with local school districts and offer professional development trainings to instructional staff in K-12 schools. This will help to transform schools of education into digital-age learning world and teacher educators who are better prepared to embrace the digital age and manifest the characteristics of 21st century teachers (Resta & Carrol, 2010).

Teachers and educators in K-12 schools should be offered online education trainings in areas such as technical and pedagogical foundations, ethical issues related to online courses, skills in online management systems, and use of asynchronous and synchronous features. Online education could be incorporated into the curriculum of teacher education preparation programs for pre-service teachers. College of education in the various universities should partner and collaborate with school districts to promote the expansion of online education in K-12 schools. For example, there is a partnership between University of Central Florida and University of South Florida with Florida Virtual School (FLVS), which started in 2003 to provide virtual student teaching and internships. Several staff at the FLVS participates in introductory teacher-preparation classes by providing information about teaching online (Project Tomorrow, 2010). This could be a model for other states and college of education to initiate a partnership on instructional technology.

Additionally, more funding should be made available to K-12 online education in the various colleges of education and local school districts to help transform instructional technology in K-12 schools to meet the rapid growth of technology in the 21st century. Equal access to online education should be made available to all students regardless of their location and socio-economic status. To reduce the discrepancies of standards between states, common national competency standards could be established for digital-age teachers as a means to ease state-to-state reciprocity (Resta & Carroll, 2010). To promote quality of online education, colleges of education, teacher education preparation programs and school districts could provide alternative teacher certification programs in online endorsement that includes online instruction and performance-based certification for teachers to transfer teaching certificates without any problem (Foundation for Excellence in Education, 2010).

Administrators, educators, policy makers, and law maker in various states could be educated and informed about the basics of online education, benefits and challenges involved in establishing successful online education program to augment the fundamental understanding of K-12 online education among school administrators, teachers, policy maker, and law makers. More research could be conducted about the best practices and pedagogy in K-12 virtual schools and what instructional methods could make teachers effective in online environments. It is important that students, educators, policymakers, and the online programs collaborate to find common agenda on where they exist, and what holds in the future.

FUTURE RESEARCH DIRECTIONS

This chapter contributes to blended and online learning in virtual K-12 schools in the United States. This Chapter demonstrates that blended and online education at the K-12 level can empower students to develop skills in analytical and critical competencies through active response to Internet resources. This allows students to define their positions in the context of other people's opinions on a particular issue (Oravec, 2002).

The educational implication of this chapter is that it adds to the available literature on blended and online learning in virtual K-12 schools. It also shares information about the benefits of blended and online education at the K-12 level as well as the challenges of implementing online education in K-12 schools. For example, the chapter discusses the need for school districts, teachers, and administrators to recognize the importance of blended and online learning to students. It also highlights the trend of blended and online education in K-12 schools and the instructional pedagogy involved. The chapter provides information about various blended and online education at the K-12 level, models of instruction, benefits, challenges and future directions of research. It further provides information to teachers, pre-service teachers, and administrators on the existing situation in blended and online learning environments.

Future investigation should be conducted about the relationship between fully online education and blended learning for at-risk students' academic performance. Another study could be investigated on the best practices and pedagogy in teaching K-12 students in blended learning environments. Additional research could be investigated on effective professional development curriculum on blended learning and online learning for K-12 teachers. Furthermore, future research should investigate the perception of students, administrators, and teachers about blended learning as compared to other students and teachers in other countries. There can be more research in areas of the relationship between students' performance in fully online learning and blended learning.

REFERENCES

Almond, P., Winter, P., Cameto, R., Rusell, M., Sato, E., & Clarke-Midura, J. et al. (2010). Technology-enabled and universally designed assessment: Considering access in measuring the achievement of students with disabilities-A foundation for research. *Journal of Technology, Learning, and Assessment*, *10*(5).

Alvarez, S. (2005). Blended learning solutions. In B. Hoffman (Ed.), *Encyclopedia of Educational Technology.* Retrieved December 24, 2012, from http://coe.sdsu.edu/eet/articles/blendedlearning/start.htm

Archambault, L., Diamond, D., Coffey, M., Foures-Aalbu, D., Richardson, J., & Zygouris-Coe, V. … Cavanaugh, C. (2010). Research committee issues brief: An exploration of at-risk learners and online education. Vienna, VA: International Association for K–12 Online Learning (iNACOL).

Belanger, Y. (2005). *Laptop computers in the K-12 classroom.* Retrieved from November 4, 2012, from http://www.ericdigests.org/2001-1/laptop.html

Black, E. W., Ferdig, R. E., & DiPietro, M. (2008). An overview of evaluative instrumentation for virtual high schools. *American Journal of Distance Education*, *22*, 24–25. doi:10.1080/08923640701713422

Bremer, C. (1998). *Design of a group oriented, virtual learning environment*. Retrieved October 18, 2010, from http://www.bremer.cx/paper1

Bull, G., & Kajder, S. (2003). Scaffolding for struggling students: Reading and writing with logs. *Learning and Leading with Technology*, *31*(2), 32–34.

Cavanaugh, C. (2001). The effectiveness of interactive distance education technologies in K–12 learning: A meta-analysis. *International Journal of Educational Telecommunications*, *7*(1), 73–78.

Cavanaugh, C. (2008). Augmented reality gaming in education: Authentic and engaged blended learning. In R. Ferdig (Ed.), *Handbook of research on effective electronic gaming in education*. Hershey, PA: Idea Group. doi:10.4018/978-1-59904-808-6.ch005

Cavanaugh, C., Gillan, K. J., Kromrey, J., Hess, M., & Blomeyer, R. (2004). *The effects of distance education on K–12 student outcomes: A meta-analysis*. Naperville, IL: Learning Point Associates. Retrieved October 5, 2012, from http://www.ncrel.org/tech/distance/index

Christensen, C., & Horn, M. (2008). How do we transform our schools? *Education Next*, *8*(3), 13–19.

Christensen, C., Horn, M., & Johnson, C. (2008). *Disrupting class: How disruptive innovation will change the way the world learns*. New York, NY: McGraw-Hill.

Dawley, L., Rice, K., & Hinck, G. (2010). *Going virtual 2010: The status of professional development and unique needs of K-12 online teachers.* Retrieved November 13, 2012, from http://edtech.boisestate.edu/goingvirtual/goingvirtual3.pdf

Dede, C. (2009). Technologies that facilitate generating knowledge and possibly wisdom: A response to web 2.0 and classroom research. *Educational Researcher*, *38*(4), 60–63. doi:10.3102/0013189X09336672

DeLacey, B. J., & Leonard, D. A. (2002). Case study on technology and distance in education at the Harvard Business School. *Journal of Educational Technology & Society*, *5*(2), 13–28.

Dennen, V. (2005). *Designing peer feedback opportunities into online learning experiences*. Retrieved October 11, 2012 from www.uwex.edu/disted/conference/Resource_library/Proceedings/

Dillion, E., & Tucker, W. (2011). *Lessons for online learning*. Retrieved December 14, 2012, from www.educationsector.org/print/publications/lessons-online-learning

Eastman, J., & Swift, C. (2002). Enhancing collaborative learning: Discussion boards and chat rooms as project communication tools. *Business Communication Quarterly*, *65*(3), 29–41. doi:10.1177/108056990206500304

Englert, C. S., Zhao, Y., Dunsmore, K., Collings, N. Y., & Wolbers, K. (2007). Scaffolding the writing of students with disabilities through procedural facilitation: Using an Internet-based technology to improve performance. *Learning Disability Quarterly*, *30*(1), 29–34. doi:10.2307/30035513

Flavin, S. (2001). *E-learning advantages in a tough economy*. Retrieved November 8, 2012, from http://www.babsoninsight.com/contentmgr/showdetails.php/id/217

Foundation for Excellence in Education. (2010). *Digital learning now.* Retrieved December 4, 2012, from www.excelined.org/Docs/Digital%20Learning%20Now%20Report%20FINAL.pdf

Garrison, D. R., & Cleveland-Innes, M. (2003). *Critical factors in student satisfaction and success: Facilitating student role adjustment in online communities of inquiry.* Paper presented to the Sloan Consortium Asynchronous Learning Network Invitational Workshop. Boston, MA.

Gee, J. P. (2010). *New digital media and learning as an emerging area and worked examples as one way forward*. Cambridge, MA: The MIT Press.

Graham, C. R., Allen, S., & Ure, D. (2003). *Blended learning environments: A review of the research literature.* (Unpublished manuscript). Brigham Young University, Provo, UT.

Hilz, R., & Goldman, R. (2004). *Learning together online: Research on asynchronous networks*. Mahwah, NJ: Lawrence Erlbaum Associates.

Hoyle, R. (2003). How to evaluate blended learning. *People Management*. Retrieved January 6, 2013 from http://www.peoplemgmt.com/

International Association for K-12 Online Learning. (iNACOL). (2010). *National standards for quality online teaching*. Vienna, VA: iNACOL. Retrieved October 12, 2012, from www.Inacol.org/research/nationalstandards/NACOL%20Standards%20Quality%20OnlineTeaching.pdf

International Association for K-12 Online Learning. (iNACOL). (2011). *Annual report on K-12 online education.* Retrieved October 30, 2012, from www.inaco.org

International Association for K-12 Online Learning. (iNACOL). (2012). *Annual report on K-12 online education.* Retrieved December 17, 2012, from www.inaco.org

Kearsley, G., & Shneiderman, B. (1998). Engagement theory: A framework for technology- based teaching and learning. *Educational Technology*, *38*(5), 20–23.

Kopriva, R. (2009). Assessing the skills and abilities in math and science of ELLs with low English proficiency: A promising new method. *AccELLerate*, *2*(1), 7–10.

Moe, T., & Chubb, J. E. (2009). *Liberating learning: Technology, politics, and the future of American education*. San Francisco, CA: Jossey-Bass. doi:10.1002/9781118269343

Morehead, P., & Labeau, B. (2004). Successful curriculum mapping: Fostering smooth technology integration. *Learning and Leading with Technology*, *32*(4), 12–16.

New Jersey Institute of Technology (NJIT). (2005). *Hybrid learning*. Retrieved September 22, 2012, from http://media.njit.edu/hybrid/

Newlin, M. H., & Alvin, Y. W. (2002). Predictors of performance in the virtual classroom: Identifying and helping at-risk cyber-students. *T.H.E. Journal*, *29*(10), 21.

O'Dwyer, L. M., Carey, R., & Kleiman, G. (2007). A study of the effectiveness of the Louisiana Algebra I online course. *Journal of Research on Technology in Education*, *39*(3), 289–306.

Oakes, K., & Casewit, C. (2003). *E-learning: The answer is blended learning, now what was the question again.* Retrieved October 2, 2012, from http://www.astd.org/astd/Publications/TD_Magazine/2003_pdf/76031017.htm

Oblender, T. (2002). A hybrid course model: One solution to the high online drop-out rate. *Learning and Leading with Technology*, *29*(6), 42–44.

Oblinger, D. (2003). Boomers, gen-Xers, and millennials: Understanding the new students. *EDUCAUSE Review*, *38*(4), 37–47.

Oravec, J. A. (2002). Bookmarking the world: Weblog applications in education, weblogs can be used in classrooms to enhance literacy and critical thinking skills. *Journal of Adolescent & Adult Literacy*, *45*(7), 616–618.

Patrick, S., & Powell, A. (2009). *A summary of research on the effectiveness of K-12 online learning*. Vienna, VA: International Association for K-12 online learning. Retrieved December 18, 2012, from www.inacol.org/research/docs/NACOL_ResearchEffectiveness-1r.pdf

Picciano, A., & Seaman, J. (2007). *K-12 online learning: A survey of U.S. school district administrators.* Retrieved from http://sloanconsortium.org

Project Tomorrow. (2010). *Learning in the 21st century: 2010 trends update.* Washington, DC: Blackboard K-12. Retrieved November 10, 2012, from www.blackboard.com/CMSPages/GetFile.aspx?guid=8106

Repetto, J., Cavanaugh, C., Wayer, N., & Liu, F. (2010). Virtual high schools: Improving outcomes for students with disabilities. *Quarterly Review of Distance Education*, *11*(2), 91–104.

Resta, P., & Carrol, T. (2010). *Redefining teacher education for digital-age learners: A call to action, the summary report of the invitational summit on redefining teacher education for digital-age leaners.* Austin, TX: The University of Texas at Austin Learning Technology Center. Retrieved December 12, 2012, from www.kdsi.org/WhitePaper2.pdf

Rice, K., Dawley, L., Gazel, C., & Florez, C. (2008). *Going virtual: Unique needs and challenges of K–12 online teachers*. International Association for K–12 Online Learning. Retrieved October 30, 2012, from http://www.inacol.org/research/docs/goingvirtual.pdf

Riel, M., & Polin, L. (2004). Online communities: Common ground and critical differences in designing technical environments. In *Designing for virtual communities in the service of learning* (pp. 16–50). Cambridge, MA: Cambridge University Press. doi:10.1017/CBO9780511805080.006

Rockman, S., Sloan, K., Akey, T., Farr, B., Pereira-Leon, M., Shapiro, J., & Clark, L. (2007). *ED PACE final report*. Retrieved October 26, 2012, from http://www.rockman.com/projects/146.ies.edpace/finalreport

Rose, D. H., & Meyer, A. (2000). *The future is in the margins: The role of technology and disability in educational reform*. Washington, DC: USDOE.

Russell, M., Hoffmann, T., & Higgins, J. (2009). Meeting the needs of all students: A universal design approach to computer-based testing. *Innovate, 5*(4).

Schwen, T. M., & Hara, N. (2004). Community of practice: A metaphor for online design. In *Designing for virtual communities in the service of learning* (pp. 154–178). Cambridge, MA: Cambridge University Press. doi:10.1017/CBO9780511805080.010

Singh, H. (2001). *A white paper: Achieving success with blended learning.* Central Software. Retrieved November 15, 2012, from http://www.centra.com/download/whitepapers/blendedlearning.pdf

Singh, H. (2003). Blended effective blended learning programs. *Educational Technology*, *43*(6), 51–54.

Smith, R., Clark, T., & Blomeyer, R. (2005). *A synthesis of new research on K-12 online learning*. Naperville, IL: North Central Regional Educational Laboratory. Retrieved December 10, 2012, from http://www.ncrel.org/tech/synthesis/synthesis.pdf

Staker, H. (2011). *The rise of K-12 blended learning: Profiles of emerging models*. Mountain View, CA: Innosight Institute. Retrieved December 18, 2012, from www.innosightinstitute.org/blended_learning_models/

Stockley, D. (2005). *Blended learning or training-definition and explanation*. Retrieved October 12, 2005 from http://derekstockley.com.au/blended-learning.html

Swan, K. (2001). Virtual interaction: Design factors affecting student satisfaction and perceived learning in asynchronous online courses. *Distance Education*, *22*(2), 306–331. doi:10.1080/0158791010220208

Tallent-Runnels, M. K., Thomas, J. A., Lan, Y. W., Cooper, S., Ahern, T. C., Shaw, S. M., & Liu, X. (2006). Teaching courses online: A review of research. *Review of Educational Research*, *76*, 93–135. doi:10.3102/00346543076001093

Toto, C. (2004). Online blogging, net result: Writing skills may improve. *The Washington Times*, p. B01.

Twigg, C. A. (2003). *Improving learning and reducing costs: Lessons learned from round I of the PEW grant program in course redesign*. Troy, NY: Centre for Academic Transformation, Rensselaer Polytechnic Institute.

U.S. Department of Education. (2009). *The condition of education 2009 (NCES 2009-081)*. Washington, DC: National Center for Education Statistics.

U.S. Department of Education, Office of Planning, Evaluation and Policy Development (USED). (2010). *Evaluation of evidence-based practices in online learning: A meta-analysis and review of online learning studies.* Washington, DC: U.S. Department of Education. Retrieved October 28, 2012, from www.ed.gov/rschstat/eval/tech/evidence-based-practices/finalreport.pdf

Waldeck, J. (2007). Answering the question: Student perceptions of personalized education and the construct's relationship to learning outcomes. *Communication Education*, *56*(4), 409–432. doi:10.1080/03634520701400090

Wang, K. H., Wang, T. H., Wang, W. L., & Huang, S. C. (2006). Learning styles and formative assessment strategy: Enhancing student achievement in web-based learning. *Journal of Computer Assisted Learning*, *22*(3), 207–217. doi:10.1111/j.1365-2729.2006.00166.x

Watson, J. (2007). *A national primer on K-12 online learning.* International Association for K-12 Online learning (iNACOL). Retrieved December 10, 2012, from http://www.inacol.org/research/docs/national_report.pdf

Watson, J., et al. (2010). *Keeping pace with K-12 online learning.* Boulder, CO: Evergreen Education Group. Retrieved from www.kpk12.com/wp-content/uploads/KeepingPaceK12_2010.pdf

Watson, J., et al. (2011). *Keeping pace with K-12 online learning: An annual review of policy and practice.* Evergreen Education Group. Retrieved December 11, 2012, from http://kpk12.com/cms/wp-content/uploads/KeepingPace2011.pdf

Watson, J., & Gemin, B. (2008). *Promising practices in online learning: Socialization in online programs.* Vienna, VA: iNACOL. Retrieved December 24, 2012, from http://www.inacol.org/resources/promisingpractices/NACOL_PP_Socialization.pdf

Watson, J., & Gemin, B. (2009). *Keeping pace with K-12 online learning: An annual review of policy and practice.* Retrieved November 20, 2012, from http://kpk12.com/

Watson, J., Gemin, B., & Ryan, J. (2008). *Keeping pace with K-12 online learning: A review of state level policy and practice*. Evergreen, CO: Evergreen Consulting.

Watson, J., Murin, A., Vashaw, L., Gemin, B., & Rapp, C. (2010). *Keeping pace with K-12 online learning: An annual review of policy and practice.* Retrieved December 13, 2012 from http://kpk12.com/

Wicks, M. (2010). *A national primer on K-12 online learning: Version 2.* Retrieved October 4, 2012, from www.inacol.org

Wilson, S. (2010). The efficient use of teachers. In F. M. Hess & E. Osberg (Eds.), *Stretching the school dollar: How schools and districts can save money while serving students best* (pp. 125–154). Cambridge, MA: Harvard Education Press.

Wise, B., & Rothman, R. (2010). *Issue brief: The online learning imperative: A solution to three looming crises in education.* Washington, DC: Alliance for Excellent Education.

KEY TERMS AND DEFINITIONS

Asynchronous: Distance learning instructional tool where students can learn the same content (pre-recorded lecture, notes posted online, web-based simulation) at different times. It could be an existing or occurring at the same time.

Blended Learning: A form of distance learning that combines different forms of instructional technology (e.g., videotape, CD-ROM, Web-based training, film) with face-to-face instructor-led instruction depending on availability and resources in the context of location.

Distance Learning: A type of learning that takes place where a significant section of the teaching is conducted by an instructor not in the classroom or in space and or time from students. Communication is through email, electronic forums, video conferencing, chat room, bulletin boards and other computer-based communication.

E-Learning: The use of computer network technology, primarily via the Internet with the purpose to deliver information, content of knowledge, skills, and instruction to learners on a one-way (asynchronous).

Instructional Technology: Instructional technology is the design, development, utilization, management, and delivery of instruction either through media, electronic, print and other technology (computers, audiovisuals and equipment) as well as the evaluation of instruction for learners.

Synchronous: An instructional distance learning tool that happens at the same time for everyone, but can be online using (Web conferencing or IM chats or offline. Not going at the same rate or exactly together with something else.

Traditional Face-to-Face Instruction: Is a form of instruction that requires teachers and students to single location (classroom) with a fixed amount of time for interaction between instructor and students at a specified time in a particular place and time (classroom).

Virtual Online: A form of distance learning, where teachers and students are separated by geographical distance and the class is conducted using different electronic communication methods such as video conferencing, online chat, synchronous conferencing, web conferencing, blogs, emails, and social networks.

This work was previously published in Transforming K-12 Classrooms with Digital Technology edited by Zongkai Yang, Harrison Hao Yang, Di Wu, and Sanya Liu, pages 25-42, copyright year 2014 by Information Science Reference (an imprint of IGI Global).

Chapter 5
Factors Predisposing Academics towards the Use of Blended Strategies:
A Model

Geraldine Torrisi-Steele
Griffith University, Australia

ABSTRACT

Universities are investing considerable resources into blended learning as an institutional strategy to respond to pressures of uncertain economies, increasing globalisation, and the changing expectations of cohorts of digitally savvy students. However, the widespread adoption of effective blended teaching practices has generally not been achieved. A greater understanding of academics' blended teaching practices is needed to facilitate the uptake of effective blended practices on a larger scale. By exploring how various factors influence academics' use of technology with face-to-face teaching, the study makes a contribution to the understanding of academics' blended practices. The study described in this paper uses a mixed method, two phase methodology to develop a predictive model of blended strategy use. A major finding of the study is gender differences in factors predisposing academics towards blended strategy. Factors predisposing academics towards the use of blended in strategies in current practice were found to be: perceived usefulness (but only for male academics), higher education teaching experience, and self-efficacy (but only for females). Significant factors influencing academics' intentions for future blended practice were found to be: perceived usefulness, current use of blended strategies and, for female academics, perceived feasibility.

INTRODUCTION

Significant strategic investment is being made by universities into the use of technology for teaching (Bonk & Graham, 2006; Bonk, Kim, & Zeng, 2006; Graham & Robison, 2007). The focus on technology in teaching is largely an institutional response to a number of factors including pressures of globalization, increased focus on quality teaching and learning, and the needs and expectations

DOI: 10.4018/978-1-4666-8246-7.ch005

of cohorts of digitally savvy students. As a result of the strategic focus on technology for teaching, the majority of academics are using technology to some degree in their teaching. However, only a minority of academics are successfully combining technology with their face-to-face teaching to provide effective, high quality learning experiences through the use of blended approaches (Collis & Van Der Wende, 2002; Graham & Robison, 2007; Driscoll, 2002; Hoffman, 2006). The majority of academics are using technology with face-to-face teaching mainly for reasons of efficiency and flexibility. Whilst efficiency and flexibility are important considerations for coping with larger, more diverse student populations, the success of blended approaches as an institutional strategy rest largely on the widespread adoption of effective blended teaching practices - which has generally failed to occur (Graham & Robison, 2007).

One reason why effective blended teaching practices are not being widely adopted is that using technology together with face-to-face teaching is a complex undertaking. Using technology in teaching requires significant course redesign, usually involving the creation of new learning activities and reconsideration of assessment methods (Garrison & Kanuka, 2004). Although most academics are well-versed in teaching in traditional settings but they may need to acquire the knowledge and skills to fully exploit the potential of technology to provide effective learning experience. Against this context, the need to provide appropriate professional support to facilitate the use of effective blended teaching approaches is self-evident. The research described in this paper is not concerned directly with the provision of professional support. Rather, the research is concerned with seeking base knowledge that will contribute towards the development of more effective professional support.

The premise underlying the research is that professional support needs to effect a connection to existing practice to facilitate the critical analysis of existing beliefs and assumptions that academics need to undertake if they are to transform their practice. Hence, understanding the factors shaping academics' blended learning practices is fundamental to the provision of the professional support needed to facilitate the uptake of effective blended practices on a larger scale. Unfortunately, existing blended learning literature provides meager insight into academics' blended practices (Torrisi-Steele & Drew, 2013). The research described in this paper thus stems from the need to better understand academics' blended teaching practices.

In an effort to contribute to a greater understanding of academics' blended teaching practices, the present study aims to identify factors which predispose academics to use technology to create blended strategies by developing a model predicting academics' *current* and *intended future use* of blended strategies. A review of relevant literature together with a conceptual framework enabled the proposal of research model. A mixed methods, two-phase methodology was then used to develop the model. In the first phase, a survey instrument was designed and distributed to academic staff within Griffith University. Using the data collected from the survey, regression was used to refine the theoretical model. In the second phase of the study, survey respondents were purposefully selected, on the basis of quantitative results, to participate in interviews. The qualitative data from the interviews was used to support and enrich understanding of the quantitative findings.

But First – What is meant by 'Blended Learning'?

Before describing the study, it is important to consider what meant by the term 'blended learning' in this instance of research. A simple, broad understanding of the term 'blended learning' is that it refers the use of technology together with face-to-face teaching. However, to clearly distinguish between uses of technology with face-to-face teaching that are considered blended learning and those which are not a more precise definition of the term is required. Unfortunately, there is a lack of consensus about the meaning of the term 'blended learning' and, as Driscoll (2002, p. 1) observes, the term 'blended learning' "means different things to different people". In order to gain further insight into the term, and in search of a specific definition for the present study, the author examined the use of the term 'blended learning' in both literature and across twenty Australian universities. The investigation revealed a great variety of definitions (Author, 2011). It was found that the existing definitions of blended learning were unsatisfactory for two main reasons. Firstly, many definitions were considered too broad, conceptualizing blended learning as a combination of various learning styles, and/or delivery modes or even as a mix of methods of philosophies with or without the use of technology (e.g., Singh & Reed, (2001); Verkroost, Meijerink, Linsten, & Veen, (2008)) - such broad definitions enable almost any teaching practice to be considered 'blended'. Secondly, many definitions were techno-centric and gave little pedagogical guidance (e.g., Falconer & LittleJohn (2007); Koohang (2009)). As Oliver and Trigwell (2005) suggest, definitions of blended learning need to focus on the learning experience rather than the technology to clarify that the aim of blended learning is to provide a quality learning experience and does not use technology for its own sake. A few of the definitions encountered encapsulated some pedagogical principles For example, Garrison and Kanuka (2004, pp. 96-97) view blended learning as "the thoughtful integration of classroom face-to-face learning experiences with online learning such that we are not just adding on to the existing dominant approach or method".

On the basis of the investigation described briefly above, a new 'learning-centric' definition of blended learning was formulated (Torrisi-Steele, 2011). For the purpose of the research described in this paper, that definition will be used; thus, 'blended learning' refers here to learning achieved through enriched, student-centered, experiences made possible by the harmonious integration of various strategies combining face-to-face interaction with information and communication technology.

RESEARCH MODEL

The study aims to find a model of factors that influence the likelihood of academics using blended strategies currently and in the future. Accordingly, the proposed research model (Figure 1) is comprised of factors that are potentially significant in predicting the use of blended strategies by academics. The research model is founded on the core constructs of the technology acceptance framework (developed by Davis 1989) perceived ease of use, perceived usefulness, behavioral intent (*intended future use* of blended strategies) and actual system use (*current use* of blended strategies). The predictor constructs are normative influences, perceived ease of use, perceived usefulness, perceived feasibility, prior teaching experience, self-efficacy and teaching approach. Notice that gender is considered a moderating variable rather than predictor construct. Venkatesh, Morris, Davis and Davis (2003) include gender as a moderating variable in the Unified theory of acceptance and use of technology (an evolution of the original technology acceptance model). Furthermore, existing studies on academics' use of technology have reported gender differences in areas such as perceptions of success in the use of technology (Lumpe & Chambers, 2001), and in the extent of technology integration, skill and perception of skill (Briesser, 2006; Markauskaite, 2006; Volman &Van Eck, 2001).

The technology acceptance model forms the bedrock of the research model shown in Figure 1 but there are other elements to the conceptual framework for the research. These elements are: constructivist philosophy (Jonassen, 1994), diffusion of innovation (Rogers, 1995), evolution of teaching practice (Sandholtz, Ringstaff & Dwyer,

Figure 1. Research model

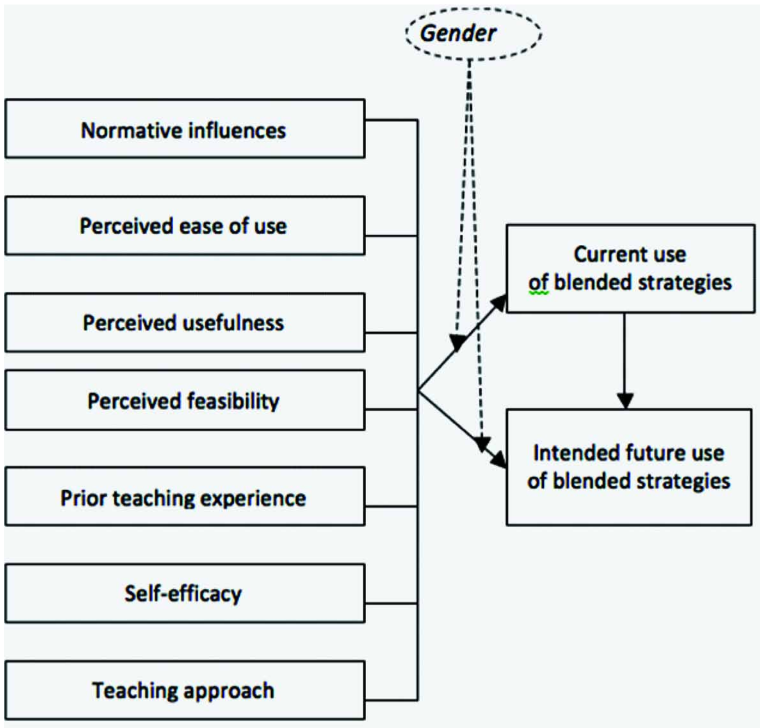
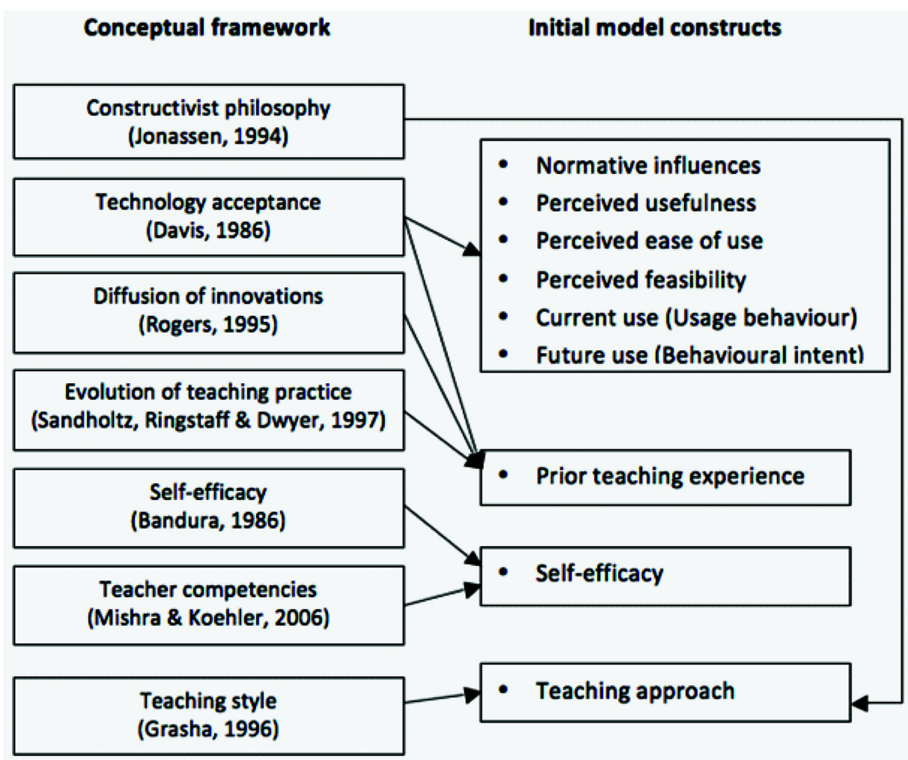


Figure 2. Conceptual framework elements and the precipitating predictor constructs of the theoretical model



1997) self-efficacy (Bandura, 1986) teacher competencies (Mishra & Koehler, 2006) and teaching style (Grasha, 1996). Figure 2.0 shows each of the model's predictor constructs and the conceptual framework element/s from which the construct emerged.

Each of the predictor constructs in the research model will now be defined, and relevant literature supporting the inclusion of the construct in the model will be briefly considered.

Normative Influences

Normative influences refer to an individual's belief about whether people important to them think that the behavior should or should not be enacted (Fishbein & Ajzen, 1975). Prior research on the acceptance of technology has investigated the role that normative influences play in academics' acceptance of technologies (e.g., Chang Lieu, Liang, Liu & Wong (2011); Tarcan, Varok, & Toker (2010)).

Important to the concerns the present study is identifying those groups whose opinions one might expect to be important to academics. Literature related to professional support of academics shows that supervisors and peers may be two such important groups. For example, Chew, Jones and Blackey (2010) report on the implementation of online assessment as an institutional strategy at the University of Glamorgan and found that having senior university staff members using blended strategies had a generally positive influence on the uptake of blended learning by more junior faculty members.

The large volume of blended learning literature concerned with the student opinions of blended strategies (e.g., Mitchell & Forer, (2010; Salmonson & Lantz, (2005; Richardson & Turner, 2000) suggests that students are another significant group whose opinions are important to academics.

Perceived Ease of Use

The amount of effort an academic believes he or she needs to expend to implement teaching strategies that require the use of both technology and face-to-face teaching is captured by the perceived ease of use construct. Existing literature on technology acceptance points to perceived ease of use as being a significant influence on the acceptance of technology (e.g., Halawi & McCarthy, 2000; Kripanont & Tatnall, 2009). The present study explores the role perceived ease of use may play in how technology is used.

Perceived Usefulness

Perceived usefulness is a core construct of the technology acceptance models. In technology acceptance models perceived usefulness positively affects behavioral intention to use technology. For the present study, perceived usefulness is the degree to which academics believe that using technology together with face-to-face teaching strategies will enhance teaching effectiveness. Researchers such as Halawi and McCarthy (2010), Chang et al. (2011) and Tarcan, Varol and Toker (2010) have found perceived usefulness positively influences the intent to use technology. Perhaps then, perceived usefulness may also significantly influence how the technology is used.

Perceived Feasibility

Present in some technology acceptance models (Venkatesh & Bala, 2008), feasibility is considered to influence usage behavior. Feasibility conditions such as time, infrastructure, professional support, technical support, and funding have been found to be significant in influencing academics' acceptance of technology (e.g., Bagher, Marek & Sibbald, 2007; Davis & Fill, 2007; Kistow, 2009; Ocak, 2010; Stewart, Bachman, & Johnson, 2010;

Wang, 2009). Given that implementing blended approaches generally requires a significant investment of time and resources, it is likely that academics' perceptions of feasibility conditions such as time, funding, support, and infrastructure play a role in shaping the extent to which technology is used by academics in their teaching.

Prior Teaching Experience

Sandholtz, Ringstaff and Dwyer (1997) observe that teachers using technology tend to progress through a number of stages of technology usage with increased experience in teaching with technology. Experience as an influence of usage behavior has also been identified in the technology acceptance models described in the previous chapter.

Self-Efficacy

Self-efficacy is the belief in one's capacity to succeed in an undertaking (Bandura, 1986). Within the present study self-efficacy refers to academics' belief in their own ability to implement teaching strategies, in a specific content area, using both technology and face-to-face teaching. The construct of self-efficacy in this study has been framed in terms of the technology, pedagogy, and content knowledge framework (Mishra & Koehler, 2006) which suggests that for teachers to use technology effectively they must possess technological, pedagogical and content knowledge

Self-efficacy in this study is conceptualised in terms academics' beliefs about their ability to:

- Use technology (technical knowledge);
- Design effective teaching strategies (pedagogical knowledge);
- Understand course content (content knowledge);
- Make good decisions about teaching approaches appropriate to teaching the content (pedagogical-content knowledge);
- Identify which technologies can be used in the content area (technological-content knowledge);
- Understand the attributes of the technology and how they can be used to form new teaching strategies (pedagogical-technological knowledge);
- Identify the attributes of technology as well as design new strategies using those attributes to best teach the required content knowledge (technological-pedagogical-content knowledge).

Teaching Approach

Aligned with Grasha's (1996) conception of teaching style, the 'teaching approach' construct is used in the present study to refer to the characteristic manner in which individual teachers design the instructional process. The decision to use teaching approach as a predictive construct is made on the observation that, in some existing studies, constructivist teaching approaches were found to be conducive to using technology as an intrinsic part of learning activities (Judson, 2006; Grasha, 1996; Weitkamp, 2006).

METHOD

This study uses a two-phase approach to data collection. In the first phase, gathering quantitative data took place through the use of an online survey instrument designed specifically for the study. The survey link was distributed to Griffith university academics via email. A door-to-door paper survey was also used in attempt to boost response rates. A total of 53 academics responded to the survey.

The survey included the following components:

- Demographic information - gender, faculty, class size, number of years teaching in/outside of higher education.

Figure 3. Matrix for measure of current use of blended strategies

Indicate the extent to you use technology with face-to-face teaching to do each of the following:	
Address areas in which students experience difficulty	Not at all Extensively 1 2 3 4 5 6 7
Achieve course objectives.	Not at all Extensively 1 2 3 4 5 6 7
Present ideas in different ways.	Not at all Extensively 1 2 3 4 5 6 7
Provide learning activities.	Not at all Extensively 1 2 3 4 5 6 7
Implement assessment tasks closely aligned with real world contexts.	Not at all Extensively 1 2 3 4 5 6 7
Provide a high degree of individual autonomy for students.	Not at all Extensively 1 2 3 4 5 6 7
Develop innovative strategies.	Not at all Extensively 1 2 3 4 5 6 7

Actual current use of blended strategies matrix (Figure 3) - The matrix enabled academics to select the extent and purpose of usage of face-to-face strategies, and the extent and purpose of usage of various technologies. The list of technologies was created using the tools available in Learning@Griffith (Learning@Griffith is Griffith University's teaching and learning management system). The measure of *current use* of blended strategies for each respondent was obtained by converting each academic's selections in the matrix to a single score by allocating weightings to purpose and extent of usage for each technology, and then summing the scores for each technology used.

Seven, 7-point Likert Scale items to measure *intended future use* of blended strategies (Figure 4) -enabled respondents to indicate the extent to which they would like to use technology to achieve certain practice objectives in their nominated course.

- Twenty-seven, 7-point Likert Scale items to measure normative influences, perceived ease of use, perceived usefulness, perceived feasibility, prior teaching experience, self-efficacy and teaching approach. The twenty-seven items were selected from an initial pool of thirty-one items by using the Q-sort method. The Q-sort method as described by Nahm, Solis-Galvan, Rao, & Ragu-Nathan, (2002) was used as a simple yet effective method of assessing construct reliability and validity.

The item sets are shown in Table 1. Respondents were asked to indicate their level of agreement with each item (1 – strongly disagree through to 7-strongly agree).

In the second phase, semi-structured interviews were conducted. A subsample (N = 8) of survey respondents was interviewed. The selection of interview participants was based on the quantitative results. Outlier sampling was used to purposefully select interview participants from the pool of survey respondents willing to participate in interviews. The qualitative data yielded from the interviews was used to add depth to the understanding of the quantitative findings.

Figure 4. Measure of intended future use of blended strategies

Q3.6. For the course, complete the following table by making entries in both the 'Usage' column and, if applicable, the 'Purpose used' column.

	Usage			purpose used					
	Not used	some usage	much used	Efficiency	Accessibility	Understanding concepts	Practice skills	Sharing ideas	Communication
Face-face lectures									
Face-face small groups									
Interactive clickers									
video conferencing									
Wikis									
lecture capture									
Email									
Blogs									
Twitter									
Facebook									
You tube									
Discussion board									
Virtual classroom									
Live chat									
Online assessment									
mobile technologies									
Online Peer/Self assessment									
Podcasting									
Wimba									
L@G Group management tool									
L@G Expo tool									
Interactive learning objects									
Other									

QUANTITATIVE FINDINGS

Before regression could be performed on the predictor construct data that was collected via the items shown in Table 1, instrument reliability needed to be addressed. Instrument reliability was demonstrated by undertaking item analysis of each of the construct item groups, that is, item analysis was conducted to check that each item, in the each set, was a good measure of the construct it intended to measure (Colten & Covert, 2007; De Vaus, 2002; Hair, Black, Babin & Anderson, 2010). Two values were calculated: Cronbach's alpha and the corrected item-total correlation. Cronbach's alpha is a check to see if all the items that intend to measure the same construct produce a similar score. Hair, Black, Babin and Anderson (2010) recommends that the lower limit value of Cronbach's alpha is 0.6. The item-total correlation checks if any item is inconsistent with averaged

Table 1. Items used to measure of predictors of current and intended future blended strategy

Constructs	Item
Normative influences	Many of my peers believe academics should use technology together with face–face teaching.
	Students have the expectation that I will use technology together with face-to-face teaching
	Industry expects students will study courses that use both technology and face-to-face teaching.
	The university would like academics to use technology together with face-to-face teaching
Perceived ease of use	It does not take much effort to use various technologies together with face-to-face teaching.
	When I use technology for teaching I do not worry that things will go wrong.
	It is easy to match characteristics of various technologies to core content, ideas, and skills.
Perceived usefulness	Technology together with face-to-face teaching is useful for enriching students' learning experiences.
	I find technology together with face-to-face teaching is useful for increasing students' opportunities for discussion and collaboration.
	Technology together with face-to-face teaching is useful for increasing efficiency.
Perceived feasibility conditions	The available professional support allows me to use technology together with face-to-face teaching
	Teaching facilities allow the possibility of using technology together with face-to-face teaching
	I have enough time to use technology together with face-to-face teaching
	The technical infrastructure of the university makes it possible to use a variety of technologies in my face-to-face teaching
Self-efficacy	I can see how I can use technology combined with face-to-face teaching to implement strategies appropriate to the course objectives.
	I am confident in my ability to include technology in teaching to enhance how I teach and engage students.
	I am confident I can solve my own technical problems.
	I am able to select effective teaching strategies to guide student thinking.
	I have good, up to date knowledge of the content area.
	I can use a wide range of teaching approaches.
	I can identify specific technologies suited to understanding the content in my content area.
Teaching approach	I use group discussions to help students think critically about content.
	I guide students' work by asking questions and exploring options.
	I encourage students to generate their own notes.
	I encourage students to restructure their existing knowledge in terms of new ways of thinking.

Table 2. Construct means across all study participants (N = 53)

Construct	Mean
Perceived usefulness	5.58
Perceived feasibility	4.81
Self- efficacy	5.40
Current use score	7.20
Future use score	5.42
Perceived current use score	4.61
Number of years teaching experience in higher education	13.31 years

behavior of other items in the group. The minimally accepted value of the item-total correlation is 0.3 (De Vaus, 2002; Hair et al., 2010).

Upon analysis, all items met the minimum value of 0.6 for Cronbach's alpha. However, an inspection of item total correlations lead to the removal of the normative construct item: "industry expects students will study courses that use both technology ad face-to-face teaching" because its value of 0.252 is less than the minimally acceptable 0.3 (De Vaus, 2002; Hair et al., 2010).

With item analysis complete, and the reliability of the instrument established, data analysis could begin. The means for construct scores across all 53 respondents are given in Table 2.

Regression was undertaken for constructs as predictors of 1) *current use* of blended strategies, and 2) *intended future use* of blended strategies. The resulting model parameters for *current use* of blended strategies are given in Table 3.

The positive estimate coefficients in Table 3 indicate a favoring of the use of blended strategies. Those academics with high perceived usefulness scores are predisposed towards using blended strategies in their current practice (note the positive coefficient). On the other hand, the negative coefficient for teaching experience in higher education indicates academics that have been teaching in higher education longer are pre-disposed to lesser use of blended strategies.

A particularly interesting outcome is the presence of interactions with gender. In particular, there is a *self-efficacy: gender* interaction and *a perceived usefulness: gender* interaction. The positive coefficient for the *self-efficacy: gender* interaction indicates females with higher self-efficacy with regard to the use of blended strategies are more inclined to use blended strategies in current practice. The negative coefficient of the *perceived usefulness: gender* interaction indicates that for female academics perceived usefulness is not as important influence on the use of blended strategies as it is for male academics.

Table 3. Model parameters for current use of blended strategies

Fixed Effects				
	Estimate coefficient	Std. Error	t value	Pr(>|t|)
(Intercept)	-5.50264	7.97975	-0.690	0.4940
Gender = female	-5.40926	10.30914	-0.525	0.6024
Perceived usefulness	2.57841	1.04254	2.473	0.0172 *
Teaching experience in higher education	-0.15763	0.07296	-2.160	0.0361 *
Self-efficacy	1.22298	1.43084	0.855	0.3972
Perceived feasibility	-1.35281	0.97083	-1.393	0.1703
Self-efficacy: Gender = female	4.82572	1.80222	2.678	0.0103 *
Perceived usefulness: Gender = female	-3.36219	1.55028	-2.169	0.0354 *

Significance codes: 0 *** 0.001 ** 0.01 * 0.05 . 0.1 ' ' 1

Table 4 gives the resulting model parameters for *intended future use* of blended strategies.

An examination of Table 4 shows perceived usefulness is a highly significant predictor of the *intended future use of blended strategies*. The coefficients of both perceived usefulness and current use are positive indicating academics who perceive blended strategies as useful are more likely to use blended strategies in the future, and those academics who are currently using blended strategies are also more likely to use blended strategies in the future.

Interestingly, perceived feasibility has a negative coefficient. This is seemingly counter-intuitive in that it suggests that those academics that perceive blended strategies to be more feasible are less likely to use them. One possible explanation can be arrived at by firstly, noting that perceived feasibility interacts with gender and the *perceived feasibility: gender = female* interaction has a positive coefficient, thus female academics who perceive the task as highly feasible are more likely to intend to use blended strategies in the future. Secondly, observe that perceived usefulness is of greater importance for male academics' for *current use* of blended strategies than it is for female academics. Possibly, for male academics, perceived usefulness is the primary concern and they will tend not to use blended strategies, even if feasible, unless they are perceived as useful.

Finally, normative influences are not significant but trending towards having a positive influence on the *intended future use* of blended strategies.

The resultant models are visually represented in Figure 5.

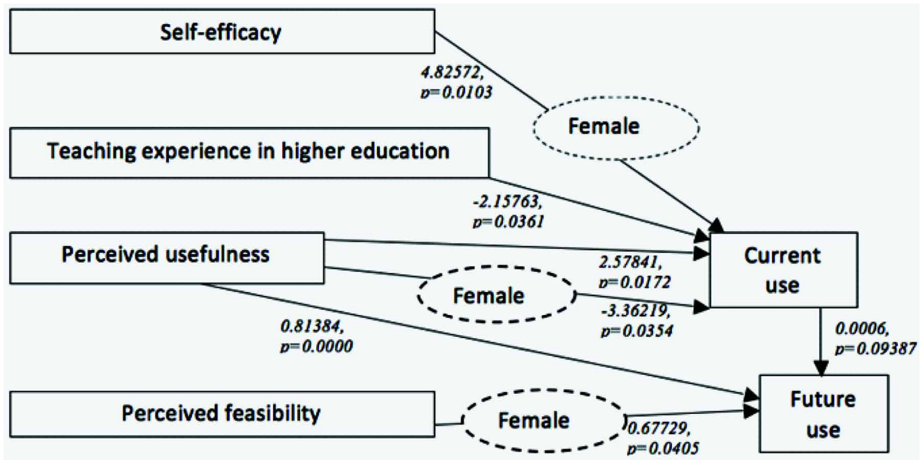
The quantitative outcomes will now be discussed in light of interview data so as to enrich understanding.

Table 4. Model parameters for intended future use of blended strategies

Fixed effects				
	Estimate coefficient	Std.Error	t value	Pr(>|t|)
(Intercept)	-0.71953	1.99170	-0.361	0.7198
Gender = female	2.55681	2.83239	0.903	0.3721
Perceived usefulness	0.81384	0.17064	4.769	0.0000 ***
Current use score	0.09387	0.02508	3.742	0.0006 ***
Perceived feasibility	-0.86361	0.27757	-3.111	0.0034 **
Normative influences	0.42743	0.23285	1.836	0.0739 .
Teaching approach	0.04828	0.19796	0.244	0.8086
Perceived ease of use	0.14647	0.14591	1.004	0.3215
Number course offerings	0.23738	0.20866	1.138	0.2620
Self-efficacy	0.25206	0.24958	1.010	0.3186
Teaching approach: gender = female	-0.72585	0.48000	-1.512	0.1383
Perceived ease of use: gender = female	-0.37108	0.25728	-1.442	0.1570
Perceived Feasibility: gender= female	0.67729	0.31988	2.117	0.0405*

Significance codes: 0 *** 0.001 ** 0.01 * 0.05 . 0.1 ' ' 1

Figure 5. The model of factors influencing academics' inclination to use blended strategies in current and future practice. Coefficients and p values are shown



DISCUSSION

Quantitative analysis revealed perceived usefulness as a significant predictor for the use of blended strategies. For male academics especially perceived usefulness is a significant predictor of *current use* of blended strategies. Perceived usefulness was found to be a highly significant predictor of *intended future use* of blended strategies for both male and female academics. Given its significance, the concept of perceived usefulness warrants some discussion. During interviews a distinction emerged between perceived usefulness for the purpose of teaching and learning versus perceived usefulness in terms of administrative efficiency or ease of access. It became abundantly obvious that when academics view the use of technology with face-to-face teaching as useful for enhancing learning, it is a strong driver for the use of blended strategies. Those academics with high perceived usefulness scores acknowledged usefulness of technology for purposes of efficiency and flexibility, but most importantly placed emphasis on use targeted towards enhancing learning experiences. For example, one participant (perceived usefulness score= 7, current use score =10) noted that blended learning is "a marriage of tech with face-to-face making it the best learning outcome". Another participant (perceived usefulness score = 7, current use score = 20) explained her integrated use of technology with face-to-face teaching in terms of learning activities and teaching:

I upload previous student essays and get them to mark them and explain why so they engage in discussion about this [discussion boards]... I also use online case studies linked to book chapters and question banks. It's very integrated...I found it [technology] very useful ...as we move through the course I see them [students] challenging each other…The online discussion feeds into the face-to-face teaching and learning.

In contrast, those academics with lower perceived usefulness score focused on efficiency and access and neglected the learning experience in their comments. One participant (perceived usefulness score 4.8, current use score=0) felt that technology was "nothing more than an administrative device". Other participants with low perceived usefulness scores and low current use scores expressed a similar sentiment:

Recording lecture audio is useful for students to access" (perceived usefulness score =4.6, current use score =2);

My main motivation for using [technology] is that we have a large cohort of students … that way I don't need to use the board as much and I use the internal communication thing on Blackboard (perceived usefulness =5, current use score =0).

An interesting feature of the resulting models for both *current* and *intended future use* of blended strategies is the presence of gender differences in the significant constructs. In the predictive model for *current use* of blended strategies, gender differences exist for the predictive constructs of perceived usefulness and for self-efficacy. Perceived usefulness is a significant predictor of current blended practice adoption for male academics but not so important for female academics. Self-efficacy, on the other hand, is more important as a predictor of *current use* of blended strategies for female academics. These quantitative outcomes manifested in interviews. Female academics placed emphasis on feeling confident and having the required skills. For example female academics made comments such as:

I've got the skills and if don't have the skills then I take the time to learn to do them ..., if it's too difficult or complex then I don't bother;

I'm pretty new here, it's a constant battle to find out what I can do and what's available and how to use it… I feel quite comfortable doing stuff once I find out;

I'm still learning...things go wrong. If things go wrong I use the tech person, he's very good. If I can't get him I use my colleagues who also have those skills so it's no problem.

An important observation is that although female academics elaborated in some detail on self-efficacy and technical support, the three male participants did not raise the issue of self-efficacy and support but rather focused almost exclusively on usefulness:

You shouldn't use it just for those reasons anyway [efficiency]. I mean I it is something you can do better with technology? That's really the question (male academic).

In the predictive model for *intended future use* of blended strategies, gender differences are observed with respect to perceived feasibility. Perceived feasibility is a significant predictor of the intention to use blended strategies in the future for female academics but not so for male academics. The emphasis that female academics put on feasibility during interviews supports the quantitative result. In addition when female academics discussed feasibility, the issue of time was often raised:

My focus is student-centric, make it fun, engaging, keep my students, I'm prepared to do what it takes… I make the time (Female; perceived usefulness = 7, perceived feasibility = 6.5);

Any plans I have for the future involve more work for me – that will require a lot of extra effort and time. There's lots of things I'd like to do, but I need to draw the line somewhere (Female, perceived usefulness=6, perceived feasibility= 3.7).

In relation to time, female academics frequently identified professional support as a mechanism to reduce time investment:

Again it's time, if someone would come to me and say well here's all your options that'd be great (Female, perceived usefulness =6.4, perceived feasibility 2.3).

In contrast, male academics made brief mention of time, and when they did it was only in reference to technical failures leading to loss of time:

Technology has 'gotten in the way' of student engagement to a certain extent, fiddling and messing around can slow you down, equipment can fail and nothing happen, so it has risks; in terms of a lecture does it really make you do more, I don't think so (Male, perceived usefulness=4.6, perceived feasibility=4.0).

The remaining significant predictor constructs present in the models are teaching experience as a predictor of *current blended practice,* and current practice as a significant predictor of the *future* intention to use blended strategies. Understanding of both these predictors is also enhanced by discussion in light of interview data.

With respect to the teaching experience predictor, it was found that the greater number of years teaching experience in higher education were less likely to be currently using blended strategies. Interview data added an interesting perspective to this finding. The participant with the greatest number of years (38 years) teaching experience viewed the use of technology in teaching as being in competition with traditional face-to-face teaching – a question of which is better:

Is it [technology] better than carefully planned face-to-face teaching … Can it be shown that bringing in technology is going to improve the learning experience? (perceived usefulness score =4.8, current use score=0).

In contrast those with the least teaching experience considered if the use of technology was appropriate to certain situations making comments such as

you've got more options [using technology with teaching]"; "this subject can't really be taught any other way…if it was a different subject then there would be more that could be done with the technology

The importance of current practice as a significant predictor in the predictive model for *intended future use* of blended strategies, was clearly demonstrated during interviews. As the model predicted, those with positive experiences in their current practice are more likely to use blended strategies in the future, whilst those negative experiences 'put academics off future use':

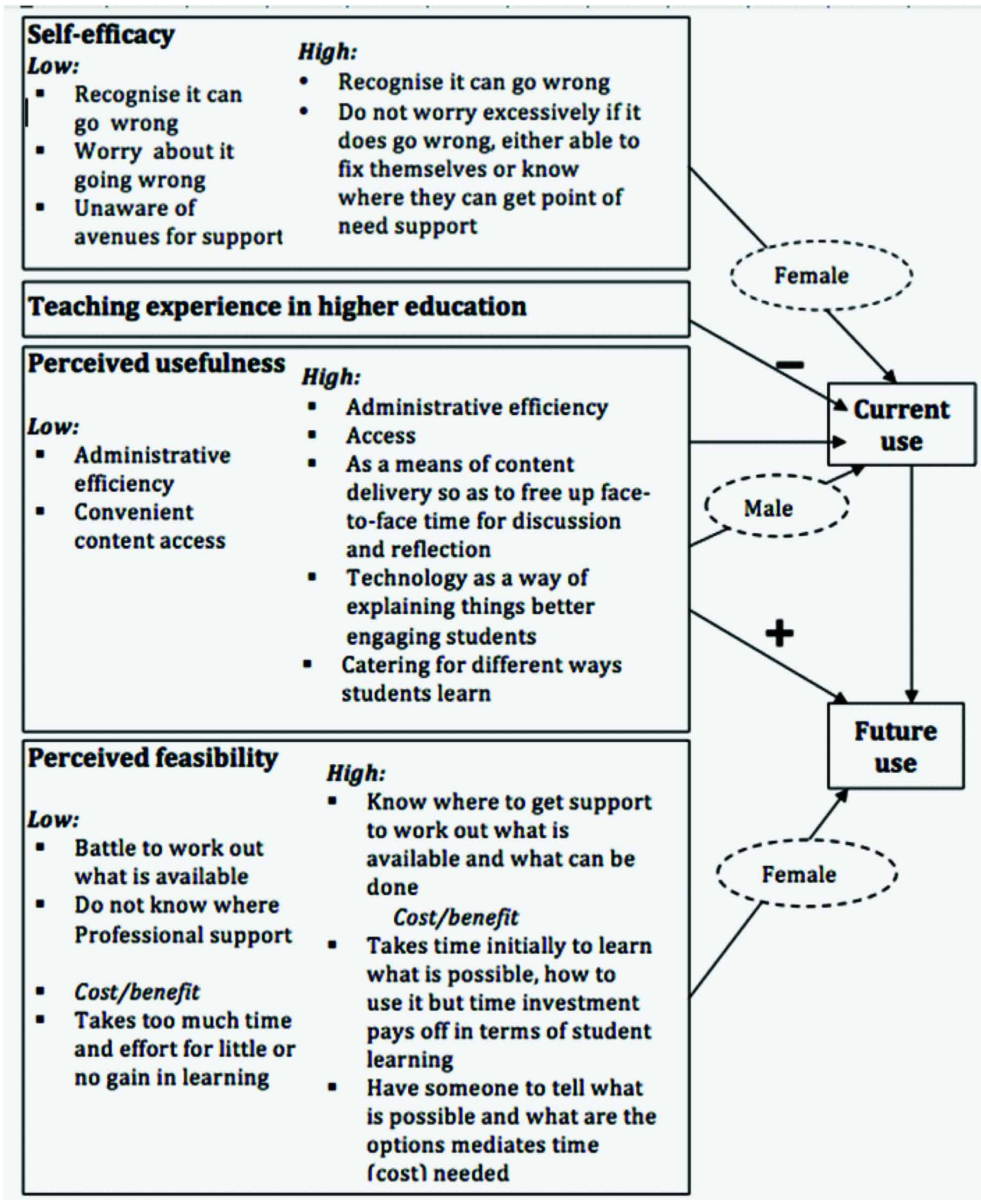
I upload case studies and ask them to respond to that..[in another course] I upload previous student essays and get them to mark and explain why so they engage in discussion about this…I've found it [discussion boards] quite useful...I use them in another course [with case studies] (Female, perceived usefulness=7, current use score=20, future use =6.2);

I don't use discussion boards [anymore]...they [students] just used them to complain or ask when marks were coming out or things like that… I have used online quizzes. It worked but it wasn't that useful because they'd [students] sit in the library [with] a set of computers. One was Googling and the other be doing the test (Female, perceived usefulness=6, current use score=4, future use = 5.3);

I once borrowed a roving microphone to use with Lectopia. It was so complicated to use I never used it...Once [when the technology went wrong] I had to apologise to a large class. A lock up like that rips out lots of time"; "I've set up discussion groups...but students remained silent and didn't use them (Male, Perceived Usefulness=4.8, current use score=0, future use score=5.2).

A discussion of the quantitative results in light of interview data both supported findings and enriched understanding of factors shaping how academics use technology in their teaching. The most important insights from interview data are added to the theoretical model to give the enhanced model shown in Figure 6.

Figure 6 . The model enhanced by qualitative insights



RECOMMENDATIONS

By expanding understanding of factors influencing how academics use technology, the present research sought to contribute to the body of knowledge that informs the formulation of professional support and development. From the research findings three key recommendations for professional support may be made:

Emphasis on pedagogy not on the technology.

Perceived usefulness was found to be a significant predictor of current and *intended future use* of blended strategies. Perceptions of usefulness of the use of technology with face-to-face teaching that related to improving student learning (and not just efficiency and flexibility of access) were most conducive to the use of blended strategies.

This finding has implications for the manner in which workshops and other support is provided. Professional support should not be techno-centric and focusing on technology. Rather a pedagogical perspective should drive support activities. It would be useful if professional support relationships with academics began by mapping learning objectives to the strategies and technologies that are currently being used. Using the information recorded in the mapping forms the basis for discussion about what strategies are working and what improvements or changes are needed.

Professional development initiatives must consider gender differences.

The research has uncovered the existence of gender differences related to self-efficacy and perceived feasibility. It is therefore important that those supporting academics' blended learning efforts are made aware of these differences. For female academics, greater self-efficacy increases the likelihood of current blended strategy use, and increased perceived feasibility raises the likelihood of the intent of using blended strategies in the future. Clearly self-efficacy and feasibility are important considerations for all academics, but professional support for female academics should incorporate specific strategies to target these constructs.

It is critical that those involved in supporting academics are made aware of the existence of gender differences so that blended learning support initiatives can be designed to address the differences between genders especially with regard to self-efficacy and perceived feasibility.

For female academics, greater self-efficacy increases the likelihood of current blended strategy use, and increased perceived feasibility raises the likelihood of the intent of using blended strategies in the future. Although self-efficacy and perceived feasibility are necessary considerations for professional support for all academics, for female academics, professional support should give more direct attention to increasing self-efficacy and perceived feasibility. Given also the emphasis on support by female academics it is imperative that measures are put in place to both provide the necessary support and disseminate information about where to get support. Professional development activities such as workshops etc. should be followed up by arranged contact with appropriate technical support individuals in order to establish contact before support is required in practice. A 'buddy' system maybe particularly useful in which academics are paired with colleagues who possess greater technical knowledge and are thus able to provide support also.

With respect to feasibility, female academics identified the provision of support as resulting in a reduction of time investment. It is recommended that professional support staff, from initial contact, work together to identify best options for a particular teaching context rather than simply giving a general 'showcase of available technologies'. In this way, preparation time is greatly reduced because relevant options are considered.

Seek to gather knowledge about the current practice of the academics they are supporting, and use that knowledge to provide appropriate support.

The importance of academics' current practices with the use of technology with face-to-face teaching was made evident by the results of the present study. Current usage was found to be a highly significant predictor of the intent to use blended strategies in the future. It is recommended that there is a focus on understanding academics current practices and it is considered important to gain insight into prior experiences of using technology. Information about current practice may be collected during workshops and serve as a launching point for more individualized support later.

Limitations and Future Directions

Whilst the study has expanded understanding of factors that influence how academics use technology after adoption and led to some recommendations for provision of more effective professional support for academics, the study limitations must be acknowledged before concluding. The limitations potentially restrict the generalizability of results but also direct attention to further research. In the described study, limitations relate to sample size, sample acquisition, institutional culture and context, and the limited number of constructs investigated.

It is unknown if a larger sample size would yield different results. Furthermore, research participants voluntarily chose to participate suggesting they were already interested to some degree in the use of technology for teaching. Results may have been influenced by this attitude.

The study was conducted within one institution in which there is strong strategic focus on blended learning and has implemented a plethora of support mechanisms for academics. Griffith University's focus on blended strategy may influence academics use of blended learning. Griffith University is a large multi-campus university situated in Australia and the results of the study may not necessarily generalize to institutions of different scales in other countries. The need for cross-cultural studies of a similar nature to this study is self-evident.

An extension of the present study may consider how disciplinary difference impact on the predictive model. A longitudinal study tracing the development of blended strategy use and any changes in perceptions in individual academics over a period of time would also be an interesting extension to the study. Finally, the study was limited to seven factors. Human behavior is very complex. Thus a natural extension of the study would be to consider a wider range of potential predictors.

CONCLUSION

The study endeavored to increase understanding of factors shaping how academics use technology in their teaching practice by identifying a predictive model of current and *intended future use* of blended strategies. Applying regression techniques to data collected via a survey from 53 Griffith University academics yielded some interesting insights. In the initial research model it was proposed that: (1) academics' disposition towards using blended strategies in their current practice could be predicted by seven constructs (perceived usefulness, perceived ease of use, perceived feasibility, teaching approach, feasibility, teaching experience and normative influences); and (2) academics intention of using blended practices could be predicted by the same seven constructs along with current practice. Subsequent data collection and analysis has shown that not all of the seven proposed predictor constructs were significant predictors of *current use* of blended strategies, and *intended future use* of blended strategies. Perceived usefulness, teaching experience in higher education and self-efficacy were significant predictors of *current use* of blended strategies. Perceived usefulness, current use and perceived feasibility were significant predictors the intention to use blended strategies in the *future*. For both *current* and *intended future use* of blended strategies gender differences exist among the factors predictive of the use of blended strategies.

The study makes a contribution to understanding why academics are inclined to use technology to create blended strategies while others do not. Importantly, it has been established that the academics' experiences, perspectives, and gender are important factors shaping how they use technology for teaching, and worth investigating further.

REFERENCES

Bagher, M., Marek, S. A., & Sibbald, A. (2007). Implementing web-assisted learning and engaging academic staff in the change process. *Journal of Organisational Transformation and Social Change*, *3*(3), 269–284. doi:10.1386/jots.3.3.269_1

Bandura, A. (1986). *Social foundations of thought and action: A social cognitive theory*. Englewood Cliffs, NJ: Prentice Hall.

Bonk, C. J., & Graham, C. R. (2006). *The handbook of blended learning: Global perspectives, local designs*. San Francisco: Pfeiffer.

Bonk, C. J., Kim, K., & Zeng, T. (2006). Future directions of blended learning in higher education and workplace learning settings. In C. J. Bonk & C. R. Graham (Eds.), *Handbook of blended learning: Global perspectives, local designs* (pp. 550–567). San Francisco, CA: Pfeiffer.

Breisser, S. R. (2006). An examination of gender differences in elementary constructionist classrooms using Lego/Logo instruction. *Computers in the Schools*, *22*(3-4), 7–19. doi:10.1300/J025v22n03_02

Chang, J.-L., Lieu, P. T., Liang, J. H., Liu, H. T., & Wong, S. L. (2011). Factors influencing technology acceptance decision. *African Journal of Business Management*, *5*(7), 2901–2909.

Chew, E., Jones, N., & Blackey, H. (2010). Implementing institutional inline assessment – Addressing the challenges. In P. Tsang, S. K. S. Cheung, V. S. K., Lee, & R. Huang (Eds), *Hybrid Learning*, Springer-Verlag Berlin Heidelberg: Lecture Notes in Computer Science. *6248*, 453-464. Retrieved from http://www.springerlink.com/content/0802v72064121055/

Collis, B., & Moonen, J. (2001). *Flexible learning in a digital world: Experiences and expectations*. London, UK: Kogan Page.

Collis, B., & Van Der Wende, M. (2002). *Models of technology and change in higher education: An international comparative survey on current and future use*. Enshede: University of Twente.

Davis, H. C., & Fill, K. (2007). Embedding blended learning in a university's teaching culture: Experiences and reflections. *British Journal of Educational Technology*, *38*(5), 817–828. doi:10.1111/j.1467-8535.2007.00756.x

De Vaus, D. A. (2002). *Surveys in social research. Crow's Nest*. Allen & Unwin.

Driscoll, M. (2002, March 1). Blended learning: let's get beyond the hype. Retrieved from E-learning: http://elearningmag.com/ltimagazine

Falconer, I., & Littlejohn, A. (2007). Designing for blended learning and reuse. *Journal of Further and Higher Education*, *31*(1), 41–52. doi:10.1080/03098770601167914

Fishbein, M., & Ajzen, I. (1975). *Belief, attitude, intention and belavior: An introduictionto theory and research*. Reading, MA: Addison-Wesley.

Garrison, D. R., & Kanuka, H. (2004). Blended learning: Uncovering its transformative potential in higher education. *The Internet and Higher Education*, *7*(2), 95–105. doi:10.1016/j.iheduc.2004.02.001

Garrison, R., & Vaughan, H. (2008). *Blended learning in higher education: Framework, principles and guidelines*. San Francisco, CA: Jossey-Bass.

Graham, C. R. (2006). Blended learning systems: Definition, current trends and future directions. In C. J. Bonk & C. R. Graham (Eds.), *Handbook of blended learning: Global perspectives, local designs* (pp. 3–21). San Francisco, CA: Pfeiffer.

Graham, C. R., & Robison, R. (2007). Realizing the transformative potential of blended learning: Comparing cases of transforming blends and enhancing blends in higher education. In A. G. Picciano & C. D. Dziuban (Eds.), *Blended learning research perspecives* (pp. 83–110). Needham, MA: The Sloan Consortium.

Grasha, A. F. (1996). *Teaching with style*. Pittsburgh, PA: Alliance Publishers.

Hair, J. F., Black, W. C., Babin, B. J., & Anderson, R. E. (2010). *Multivariate data analysis* (7th ed.). Upper Saddle River, NJ: Prentice Hall.

Halawi, L., & McCarthy, R. (2000). Measuring faculty perceptions of Blackboard using TAM. *Issues in Information Systems*, *8*(2), 160–165.

Hoffman, J. (2006). Why blended learning hasn't (yet) fulfilled its promises: Answers to those questions that keep you up at night. In C. Bonk & C. Graham (Eds.), *The Handbook of Blended Learning: Global Perspectives, Local Designs* (pp. 27–40). San Francisco, CA: Pfeiffer.

Janes, J. (1999). Survey construction. *Library Hi Tech*, *17*(3), 321–3325. doi:10.1108/07378839910289376

Jonassen, D. H. (1994). Thinking technology: Toward a constructivist design model. *Educational Technology Research and Development*, *34*(4), 34–37.

Judson, E. (2006). How teachers integrate technology and their beliefs about learning: Is there a connection? *Journal of Technology and Teacher Education*, *14*(3), 581–597.

Kistow, B. (2009). E-learning at the Arthur Lok Jack Graduate School of Business: A survey of faculty members. *International Journal of Education and Development using ICT, 5*(4), 14-20.

Koohang, A. (2009). A learner-centered model for blended learning design. *International Journal of Innovation*, *6*(1), 76–91.

Kripanont, N., & Tatnall, A. (2009). The role of a modified technology acceptance model in explaining internet usage in higher education in Thailand. [IJANTTI]. *International Journal of Actor-Network Theory and Technological Innovation*, *1*(2), 31–49. doi:10.4018/jantti.2009040103

Lumpe, A. T., & Chambers, E. (2001). Assessing teachers' context beliefs about technology.

Markauskaite, L. (2006). Gender issues in preservice teachers' training: ICT literacy and online learning. *Australasian Journal of Educational Technology*, *22*(1), 1–20.

Mishra, P., & Koehler, M. J. (2006). Technological pedagogical content knowledge: A framework for teacher knowledge. *Teachers College Record*, *108*(6), 1017–1054. doi:10.1111/j.1467-9620.2006.00684.x

Nahm, A., Solis-Galvan, L. E., Rao, S., & Ragu-Nathan, T. S. (2002). The Q-sort method: Assessing reliability and construct validity of questionnaire items at a pre-testing stage. *Journal of Modern Applied Statistical Methods; JMASM*, *1*(1), 114–125.

Ocak, M. (2010). Why are faculty members not teaching blended courses? Insights from faculty members. *Computers & Education*, *56*(3), 689–699. doi:10.1016/j.compedu.2010.10.011

Oliver, M., & Trigwell, K. (2005). Can blended learning be redeemed? *E-learning*, *2*(1), 17–26. doi:10.2304/elea.2005.2.1.17

Rogers, E. M. (1962). *Diffusion of innovation*. Glencoe: Free Press.

Rossett, A., Douglis, F., & Frazee, R. V. (2003). Strategies for building blended learning. Retrieved from Learning Circuits: http://www.astd.org/LC/2003/0703_rossett.htm

Salamonson, Y., & Lantz, J. (2005). Factors influencing nursing students' preference for a hybrid format delivery in a pathophysiology course. *Nurse Education Today*, *25*(1), 9–16. doi:10.1016/j.nedt.2004.09.006 PMID:15607242

Sandholtz, J., Ringstaff, C., & Dwyer, D. (1997). *Teaching with technology*. New York, NY: Teachers College Press.

Singh, H., & Reed, C. (2001). A White Paper; Achieving success with blended learning. ASTD State of the Industry Report, American Society for Training and Development. Retrieved from http://www.chriscollieassociates.com/BlendedLearning.pdf

Stewart, C., Bachman, C., & Johnson, R. (2010). Predictors of faculty acceptance of online education. *MERLOT Journal of Online Learning and Teaching*, *6*(3), 597–616.

Tarcan, E., Varol, E. S., & Toker, B. (2010). A study on the acceptance of information technologies from the perspective of academicians in Turkey. *Ege Academic Review*, *10*(3), 791–812.

Thorne, K. (2003). *Blended learning: How to integrate online and traditional learning*. London, UK: Kogan Page.

Torrisi-Steele, G. (2011). This thing called blended learning- A definition and planning approach. *Proceedings of Higher Education Research and Development Society: Higher Education on the Edge Conference.* Retrieved from http://www.herdsa.org.au/?page_id=2452

Torrisi-Steele, G., & Drew, S. (2013). The literature landscape of blended learning in higher education: The need for better understanding of academic blended practice. *The International Journal for Academic Development*, *18*(4), 371–383. doi:10.1080/1360144X.2013.786720

Uğur, B., Akkoyunlu, B., & Kurbanoğlu, S. (2011). Students' opinions on blended learning and its implementation in terms of their learning styles. *Education and Information Technologies*, *16*(1), 5–23. doi:10.1007/s10639-009-9109-9

Venkatesh, V., & Bala, H. (2008). Technology acceptance model 3 and a research agenda on interventions. *Decision Sciences*, *39*(2), 273–315. doi:10.1111/j.1540-5915.2008.00192.x

Verkroost, M., Meijerink, L., Linsten, H., & Veen, W. (2008). Finding a balance in dimensions of blended learning. *International Journal on E-Learning Academic Research Library*, *7*(3), 499–522.

Volman, M., & van Eck, E. (2001). Gender equity and information technology in education: The second decade. *Review of Educational Research*, *71*(4), 613–634. doi:10.3102/00346543071004613

Wang, S.-C. (2009). University instructor perceptions of the benefits of technology use in e-learning. In K. Jusoff, S. S. Mahmoud, & R. Sivakumar (Ed.), *Proceedings of the Second International Conference on Computer and Electrical Engineering* (pp. 580-585). Dubai: IEEE Computer Society Washington. doi:10.1109/ICCEE.2009.275

Weitkamp, E. W. (2006). *Teaching style and technology: The role of educational values in the adoption of information technology innovations in the classroom.* Retrieved from http://gateway.proquest.com/openurl%3furl_ver=Z39.88-2004%26res_dat=xri:pqdiss%26rft_val_fmt=info:ofi/fmt:kev:mtx:dissertation%26rft_dat=xri:pqdiss:3183581

This work was previously published in the International Journal of Adult Vocational Education and Technology (IJAVET), 5(3); edited by Victor C. X. Wang, Stephen Brookfield, and Patricia Cranton, pages 1-20, copyright year 2014 by IGI Publishing (an imprint of IGI Global).

Chapter 6
Benefits of the Flipped Classroom Model

Marie Larcara
Canisius College, USA

ABSTRACT

With the advent of new technologies and the move for faculty to implement these into their teaching practice, a new model for course design and delivery has developed called the flipped classroom model. As more instructors investigate this model, the benefits, which include classroom management, active learning, critical thinking, and maximum use of student-faculty time together, become obvious. With classroom sizes increasing, more instruction moving online, and resources dwindling, the flipped classroom model can be an improved model for both instruction and quality learning. Research supports the benefits of the flipped classroom, but the change from a traditional classroom model to a flipped model requires a pedagogical shift on the part of both teacher and learner.

INTRODUCTION

There's a reason so many have latched on to the concept of the flipped classroom. And, there is a reason many K-12 teachers have moved, or are moving to this model. As early as the nineties, Nancy Atwell (1998) wrote about the reading/writing workshop. This method, at the time, was not called "flipping," but it most certainly follows what later teachers came to define as a flipped classroom (Bergmann, 2013). The workshop method asks that teachers essentially watch students read and write in class, using mini-lessons as the basis for teaching, rather than period-long lectures (Atwell, 1998). When I begin teaching in 1993, the workshop method and "flipping" were not on my radar. I didn't realize it at the time, but I was a constructivist, believed strongly in student choice whenever possible, and embraced the idea that students need to connect on a personal level with the content for it to move into their own world. Many of us have a story to share of our early teaching experiences, and I am no exception. I was an adult when I returned to earn my teacher certification. As a newly certified high school English teacher, I felt confident in my skills. Unlike my peers in education classes, I did not suffer the learning curve with time management, organization, lesson planning, or classroom management. One of my first assignments was a long-term

DOI: 10.4018/978-1-4666-8246-7.ch006

substitute middle school language arts classroom where I was informed I was the third teacher that year. I came in to the situation in April, with just about three months of instruction time left in the year. I was told the class was "troublesome" but not given many details beyond that. After more than one violent outburst, and a situation that had to involve many parents, social workers, and the school psychologist, I realized this class needed something different. There was daily violence, little respect for each other or me, and more than a few students at risk of failing. Reaching out to a mentor, it was suggested I look into Atwell (1998) and a reading/writing workshop method. Of course I did not know it, but this was to be my first experience with a flipped classroom. In my dog-eared, coffee-stained copy of *In the Middle* (Atwell, 1998), the author begins the text with these words:

These days, I learn in my classroom. What happens there has changes; it continually changes. I've become an evolutionist, and the curriculum unfolds now as my kids and I learn together. My aims stay constant-I want us to go deep inside language, using it to know wand shape and play with our worlds-but my practices evolve as eighth graders and I do deeper. This going deeper is research, and these days my research shows me the wonders of my kids, not my methods. But it has also brought me full circle. What I learn with these students, collaborating with them as a writer and reader who wonders about writing and reading, makes me a better teacher-not great maybe, but at least grounded in the logic of learning, and growing. (p. 3)

What Atwell is telling us here, years before we named it "flipping," is essentially that we must work and learn *with* our students, not *at* them if we are to grow as professionals and put their learning at the forefront of our teaching practice. This was transformative for me as a new teacher and I dove in.

As I quickly realized that the traditional classroom management strategies I had learned in college would not help in this unique situation, and with the added incentive of landing a permanent teaching job, I devoured my copy of *In the Middle* (Atwell, 1998). In the book, Atwell uses the art of storytelling to teach us a method of classroom instruction, which, even now, seems foreign and quite a paradigm shift. It involves differentiating instruction, individualized learning, choice, and new and challenging management strategies. While Atwell did not have the benefit of the emerging technologies we do today, she was in fact "flipping" her classroom. In a reading/writing workshop classroom you watch students *do* something with the content. They collaborate, peer revise, talk out loud like writers and thinkers, and process their learning in front of the teacher and peers. The teacher, in Atwell's early days, used intense, "mini-lecture" format to deliver new content. You do this by daily assessing the learning needs of the group and addressing them in intense, shorter teaching formats. Today, these may be a video created to address a specific need of the group or a part of a lecture students traditionally struggle with. But, the bulk of class time is not spent talking *at* students; instead, the classroom is an active learning environment in which the teacher is a guide. This requires a shift in both pedagogy and skills which many find intimidating. I know I did, but the move from a passive classroom environment to an active one transformed me as a teacher and I still refer to and think of Atwell often.

If you could see my copy of *In the Middle* right now, you would see a desperate, new teacher's scribbles in the margins. Some read, "NEVER do this again" or "ALWAYS use this as a journal" as a way of making sense of my own teaching philosophy and her stories. But, beyond Atwell's stories, she also shares research and explains that, coming up with the reading/writing workshop method, among other strategies she shares, is the result of a shared experience between the teacher and students, changing with every shift in student and content, resulting in "theory in action" (p. 22). This collaboration between the teacher and students and the action they take together to "forge and inhabit a common ground where the logic of their learning and my teaching can finally converge to become one" (p. 22) creates the philosophy and drives the methodology. It is with this attitude I suggest you investigate the "flipped classroom" -for there is not one way to tackle this strategy, one way to make it work, or one method that guarantees success. Instead, it is another tool in the teacher's toolbox to enhance the teaching and learning process and build a "theory in action" which can impact both teacher and learner as they continue to grow.

Asking teachers and faculty to create a more active classroom is not new and research has shown that students at all levels can benefit from an active learning format. From college professors aimed at improving content literacy (Butler, 1992; Garfield, 1995; Sander et al., 2000; Smith, 1998) to the K-12 classroom (Walker, 2012) those who aim to improve the student experience are adding active learning and flipping the classroom as a strategy for learning. From positively impacting retention (Schullery, Reck, & Schullery, 2011) to improving motivation (Strayer, 2012), the flipped classroom clearly has many benefits.

Teachers and Students Flip

Bergmann (2013) ask that those who consider flipping their classroom ask themselves one essential question, "What is the best use of face-to-face time with students?" (Stop for a moment and reflect on that.) If one answers that question honestly, and from a student-centered perspective rather than a teacher-centered perspective, the answer must be that the best use of face-to-face time with students is creating products, having students demonstrate and practice new learning, asking questions to deepen learning, and participating in peer review and revision with the goal of a better product. I would venture to say that few would answer that the best use of time with students is going over what students were *supposed* to read, or reading verbatim the slides of a PowerPoint presentation. But that has been, and still is, the method used in many classrooms. In short, in a flipped classroom, student time is active, not passive. The passive activities of reading and listening to lecture are saved for online or at home time. Class time is reserved for clarifying, extending, re-directing, and creating a product or project utilizing the new content. It is active, questions are raised and addressed, new content is framed in experience, and students can use high-levels of Bloom's Taxonomy-yes even in our technological age-to show what they know (Munzenmaier, & Rubin, 2013).

This requires a new set of skills for teachers and a new set of behaviors for students, which may seem insurmountable at first, particularly for those struggling with covering the massive content required in many subjects. But, that said, teachers from Kindergarten to the doctoral level, even those in very heavy content areas, are embracing this strategy to enjoy the benefits of added motivation, deeper learning, authentic assessment, and student success. Teachers aiming to flip their classrooms and create an active environment must begin with planning and aligning activities to learning goals (Biggs & Tang, 2007). This process may be new to some, or by the nature of changes to curriculum and teaching assignments, may require time and energy, as well as collaboration, to put in place. If a teacher has not re-visited their program and course goals and objectives, and aligned them with assessments, there is work to be done. A tightly constructed curriculum, which scaffolds learning from week to week and course to course, can result in meeting program goals, but this alignment takes collaboration and effort both at the onset, and in re-visits as curriculum, teachers, strategies, tools, and students change. Once done though, the move to active rather than passive learning can re-invigorate the teaching and learning process. According to Pierce and Fox (2012):

The challenge for educators in every discipline is for them to transition from being dispensers of facts to being architects of learning activities. Critical in this process is designing experiences that facilitate students developing into active learners rather than passive receptacles of information.

In many institutions, class sizes are increasing and traditional resources are shrinking, yet emerging technologies and more equal access to the Internet are giving teachers more high-quality online content. Along with new developments in how people learn and acquire new content, the more traditional large lecture delivery method is coming into question (Pierce & Fox, 2012). Teachers who decide to flip their classrooms can and often do create original material. But, that said, there are also well-respected educators who are creating content to be shared. From EdX, to Coursera, to The Khan Academy, to Massive Open Online Courses (MOOCS), content is being made available which can be used and shared to enhance learning. While some argue the quality of this content, and not all available content is credible or good, each day there is more and more high-quality, relevant, useful content available to teachers. The list of possible added content seems endless as more and more embrace the open and sharing content philosophy. This includes well-respected educational institutions and professors including Harvard Open Courses (http://www.extension.harvard.edu/open-learning-initiative).
Need a visual or more creative way to help struggling students understand the water cycle? Do a search on teachertube and you can find a rap version of the water cycle ("The Water Cycle Rap," 2011). Want to offer students the chance to extend their learning on a subject of particular interest? Visit the Harvard Open Course: Open Learning Initiative and search the available topics. While some argue that open content is the disruption of education (Bass, 2012), classroom teachers are also finding these sources to be invaluable as they create and curate more and more content to address diverse learners and allow for active instruction time.

Moving to a more active classroom also requires planning for a tightly constructed curriculum, which ties learning outcomes, activities, and formative and summative assessments. Taking this plan and delivering it in a flipped model means moving the focus to what a student *does* with the new content. This can even include students teaching and coaching other students (Berrett, 2012), a model which is often a paradigm shift for the traditional teacher. But, the rewards of this paradigm shift are many and leaders are looking closely at this model as a way, not only to make large classes more productive, but also as a way to better measure student learning and use this information to create better learning, and more effective management of resources for learning (Berrett, 2012). Fulton (2012) notes that the shift in thinking about managing the classroom from a traditional teacher-focused classroom to a flipped classroom can be a struggle for teachers. Teachers must use video or other technology to re-invent the lecture and staying ahead of that proves difficult for some (Fulton, 2012).

Similarly, classroom management skills must be honed, as students are no longer passive. This requires a renewed purpose for teaching, but also a review, or learning of advanced classroom management strategies. Managing group work, answering student questions, utilizing formative assessment methods, helping students learn how to learn actively, are all required in this model. So, why go through all this change? The impact of increasing student motivation, of watching students *do* something with the content, and addressing all students' learning can transcend the teaching and learning process. For example, the implications for those who struggle with reading and low performance due to low-level reading can lead to poor attitudes for learning and school in general, negatively impacting a student's future and success (Davis, Spraker, & Kushman, 2004). Watching and re-directing students in the process of learning can be improved before assessment, thus breaking this negativity and cycle of failure.

This empowers students and often helps those who have had little or no success in the classroom before, find that success.

Silver, Strong, and Perini (2007), note "Research and experience demonstrate that teaching strategies are critical to the overall health of the classroom and to the academic success of our students (p. 4). By improving instructional strategies, diverse learners can be addressed and learning improved. This approach, which is also a process approach in many ways, breaks down the large tasks and helps the individual meet those tasks in a process approach-ensuring success. Aiming instruction towards the individual learner, rather than to a whole group, is often called *differentiating instruction*-a strategy, which can improve content literacy (Chapman & King, 2009).

- Differentiation is when a teacher modifies instruction in one of four ways:
- Offering different content;
- Offering a different process of learning the material;
- Offering a different product to apply or extend what is learned; or
- Offering a different environment for learning to address the individual learner (Tomlinson, 1999).

Examples of differentiating content include using varied reading materials (by content or by difficulty), allowing the reading to be done using technology (audio), using paired reading strategies, or using small group instruction when needed. To differentiate by process, one might use tiered activities, which means presenting the same skills or concepts, but utilizing different levels of complexity or support. To differentiate the product, an instructor might offer choices in how a student or group proves learning. This may include a formal paper, a presentation, the use of multi-media, etc. Tomlinson (2004) shares examples of differentiating by environment to include:

Making sure there are places in the room to work quietly and without distraction, as well as places that invite student collaboration; providing materials that reflect a variety of cultures and home settings; setting out clear guidelines for independent work that matches individual needs; developing routines that allow students to get help when teachers are busy with other students and cannot help them immediately; and helping student understand that some learners need to move around to learn, while others do better sitting quietly.

While Tomlinson is speaking here of the elementary classroom, we know that even adult, high-level students can benefit from differentiating in these ways. For example, differentiating environment in a college classroom may involve having a learner or group move to a quiet spot to work on their research or project. This move may be important for learners who learn better on any given day in a quiet space.

In a flipped classroom, differentiation is possible-some would say necessary. Firstly, the online lectures can be audio and written. This already addresses differentiation as students can listen to the lecture as often as they like, which can benefit many students, specifically those dealing with content which is difficult for them. Students can refer back to the lecture later in the semester, when studying for a final exam, or when working on a project. The ability to read and hear a lecture multiple times truly addresses differentiation and learner needs. The teacher can also differentiate the flipped classroom content. Projects can be based on student interest, students can work in groups of their choosing, and while watching and listening to students' work, the teacher can differentiate based on obvious student need and interest. This level of instruction required daily reflection on the learner and practice and a set of management skills which may be new to some.

In a flipped classroom, the teachers have the ability to check in, monitor, re-direct and mentor the individual at each class meeting. This will allow for an in-depth knowledge of each learner on a level which may be new to the traditional teacher. We know that integrating learning styles and multiple intelligences into the classroom can positively impact the learning process (Silver, Strong, & Perini, 2000). To properly address diverse learners (intellectual, physical, and cultural), requires a deep understanding of the way students think, problem-solve, learn, process, and create new information. It also required both teacher and student to share lived experiences as they relate to the new content. This creates the active classroom where the teacher guides rather than delivers learning and where students and teachers are, in Atwell's words, working together to "forge and inhabit a common ground where the logic of their learning and my teaching can finally converge to become one" (1998, p. 22).

Teachers can quickly learn to create lectures and helpful videos, which can be housed online. New and even free technologies are being created which make this is a relatively simple task (see Jing and apps such as "Explain Everything, and "Screenchomp," and "Educreations"). Where the creating of video in the past was involved, costly, and created a need for technical support, today technology tools are often free and intuitive enough that virtually any instructor can create video on their own. In fact, as flipping is taking hold in education, faculty are realizing they can collaborate on the creative of videos and even share content (Ash, 2012). This is not only saving time, but also creating opportunity to collaborate, which can improve curriculum alignment and research opportunities. Once past the learning curve to do so, video can be quickly created and stored for use from semester to semester. Think of how much MORE teaching can be done with the time usually spent on lecture given to direct interaction with students! While the up-front time to create these, and the learning curve to do so, may involve a learning curve for many teachers (Fulton, 2012), the benefits for both teachers and students are many. Also, as companies develop emerging technology, and as institutions more fully embrace open resources, there are more and more content videos available for free and open use. Not without controversy, the Khan Academy was influential in both the movement to flip and in providing open content for teaching and learning, and others are taking on the charge to make available open content.

One benefit for teachers, once they free up class time, is the ability to facilitate deep discussions, watch students participate in small groups, allow time for writing and projects, and organize activities to synthesize the learning. These in-class activities may include debates, panel discussions, student-led presentations, peer revision, and other active learning strategies. Rather than delivering content to students in the form of lecture, the teacher can watch, observe, note, and re-direct learning as students engage with the new content. A very important element and benefit of this model is that the teacher in a flipped classroom watches the students perform or participate; therefore they can redirect the learning when a student misunderstands the content. For example, if there is a class discussion, or student-led panel discussion, the teacher can interject and offer new examples or information for clarity and depth of learning. Often times, in this model, students will also jump in and offer excellent examples, which may help their peers to understand the new content and tie content to students' lives, which also improves learning (Chapman & King, 2009).

For students completing the work at home, with no supervision or mentorship, the opportunities for re-direction are minimal. Only when the teacher grades the homework or written work, can redirection happen. Often, this is either too late (post-assessment), or the feedback is not of the quality to help the student deepen their learning. Minimally, this passive feedback, often in the form of written feedback on written assessment, may never be applied or scaffolded to the next level of learning and the teacher still does not have the face-to-face opportunity to clarify. If the student does not understand the written corrections, or does not read them, there again is a lost opportunity for growth, which goes on to impact success as the teacher builds upon that content.

In summary, a wonderful benefit to a flipped classroom, and one, which is gaining importance of late, is the fact that you can fine-tune your assessments to the course and program objectives, utilize formative assessments along the way, and minimize failure on the summative assessment . In a traditional classroom, you cannot tell if an assessment is successful until you see the results. Often, this is too late for both the teacher and student. In a flipped classroom, students are showing you on a day-to-day basis what they know and how they are growing with the content. The teacher can still use formal assessments, and both formative and summative assessments, but the results are often easier to predict. Also, with watching learning in action, there are great opportunities for active research. A teacher can take a pre-assessment (survey, "ticket out the door," etc.), implement a strategy (literacy strategy, group discussion, etc.), the do a post-assessment to validate a teaching strategy. The time to do this is created in the flipped classroom and can transform the teacher's practice in many ways.

More and more, teachers at all levels are asked to document and utilize data to drive instruction, and opportunities to utilize action research is one way to impact this process (Marzano, 2003). Marzano, speaking of K-12 school reform but applicable to all levels, outlines the use of action research for reform to include three basic steps. First, take the pulse of your school (or in higher education department or program). This can include a questionnaire or survey to identify gaps or needs. Next, identify and implement an intervention. This can include a literacy strategy to improve learning, new assessments, direct observations, participant interviews, etc. Finally, examine the effect on achievement. Since the goal of any intervention is the positive impact on learning (Marzano, 2003, p. 166), this step is crucial. Collecting evidence is important to impact change and this stepcan include multiple teachers and leaders.

The flipped classroom model offers the opportunity to collaborate on such research, implement it, reflect upon it, and initiate positive change .In fact, the opportunity to reflect on the teaching practice in general can be positively impacted with flipping the classroom. Fichtman Dana and Yendol-Silva (2003) acknowledge that teachers have "an enormous amount of knowledge that they have accumulated through their years of teaching" and that "this knowledge can be mined by teachers studying their own practice, making visible the complexities of teaching" (p. vii). Through classroom and collaborative research in the active classroom, teachers can improve their own practice and student learning utilizing data rather than "only" instinct and experience. Fichtman Dana and Yendol-Silva (2003) explain, that,

Teacher inquiry differs from traditional professional development for teachers, which has typically focused on the knowledge of an outside "expert" being shared with a group of teachers. This traditional model of professional growth, usually delivered as a part of traditional staff development, may appear an efficient method of disseminating information but often does not result in real and meaningful change in the classroom. (pp. 5-6)

This holds true for teachers at all levels and has long been a complaint of K-12 teachers hungry to improve their practice, only to be forced to sit through a professional development which does not meet their needs, or offers no support for implementation. The use of action research, and collaborative opportunities for research which translates into action, can break this cycle, empower the teaching practice, and improve student learning. Fichtman Dana and Yendol-Silva (2003) finish their text by urging teachers to finish the practitioner inquiry model by making the inquiry public. This last step moves not only the individual teacher's practice, but can impact others as well. The authors make the analogy of unshared teacher inquiry to a stone lying beside the pond,

Unless that inquiry is tossed into the professional conversation and dialog that contributes to the knowledge base for teaching, the inquiry has little change of crating change. However, once tossed in, the inquiry disturbs the status quo of educational practices, creating a ripple effect, beginning with the teacher himself or herself and his or her immediate vicinity (the students and his or her classroom) and emanating out of a school, a district, a state, eventually reaching an contributing to the transformation of the perimeter of all practice-the profession of teaching itself. (pp. 139-140)

Again, while geared to the K-12 practice, this is relevant to higher education as well. In fact, in some ways, departments in higher educational institutions may need this opportunity as much, if not more, than the K-12 teacher. As teachers who are also asked to research in their field (not necessarily as it relates to teaching or student outcomes), college faculty often have little or no opportunity to refine their teaching or reflect and improve upon their practice.

In a flipped classroom, there is also the opportunity for the teacher to see great growth, and offer extension of learning to those who may desire it. A student who shines can be offered a different opportunity to deepen learning. This too is a way to address diverse learners in the classroom (Chapman & King, 2000). Examples of this might be to differentiate for that student by offering more or more detailed sources to investigate, or even a different product to prove learning. Asking a student to apply their project or paper to the real world, and report back to the class, is one example of how one can deepen and extend learning for the student in question, but also for the others in class. In a traditional classroom, it is much more difficult to recognize students who may excel in the content and who would enjoy a deeper experience. The flipped model, based on active and individualized instruction, offers teachers a chance to know their students' interests and gifts on a much deeper level, which can inform later project choices and support as students go into the field of their choice. To facilitate this, teachers can use class time to design learning experiences that include sources chosen or guided by students' individual interests and those they want to read (Moore, Bean, Birdyshaw, & Rycik, 1999). In the classrooms of today, this may involve emerging or "new" literacies (Lanksear & Knobel, 2003), including content texts in the form of blogs, online articles, videos, etc. Allington (2002), notes that an issue in classroom's today is that students cannot learn from texts they cannot read, therefore diversifying the choice in reading is key. This individualization and constructivist approach can greatly improve content area reading and literacy (Alvermann, Phelps, & Ridgeway-Gillis, 2007) and allow the teacher to reach both those who struggle, and those who would benefit from extension.

American students, for the most part, are not used to a flipped classroom-particularly at the college level. In some ways, they may be more comfortable at first with a traditional classroom. They can show up, sit quietly, and even "zone out" if they want and still receive credit for being present. But, once home, if they do not understand the content, there is little or no opportunity for help or redirection. In the flipped classroom, the ownership and responsibility for reading the material and listening to the lecture is put on the student. They will soon realize that the teacher is not going to go over all that was to be read or listened to in class and research shows that students embrace and respect this new classroom model (Butt, 2012). For some time now teachers have lamented that students do not read the material (Allington, 1977).

If you ask students why they don't complete the reading, the reasons are many. One common reason often given by students is that there is not a purpose for reading. Why read when the teacher will go over all concepts in class in a long lecture, often accompanied by a PowerPoint with ALL the information given on the slides? Without a purpose for reading, students may superficially read, skim, or skip the reading altogether. Or, for those who struggle with literacy, they may labor over the reading, but not truly comprehend the content. In a flipped model, if they do not show up with the reading completed, they will not be able to participate at the high level a flipped classroom model requires. With some guidance and patience, and some new classroom management strategies (rubrics, student choice in reading, problem-based projects, etc.), a teacher can quickly acclimate students to this model and the benefits are many (Johnson, 2013; Butt, 2012). When students are held responsible for their own learning, and they know they will have to show what they know during class activities, they will take the work more seriously. Their audience becomes authentic, because they will be working directly with their peers. This, along with other tools the flipped classroom teacher may utilize, such as student-led discussions, presentations, and projects, will require students to come to class prepared (Minifie & Davis, 2013).

Bergmann (2013) shares the experience of his daughter in a flipped high school classroom. She shares, "For the first time ever I had the ability to pause the teacher while watching the lectures online. Working on my own timetable allowed me to explore learning styles and techniques, and to hone in on the way that I learn best." She goes on to share that the flipped classroom also helped her feel in control of her learning and the added ability to "Step up and take responsibility for my own learning at a pace that worked for me." Finally, she shares how the flipped classroom alleviated stress (She is reflecting upon a college Chemistry class, mind you). She felts supported, even when she did not fully understand the content she completed at home, and knew that clarity would come in the risk-free, flipped classroom her teacher created. For more information from Bergman and others on flipped learning, visit the Flipped Learning Network Ning at http://flippedclassroom.org/video/navigating-the-flipped-learning-network-ning.

Another benefit of the flipped classroom is the opportunity for student-to-student modeling and students are often energized by this active opportunity (Bergmann, 2013). Since students are not sitting passively in class, they can listen to each other, share work with each other, peer revise and edit, and offer a fresh and different perspective on the content to their peers. Again, this is not possible or probable in a traditional lecture-based setting. It is well known that the classroom environment impacts learning, motivation, and engagement and that teachers need to provide a challenging and positive climate where all students can be successful. Those who struggle often lack self-efficacy and motivation for the tasks with which they are charged. Self-efficacy is impacted by past performance, vicarious learning, and physiological reactions, such as fear and anxiety (Davis, Spraker, & Kushman, 2004).

In order to enhance self-efficacy, teachers need to build learning environments and experiences, which allow for risk-free learning, and knowledge of the learner beyond their classroom identity. Only then will the learner gain self-efficacy and find their own competence that can then be transferred to the learning task (Hinchman, Alvermannm, Boyd, Brozo & Vacca, 2003). Taking an interest in students' outside of the classroom identity, and allowing peer to peer collaboration builds confidence and will lead students to take risks, and grow as learners. The collaboration of teacher to student, and student to student creates a high-achieving focus in the classroom and helps to cultivate a mutual respect for learners and the teacher. With the teacher as ally, students will take risk with content and push each other to achieve higher levels of learning (Brozo & Flynt, 2008).

While many picture a flipped classroom as online lecture and all collaboration happening in person, the online portion of the class can offer student-to-student interaction as well. The teacher can ask students to listen to a lecture, or other material (videos by experts), and then require them to participate in an online peer discussion on the topic.

Best practices here are that students are asked to help each other in the online discussion to see how the new content fits into their professional or personal lives. This peer interaction can be one of the most beneficial aspects of flipping the classroom. In the traditional classroom, students benefit little from each other in the class, and only connect outside of class if they make the extra effort to do so. But, in an online discussion, students can take their time to respond to one another, and with proper guidance and use of best practices, the instructor can nudge students to new levels of learning and response which utilizes high levels of critical thinking and resources.

Last but not least, a flipped classroom offers the opportunity for the teacher to have the in-class activities consist of parts of the assessment as a whole. For example, instead of assigning a research paper in the beginning of the term, then lecturing through the semester, reminding students of the paper here or there, in a flipped classroom, the classroom activities can BE the parts of the research paper. The students will listen to the lecture, and experience the resources (video, added readings, webinars, etc.), outside of class. Inside class, they can write and share sections of their papers, share high quality resources, or even collaborate on a section of the paper. They can peer review, share findings, discuss the importance of their research, debate their findings, defend their choices, etc. During this, the teacher is refining with them, helping them to see new connections, making suggestions, re-directing, and extending the learning. By the time the teacher sees the final product, they have experienced the pieces of the product more than once with the students and grading is much faster and easier. And, of course, if a student is not understanding the content, or not reaching the depths required, this can be corrected along the way-ensuring a high-quality, successful, end product. The chances of a student failing to gain mastery in this model is much less than in the traditional model of assigning the work to be done outside of class.

CONCLUSION

There is an art and science to teaching and teacher growth is necessary for one to improve their practice. Unfortunately, there may be little growth in the art of teaching in a traditional classroom. Teachers may revise their lectures and readings, based on student success on assessments, but beyond that, there is little feedback given to a teacher in the traditional classroom. In a flipped classroom, the "feedback" is visually apparent each and every class meeting. You can see and hear if students are growing as learners and you can make adjustments to your practice when it really counts-before the assessment and before the students give a final evaluation of the course! This built-in time to adjust can be quite transformative to a teacher and learner. A warning is given by Ash (2012) however, in that taking an ineffective teacher and asking them to flip their classroom will not result in success. According to Wolf (as cited in Ash, 2012), "You can't just hand the flipped classroom off to an ineffective teacher and say you're going to transform the classroom. It's not going to make a bad teacher a good teacher." It's more complex than that, but worth the effort to transform to reap the benefits for both the teacher and learners in the classroom.

REFERENCES

Allington, R. L. (1977). If they don't read much, how they ever gonna get good? *Journal of Reading*, *21*(1), 57–61.

Allington, R. L. (2002). You can't learn much from books you can't read. *Educational Leadership*, *60*(3), 16–19.

Alvermann, D. E., Phelps, S. F., & Ridgeway-Gillis, V. (2007). *Content area reading and literacy: Succeeding in today's diverse classrooms*. Boston, MA: Pearson.

Ash, K. (2012). Educators evaluate 'flipped classrooms': Benefits and drawbacks seen in replacing levures with on-demand video. *Education Week*. Retrieved from http://216.78.200.159/Documents/RandD/Education%20Week/Flipped%20Classrooms.pdf

Bass, R. (2012). Disrupting ourselves: The problem of learning in higher education. *EDUCAUSE, 47*(2).

Bergmann, J. (2013). *The flipped classroom: A student's perspective*. Retrieved from http://researchnetwork.pearson.com/online-learning/the-flipped-classroom-a-students-perspective

Berrett, D. (2012). How 'flipping' the classroom can improve the traditional lecture. *The Chronicle of Higher Education*. Retrieved from http://moodle.technion.ac.il/file.php/1298/Announce/How_Flipping_the_Classroom_Can_Improve_the_Traditional_Lecture.pdf

Biggs, J., & Tang, C. (2007). *Teaching for quality learning at university* (3rd ed.). London: Open University Press.

Brozo, W. G., & Flynt, E. S. (2008). Motivating students to read in the content classroom, six evidence-based principles. *The Reading Teacher*, *62*(2), 172–174. doi:10.1598/RT.62.2.9

Butler, J. A. (1992). Use of teaching methods within the lecture format. *Medical Teacher*, *14*(1), 11–25. doi:10.3109/01421599209044010 PMID:1376853

Butt, A. (2012). *Student views on the use of lecture time and their experience with a flipped classroom approach*. http://dx.doi.org/10.2139/ssrn.2195398

Davis, D., Spraker, J., & Kushman, J. (2004). *Improving adolescent reading: Findings from research*. Portland, OR: Northwest Regional Educational Laboratory.

Fichtman Dana, N., & Yendol-Silva, D. (2003). *The reflective educator's guide to classroom research: Learning to teach and teaching to learn through practitioner inquiry*. Thousand Oaks, CA: Corwin Press.

Fulton, K. (2012). Upside down and inside out: Flip your classroom to improve student learning. *Learning and Leading with Technology*, *39*(8), 12–17.

Garfield, J. (1995). How students learn statistics. *International Statistical Review*, *63*(1), 25–34. doi:10.2307/1403775

Johnson, G. B. (2013). *Student perceptions of the flipped classroom*. Retrieved from https://circle.ubc.ca/bitstream/handle/2429/44070/ubc_2013_spring_johnson_graham.pdf?sequence=1

Lanksear, C., & Knobel, M. (2003). *New literacies: Changing knowledge and classroom learning*. Philadelphia, PA: Open University Press.

Marzano, R. J. (2003). *What works in schools: Translating research into action*. Alexandria, VA: ASCD.

Minifie, R. J., & Davis, K. (2013). Ensuring gen Y students come prepared for class, then leveraging active learning techniques to most effectively engage them. *American Journal of Business and Management*, *2*(1), 13–19. doi:10.11634/216796061302228

Moore, D. W., Bean, T. W., Birdyshaw, D., & Rycik, J. R. (1999). Adolescent literacy: A position statement. *Journal of Adolescent & Adult Literacy*, *43*, 97–112.

Munzenmaier, C., & Rubin, N. (2013). Bloom's taxonomy: What's old is new again. *The ELearning Guild Research.* Retrieved from http://insdsg602-s13-manning.wikispaces.umb.edu/file/view/guildresearch_blooms2013.pdf/403007658/guildresearch_blooms2013.pdf

Pierce, R., & Fox, J. (2012). Vodcasts and active-learning exercises in a flipped classroom model of a renal pharmacotherapy module. *American Journal of Pharmaceutical Education*, *76*(10), 196. doi:10.5688/ajpe7610196 PMID:23275661

Sander, P., Stevenson, K., King, M., & Coates, D. (2000). University students' expectations of teaching. *Studies in Higher Education*, *25*(3), 309–323. doi:10.1080/03075070050193433

Schullery, N. M., Reck, R. F., & Schullery, S. E. (2011). Toward solving the high enrollment, low engagement dilemma: A case study in introductory business. *International Journal of Business. Human Technology*, *1*(2), 1–9.

Silver, H., Strong, R., & Perini, M. (2000). *So each may learn: Integrating learning styles and multiple intelligences*. Alexandria, VA: Association for Supervision and Curriculum Development.

Silver, H., Strong, R., & Perini, M. (2007). *The strategic teacher: Selecting the right research-based strategy for every lesson*. Alexandria, VA: Thoughtful Education Press.

Smith, G. (1998). Learning statistics by doing statistics. *Journal of Statistics Education*, *6*(3).

Strayer, J. F. (2012). How learning in an inverted classroom influences cooperation, innovation and task orientation. *Learning Environments Research*, *15*, 171–193. doi:10.1007/s10984-012-9108-4

Tomlinson, C. A. (1999). *The differentiated classroom: Responding to the needs of all learners*. Alexandria, VA: Association for Supervision and Curriculum Development.

Tomlinson, C. A. (2004). *Differentiation of instruction in the elementary grades.* Retrieved from http://www.ericdigests.org/2001-2/elementary.html

Walker, D. (2012). *From flipping the classroom to BYOD, technology moves Jefferson township schools forward: Educational viewpoints*. Trenton, NJ: New Jersey Principals and Supervisors Association.

Water Cycle Rap. (2011). Retrieved from http://www.teachertube.com/viewVideo.php?video_id=230786

KEY TERMS AND DEFINITIONS

Bloom's Taxonomy: A classification of educational objectives based on the work of Benjamin Bloom and a committee of educators in 1956. Educational objectives are divided into domains, including cognitive, affective, and psychomotor.

Differentiated Instruction: An instructional theory which takes into account diverse learners in planning, delivering, and assessing learning. Learning environments are varied by interest, delivery, abilities, and modes of assessment.

Flipped Learning: Learning where student-teacher interaction time is optimized. Often, lectures, readings, and passive activities are done outside of student-teacher time together.

Massive Open Online Courses (MOOCs): A way to deliver online content to any person interested in taking the course. There are no limits on attendance and the MOOC is often large, with many diverse participants.

New Literacies: A form of literacy, which came about due to digital technology and the access to text and images in new media formats.

Screencasting: The use of video for instruction. Lectures can be screencasted in video format so that students can access the lecture more than once, and refer back to it at a later time. Various technology tools are used to video the information.

This work was previously published in Promoting Active Learning through the Flipped Classroom Model edited by Jared Keengwe, Grace Onchwari, and James N. Oigara, pages 132-144, copyright year 2014 by Information Science Reference (an imprint of IGI Global).

Chapter 7
Promoting Active Learning through a Flipped Course Design

Heather D. Hussey
Northcentral University, USA

Bethany K. B. Fleck
Metropolitan State University of Denver, USA

Aaron S. Richmond
Metropolitan State University of Denver, USA

ABSTRACT

There are numerous ways in which faculty can deliver information in a blended course; however, the question remains as to which information is best suited to online delivery versus face-to-face. The focus of this chapter is on the flipped classroom, including a study in which a psychology statistics class was flipped and students' statistical knowledge, attitudes toward statistics, and intercultural sensitivity were assessed. In order to understand the theoretical underpinnings of the classroom, the authors examine the flipped structure through Blended Learning Theory, Problem-or-Project-Based Learning Theory, and Cognitive Taxonomy Theory. Advantages and disadvantages to transitioning to such a format as well as applications to other courses and some of the best practices in a flipped course are discussed.

INTRODUCTION

Colleges and universities across the country are utilizing distance learning, including online and blended course formats. This trend is not recent, in 2000-2001, 90% of 2-year and 89% of 4-year public institutions offered distance education options (Jackson & Helms, 2008). In 2005, 3.2 million students were enrolled in online courses (Callaway, 2012). Allen and Seaman (2011) conducted a large-scale survey of 4,523 active, degree-granting institutions of higher education in the USA. In conjunction with the Babson Research Group and the College Board, their analysis represents 80% of higher education enrollments. Results of the survey indicate that online enrol-

DOI: 10.4018/978-1-4666-8246-7.ch007

ment, as a percent of total enrolment has increased from 9.6 in the fall of 2002 to 31.3 in the fall of 2012. This equates to 1.6 million students taking an online course increasing to 6.1 million. The growth rate of 18.3% is larger than that of higher education overall, which has only grown at an annual rate of just over 2% during the same time period (Allen & Seaman, 2011).

After massive growth in online enrollment over the past 8 years, 2010 marked the first sign of slowing. Projections suggest this rate will stay steady over the coming years for all intuitions including public, private, non-profit, and private for profit (Allen & Seaman, 2011). Distance learning courses allow institutions to expand current student markets, increase brand recognition and the alumni base, while saving campus energy and operational cost. These courses have allowed institutions to battle cuts in state funding while recruiting students beyond their local or regional markets, thus enabling them to extend their brand nationally and even globally (Allen & Seaman, 2011; Betts, Hartman, & Oxholm, 2009). In addition, faculty training for online education can be an indicator for intuitional support. Only 6% of intuitions report no training for online teaching, a number that has significantly degreased over the past decade. The most common training reported includes institutionally run courses (72%) and informal mentoring (58%). Such training is provided at a higher rate than courses intended for face-to-face teaching (34%) (Allen & Seaman, 2011).

Distance learning courses not only benefit schools but they also match the majority of students' life-long experiences with the Internet. Current traditional age college students are described as "digital natives" who have always had laptop computers, cell phones, and text messages (Davis, Deil-Amen, Rios-Aguilar, & Canche, 2012). Distance learning courses allow students to maintain some autonomy over how and when they complete course requirements. Such flexibility has been found to be important for student satisfaction (Allen & Seaman, 2011; Callaway, 2012; Muirhead, 2002; Ocak, 2012).

Faculty perceptions of distance learning are also important. When polled, 44% of Chief Academic Officers of intuitions that offer online education say their faculty accepts the value and legitimacy of online education. This number has not changed much in the past 8 years (although it varies widely by school) (Allen & Seaman, 2011). In a recent study, 73 faculty members of various levels were surveyed on their perceptions of blended teaching (on-line and face-to-face), their satisfaction with such courses, roles, and perceptions of student learning (Ocak, 2012). The majority of faculty (88%) reported being generally satisfied with teaching blended learning classes. In addition, 92.1% reported their students learn a lot in the blended course. Ninety-six percent felt that blended courses were appropriate learning environments for college courses and that they were eager to teach another blended course (69.6%). However, it should be noted that 95% of respondents believed that blended learning requires more time and effort than face-to-face and full online course formats. They acknowledge that it requires creativity in teaching and requires educators to reflect in meaningful ways on their pedagogy. Few disadvantages were reported, such as problems with students' ability to use of technology and lack of intuitional support. Overall advantages of blended learning outweighed these issues (Ocak, 2012).

The high numbers of online and blended course enrollment indicate that distance learning is a viable and desired option for students. Furthermore, the majority of intuitions and faculty are in support of such course formats, especially in regard to blended learning. It is important to better understand the learning environments and student outcomes of courses utilizing Internet technology. To begin, a clear understating of what distance education courses are is of focus, with an emphasis on blended learning.

What is Blended Learning?

Traditional courses are face-to-face in which the majority, if not all, of content is delivered using methods inside of the classroom (Allen & Seaman, 2011). In an online course the majority, if not all, of the content is delivered via the Internet on course management systems (Allen & Seaman, 2011). A hybrid course combines online and face-to-face delivery where by any amount of content is delivered online, while the rest is delivered in a reduced number of face-to-face class meetings (Allen & Seaman, 2011; Jackson & Helms, 2008).

As a point of clarification, hybrid courses are often called "blended learning environments" (Howard, Remenyi, & Pap, 2006; Osguthorpe & Graham, 2003). However, Blended learning implies mingling together in ways that lead to a well-balanced combination, uniform, and harmonious mixture (Osguthorpe & Graham, 2003). Osguthorpe and Graham suggest there are at least three elements that an instructor might blend together in a course including:

- Online and face-to-face activities,
- Online and face-to-face student meetings, and
- Online and face-to-face instructor and student meetings.

The goal is to create a synchronous set of learning activities where classroom based face-to-face interactions with instructors and peers is complemented asynchronously by work performed outside of class. Typically in these situations there is a lack of immediacy in feedback, assessment, and the instructor's ability to work collectively with students. Modern learning technologies make it possible to provide what is missing here, adapting the learning to each individual (Osguthorpe & Graham, 2003). For the purpose of this paper we will adopt Garrison and Kanuka's (2004) definition of blended learning stating, "at its simplest, blended learning is the thoughtful integration of classroom face-to-face learning experiences with online learning experiences" (p.96).

Howard and colleagues (2006) suggest that integration is an important aspect of blended learning. In an integrated-blended learning environment the student studies online before class, works on material during class meetings, and then revisits material again after class online. In this model, the student can prepare before class by taking online pre-tests, utilizing resources (e.g., readings or online lectures), and participating in adaptive exercises. During class, the student interacts with peers and the instructor, works to clarify content, and receives feedback. After class, the student can perform more online exercises, revisit concepts, and take online post-tests (Howard et al., 2006).

Some educators posit that blended learning courses, such as the model described above, offer the best of both delivery methods (Rausch & Crawford, 2012). It is proposed to minimize some of the weaknesses of fully online courses by allowing face time with the professor, student, and peers, and provides an opportunity for clarity of difficult concepts or assignments (Bersin, 2004; Lage, Platt, & Treglia, 2000). Offering courses in such a mixed format can be a one-course-for-all system that shifts the course from a professor-dominated to a student-centered world (Chamberlin, 2001). However, not all researchers agree. Some suggest that blended courses are stuck-in-the-middle, being neither effective in teaching methodology nor low-cost for intuitions (Callaway, 2012; Jackson & Helms, 2008). In addition, results from survey data suggest, "there is a lack of consistency among students and faculty as to what is the most effective and innovative way to design hybrid courses" (Callaway, 2012, p. 15), leading to the need for more research to better understand what materials are best delivered online versus in-class (Brothen & Wambach, 2007; Masalela, 2009).

What is Flipped Learning?

Flipped learning, also called a flipped classroom, utilizes blended learning to reorganize the structure of a typical classroom model. The reorganization centers on inverting when and where students complete course work and are exposed to content via lectures. “Inverting the classroom means that events that have traditionally taken place inside the classroom now take place outside the classroom and vice versa” (Lage et al., 2000, p. 32). In this way, a flipped classroom employs blended learning by using the Internet to deliver content to the students, frequently assigning lectures to be viewed online while students are away from school. When students come into the classroom they have already been exposed to the lecture content and can immediately start working on assignments and course related material.

The motivation for flipping a classroom stems from the problems that can exist within traditional in-class lectures. Lectures are often passive, and provide a “one-way flow of information from professor to the student” (Foertsch, Moses, Strikwerda, & Litzkow, 2002, p. 26). Professors who employ active learning techniques argue that timing is the biggest issue with lectures. Using class time to lecture takes up valuable minutes that students and professors have to interact with each other and the material. However, lectures are a necessary aspect to college teaching. Professors have a level of expertise that students need to be able to comprehend the material under investigation. Even professors that use active learning pedagogy often find it necessary to convey specific knowledge by giving lectures before group activities can begin (Foertsch et al., 2002). Flipped learning can overcome this paradoxical problem. It allows professors to still delver content using lectures but saves class time for important course work and interactions.

With the prevalence of blended courses, and some inconsistency in the literature about their effectiveness, this chapter will work to provide professors with an example of a flipped classroom, including data analysis of student learning and attitudes. We will describe a statistics course that used blended learning techniques to create a flipped classroom. Under the umbrella of active learning, this chapter will base blended and flipped classroom designs in three theories, Blended Learning Theory, Project Based Learning and Cognitive Taxonomy Theory.

THEORETICAL FOUNDATIONS

Just as it is important to investigate and review the research on flipped classrooms, it is also important to contextualize this research within a theoretical framework. In order to understand the theoretical underpinnings of the classroom, we suggest future researchers and practitioners who wish to implement the flipped classroom should consider the explications that Blended Learning Theory (e.g., Alonzo, Lopez, Manrique, & Vines, 2005; Kerres & De Witt, 2003), Problem-or-Project Based Learning Theory (e.g., Helle, Tynjälä, & Olkinuora, 2006), and Cognitive Taxonomy Theory (e.g., Bloom, 1956; Krathwohl, 2002) provide. These theories may be considered to be under the umbrella of Active Learning Theory (e.g., Poirer & Feldman, 2007; Warren, 2006). As such, both the description and application of theory within the flipped classroom research is discussed.

Blended Learning Theory (BLT)

Description

BLT is a pedagogical approach to instruction that is a combination of face-to-face, computer mediated activities, and online learning that is rooted in Active Learning Theory (Alonzo et al., 2005; Kerres & De Witt, 2003). Kerres and DeWitt contend that BLT includes “….didactical methods (expository presentations, discovery learning, cooperative learning, etc.); and delivery formats (personal communication, publishing, broadcasting, etc.)" (p. 103). Osguthorpe and Graham (2003) suggest the term BLT to better represent the "mingling" of online and face-to-face best practices. BLT is proposed to minimize some of the weaknesses of full online courses by allowing face time with the professor, student, and peers, and provides an opportunity for clarity of difficult concepts or assignments (Bersin, 2004; Lage et al., 2000). Offering courses in such a mixed format can be a one-course-for-all system that shifts the course from a teacher to learner-centered focus (Chamberlin, 2001). Clearly BLT should be applied to the research investigating the efficacy of the flipped classroom, as it was a theoretical precursor.

Application

If BLT is an integral part of the flipped classroom as purported (Rausch & Crawford, 2012), how then, can it explain the results of flipped classroom research? First, Walker, Cotner, and Beermann (2011) investigated the impact of a modified flipped classroom had on student learning in a large basic biology course. Walker et al. used "vodcasts" and other multimedia methods to teach both online and face-to-face. After controlling for several individual demand characteristics, they found that students in the flipped classroom academically outperformed students in a traditional class format on some academic measures and were statistically the same on other academic measures. We suggest through the use of various Active Learning methods, computer mediated activities, and face-to-face activities, students in Walker et al.'s study were able to do as well as or even better than a more traditional lecture base course because unlike a traditional classroom, using BLT, the professor had more in-class time to achieve these techniques (i.e., active learning).

Project Based Learning Theory (PBLT)

Description

PBLT is thought to be student-centered pedagogy that focuses on a project or problem that is experienced by the students as means for instruction (Helle et al., 2006). Further, Adderley (1975, p. 1) defined PBLT as:

1. Involving the solution of a problem; often, though not necessarily, set by the student himself;
2. Involving initiative by the student or group of students, and necessitate a variety of educational activities;
3. Commonly resulting in an end product (e.g., thesis report, design plans, computer program and model);
4. Work often goes on for a considerable length of time;
5. Teaching staff are involved in an advisory, rather than authoritarian, role at any or all of the stages—initiation, conduct and conclusion.

Often in PBLT, the student learning objectives are directed at helping students develop intrinsic motivation, collaborative skills, flexible and effective problem solving skills, and ultimately self-directed learning (Hmelo-Silver, 2004). Additionally, PBLT provides students with the opportunity to solve real-world problems. The teacher is often viewed as a facilitator who works side-by-side with student to assist in framing questions and structuring authentic and meaningful tasks while providing critical feedback to the students (Hmelo-Silver, 2004).

Not only has PBLT been well defined, it has been successfully used in many contexts. Whether it was employed to enhance writing instruction English Language Learners (Foulger & Jimenez-Silva, 2007), or designing k-12 science instruction (Polman, 2000), or incorporating PBLT in technology (Boss & Krauss, 2007), PBLT has been demonstrated to be an effective means of instruction. Accordingly, when investigating the efficacy of the flipped classroom pedagogy, PBLT may be used to understand the potential theoretical underpinnings of the pedagogy.

Application

What would the view of the flipped classroom look like through the lens of PBLT? For example, Schullery, Reck, and Schullery (2011) found that students in a high-enrollment flipped classroom were more satisfied and engaged in the class as a result of the design. This was especially important as prior to the study, they found that the size of the class prohibited meaningful activities and discussions. The results of the Shullery et al. study may be interpreted through PBLT as Schullery and colleagues designed their pedagogy so that "students are encouraged to interact during discussions and they are expected to collaborate with their peers in classroom teams" (p. 3). We believe that this is analogous to one of the definitions and goals of PBLT in that students work together in collaboration to solve a joint problem (Adderley, 1975; Hmelo-Silver, 2004).

Yet another example of PBLT in the flipped classroom research occurs in a study by Pierce, Fox, and Dunn (2012). Pierce et al. used the flipped classroom pedagogy to teach renal pharmacotherapy in an 8-week course. They found that students both objectively outperformed and positively viewed the classroom when compared to a traditional lecture based class. One of the pedagogical tools used in Pierce et al.'s study was, in group settings, "design experiment…set in the messy situations that characterize real-life learning" (p.196). We believe this element and many other elements in the Pierce et al.'s study constitutes PBLT, in that the class was framed in a meaningful and authentic manner as suggested by Hmelo-Silver (2004). These are just a few examples of how PBLT can explain the research currently being conducted on the flipped classroom.

Cognitive Taxonomy Theory (CTT)

Description

Building on the works of Bloom (1956) and Anderson and Krathwohl (2001), Krathwohl (2002) modified the original Bloom's Cognitive Taxonomy to reflect current changes in the cognitive psychology literature. CTT is a way to categorize and identify types of cognitive processes. In other words, it is way of classifying thinking. Anderson and Krathwohl identified the revised CTT as pertaining to six cognitive domains (e.g., remembering, understanding, applying, analyzing, evaluating, and creating). These cognitive domains are hierarchical in nature and start with *remembering* (the most basic level) and end with *creating* (the most complex and highest level). Simply, *remembering* is defined as retrieving recognizing; *understanding* is classified as constructing meaning through processes such as summarizing; *applying* is implementing or executing a procedure; *analyzing* is breaking a concept into parts and understanding the interrelationship and structure among the parts; *evaluating* is making a criterion and standard based judgment; and *creating* is putting or reorganizing elements together into a new structure (Anderson & Krathwohl, 2001). CTT has been used successfully in countless research articles and is one of the most widely accepted and cited works in educational research today (Anderson & Sosniak, n.d.). Finally, we believe that CTT is a logical fit to understanding the research on flipped classrooms, as there CTT elements in the flipped classroom format.

Application

There are many ways in which we can apply CTT to flipped classroom research. CTT can directly be applied to the works of Pierce et al. (2012) and Sadaghiani (2012). First, Pierce et al. targeted the application level of CTT and found that when compared to a traditional classroom, students in a flipped classroom, significantly academically outperformed on application level assessments. We contend, that it is also likely that if Pierce et al. looked at other levels of CTT, that the students taught in a flipped classroom would demonstrate higher academic performance over that of direct instruction. Theoretically, the reason students did better at the *application* CTT level is because the instructional format enabled students to build lower-order CTT levels through self-regulated learning and thus process information at a deeper level. In another study investigating the effects of flipped classroom, Sadaghiani (2012) found that when students received online pre-lectures (i.e., podcasts and prequizzes), then completed problem-solving tasks in a face-to-face setting, students' physics knowledge increased, as did their enjoyment of the class. Sadaghiana's results can be explained by CTT in that as a result of the flipped classroom pedagogy, students built lower levels of learning (prior to class) and engaged in higher levels of learning during class using the flipped model.

LITERATURE REVIEW

The theoretical descriptions of PBLT, BLT and CTT set a framework for both blended and flipped learning paradigms. Such courses have the potential to offer the best of online and face-to-face teaching. Therefore, in this section we will discuss both the advantages (e.g., preparedness and engagement, student interaction, active learning, etc.) and the perceived disadvantages and barriers (e.g., technical problems, student perceptions, and lack of control) discussed in the literature on flipped and blended classrooms.

Advantages

Preparedness and Engagement

Faculty and students note that blended courses help students prepare for face-to-face classes, which helps increase engagement in the class as well as with course materials. Having students view the lectures online before coming to class allows them time to digest the material and be better prepared for higher level learning through in class applications (Gecer & Dag, 2012). Similarly, students report that online learning requires them to take greater responsibility for their learning (Gecer & Dag, 2012), which aids in developing independent scholarly skills. In addition, the better-prepared students are, the more likely they are to engage in the classroom (Schullery et al., 2011). For example, the online format allows students time to reflect on the material and their learning, which has shown to increase engagement and participation in the classroom (Dengler, 2008; Rausch & Crawford, 2012; Stacey & Gerbic, 2007). Students have commented on how online discussions help them to be concise and clear in their arguments and writing (Dengler, 2008; Stacey & Gerbic, 2007). Similarly, students who are hesitant to participate in class can use online discussion forums as a means to dialogue about class content, which can increase confidence to participate in face-to-face discussions (Rausch & Crawford, 2012; Stacey & Gerbic, 2007). Dengler (2008) suggests this might especially be the case for women and non-native English speakers.

Student Interaction

The benefits of increased student interaction and engagement are vital to building a sense of community in the course (Schullery et al., 2011). Incorporating online learning tools allows for more student collaboration as well as teacher-to-student interaction (Osguthorpe & Graham, 2003). Faculty note the transition to blended learning resulted in more time with students to facilitate learning (Beck & Ferdig, 2008; Schullery et al., 2011). Students also asked more questions in the online environment, including those related to their interests versus just class content (Beck & Ferdig, 2008). Others note how online discussion boards are frequently used by students to get help on topics and/or assignments with which they were struggling (Cole & Kritzer, 2009; Heinze & Procter, 2006). In addition, the blended format can offer more opportunities for group work. As a result, students learn to appreciate peer feedback and collaboration (Groves & O'Donoghue, 2009; Strayer, 2012).

Active Learning

Online tools can be used to have students engaged in the material beyond the classroom, which can aid in applying the material learned as well as add continuity between classes (Dengler, 2008). Faculty report an increase in critical thinking and independent scholarly skills through such engagement (Masalela, 2009; Osguthorpe & Graham, 2003). Even prerecorded lectures can be more of an active learning tool when students engage in the video by stopping to take notes, replaying points of confusion, and by using the videos for review (Foertsch et al., 2002; Senn, 2008). In the comparison of blended courses with traditional courses, students note the need to participate more actively in courses with the blended structure, which promotes learning (Gecer & Dag, 2012).

Flexibility and Interests

Students and faculty have also found the blended course format to allow for more course flexibility for students. For example, some faculty allow students the option to make the course completely online as long as they meet certain grade criteria (Ackerman, 2008; Brothen & Wambach, 2007). This gives students the opportunity to learn on their own time and in ways that best suit their needs (Masalela, 2009), which students report as a motivational factor in blended courses (Gecer & Dag, 2012). Students have also noted that they spend more time focused on the material when they can control when and where they learn versus having to sit in a classroom (Stacey & Gerbic, 2007). In addition, non-traditional students are better able to fit these courses around work and family (Osguthorpe & Graham, 2003). Zapatero, Maheshwari, and Chen (2012) suggest the use of technological learning tools also better meets the interests of younger students who are bored with traditional classroom methods. They note this boredom can lead to less engagement in the classroom and poorer student performance.

Diversity Inclusion

Although some may worry the blended classroom comes at a cost to content coverage, many faculty report coverage is not sacrificed (Lage et al., 2000; Osguthorpe & Graham, 2003). Instead, we found the format allowed for greater content coverage and application, including the infusion of diversity related materials. The need for a diversified education grows with our increasingly multicultural society (Hussey, Fleck, & Warner, 2010). In our rapidly changing and 'shrinking' world, researchers have reported greater awareness of White privilege, empathy for racial minorities, and increases in positive attitudes toward minorities when diversity was included in the curriculum (Hussey et al., 2010; Niehuis, 2005; Paoletti, Segal, & Totino, 2007). For example, Hussey and colleagues compared learning outcomes and attitudes toward minorities in a traditional course versus a diversity infused course. Diversity content was infused through such things as reading materials, class discussions and activities, and guest speakers. At the end of the semester, the courses did not differ in regards to content knowledge gained, but they did in terms of attitudes toward minorities. As will be discussed, diversity content was infused into the curriculum of the current study through "application days" and the final project.

Perceived Disadvantages and Barriers

As Mortera-Gutierrez (2006) notes, resistance of some level is expected of faculty for which online teaching is new. Some faculty might be better suited to blended learning than others based on their teaching methods and their openness to new teaching methods (Beck & Ferdig, 2008). Also, based on teachers' experiences with online learning tools, they might be more apt to perceive certain disadvantages or barriers to using a blended format. These potential disadvantages or barriers include technical problems and knowledge, student perceptions, lack of control, and mixed perceptions, each of which is described in detail.

Technical problems and knowledge: Faculty may avoid the use of online teaching tools for fear of technical problems, which can detract from learning and take away from class time (Mortera-Gutierrez, 2006). Non-adopters of blended learning note the importance of online infrastructure available at their school as well as technicians influencing their decision to transition to a blended format (Masalela, 2009). Relatedly, faculty may also avoid the use of online learning tools if they do not feel confident in their knowledge of using the tools effectively (Cole & Kritzer, 2009; Mortera-Gutierrez, 2006). This barrier could also be perpetuated if faculty feel they do not have time to learn about the tools or if they feel they do not have technical support in using the tools (Mortera-Gutierrez, 2006). Similarly, faculty may not feel they have the skill set to train students to use online tools.

Student perceptions: A number of potential barriers also exist regarding student perceptions of faculty and the course. Many students are accustomed to traditional courses and having access to their instructor while in class working on assignments (Foertsch et al., 2002). This is not always the case in an online environment. Unless the instructor is having online office hours, students will have to email questions and wait for a response, which could lead to perceptions of less faculty support in a blended course (Senn, 2008). This perceived lack of support can lead students to feel the blended course is more work. Although the workload is usually the same, Senn (2008) suggests such perceptions can arise from the effort students need to put into completing online assignments. For example, when students are in class, the instructor can see where students are getting stuck and provide immediate feedback. In a virtual class, it might not be as obvious to faculty where students are having trouble and feedback usually takes longer (e.g., email). In the meantime, students often search for the solution and become frustrated.

This frustration can arise from students not understanding the material to confusion over how to use an online tool. Not all students are computer savvy, which can lead to having to teach students how to access course material. This may include a training session at the beginning of the course as well as throughout the course as needs arise (Groves & O'Donoghue, 2009). Even after going through the online portions of the course, students can still struggle to access the material due to things such as internet connection issues, remaining confusion, or being overwhelmed by the amount of information provided (Gecer & Dag, 2012). However, addressing these issues early in the course will help students become comfortable with the technology and troubleshooting problems (Cole & Kritzer, 2009).

As a result of these potential issues, faculty might be hesitant to transition to a blended format due to possible negative student ratings. This might especially be a concern for faculty whose tenure and promotions hinge partly on student ratings (Cole & Kritzer, 2009). Students who struggle with the independent learning of the blended format, and in turn perform poorly, may blame this on the instructor and give lower course evaluation ratings (Senn, 2008). High expectations of faculty performance and the course structure can also lead to negative ratings (Gecer & Dag, 2012).

Lack of control: Faculty may be hesitant to transition to a blended course because they perceive having less control in the classroom. For example, the question arises as to whether students will actually view the online materials. Foertsch and colleagues (2002) found that most students watched prerecorded lectures in order to prepare for face-to-face classes. Others have used incentives to ensure engagement with online tools, such as allowing students to have input on certain course elements (Groves & O'Donoghue, 2009). To best incorporate online learning tools, faculty should also be aware of, and involved in the discussions students have online. This includes potentially unfamiliar territory, examples, and questions raised by students that faculty might not feel prepared to handle as these online discussions carry over into the classroom (Dengler, 2008). Heinze and Procter (2006) note that the use of online discussion boards can also be unpredictable due to students going off topic, not participating, or over-participating.

Mixed perceptions: Sometimes the elements of blended courses are perceived as both advantages and disadvantages. For example, Jackson and Helms (2008) examined students' perceptions of quality hybrid courses using a method that allowed students to identify what they perceived as important course elements. Students reported interaction with faculty as strength and a weakness of blended courses. For example, the online format allowed more time to reflect on answers, but also limited interaction with faculty, which could lead to perceptions of decreased learning. Similarly, interactions with other students was seen as an advantage and disadvantage because students felt they could learn from their peers in online discussion forums, but at the same time felt less connected to fellow classmates. Students reported the greater amount of work outside of class contributed to more in-depth coverage of material in class as well as critical thinking. However, others felt the blended format detracted from learning because students were able to read others' answers online before posting their own.

Time commitment is another factor that has been viewed both positively and negatively. Like any course, there are time commitment issues with prepping for a flipped classroom. However, the flipped course is more frontloaded in preparation than a traditional course due to setting up the virtual classroom, prerecorded lectures, and other materials (Cole & Kritzer, 2009). However, pulling from previous course materials as well as enlisting technical support can help reduce this workload (Lage et al., 2000). Faculty who are completely new to online teaching might benefit from training (Kim & Bonk, 2006), yet faculty might perceive this as intimidating or a burden (Cole & Kritzer, 2009; Masalela, 2009). In addition, faculty may worry about the added time of having to train students to successfully learn online (Masalela, 2009). Some faculty have also noted greater communication demands with students after transitioning to a blended format (Beck & Ferdig, 2008; Senn, 2008). This can lead to faculty frustration in feeling that student questions could have been quickly addressed during class conversations (Senn, 208). Furthermore, some faculty report increased feedback on assignments after switching to a blended format (Beck & Ferdig, 2008).

However, elements of blended learning can help increase learning with minimal time commitment. For example, many blended courses are developed from preexisting traditional courses, reducing the amount of work for faculty (Osguthorpe & Graham, 2003). Others have found that producing online lectures can cut lecture time in half (Foertsch et al., 2002). In addition, discussion board involvement for faculty might involve 30 minutes a week (Dengler, 2008). However, as class size increases beyond 40-50 students, time commitment will likely increase (Dengler, 2008; Lage et al., 2000). Nevertheless, there are instructors who use certain blended formats in order to increase student contact in the classroom to make the most of face-to-face time with their students in larger classes (Foertsch et al., 2002; Schullery et al., 2011). Other faculty have changed some assignments to be peer reviewed online versus faculty graded, which has also been shown to improve learning (Groves & O'Donoghue, 2009). In addition, this reduces faculty time commitment and students often report enjoying giving and receiving peer feedback (Groves & O'Donoghue, 2009; Jackson & Helms, 2008; Strayer, 2012).

Although there are a number of potential barriers to transitioning to a blended format, the benefits outweigh the costs (Cole & Kritzer, 2009). After faculty put in the time to learn the online tools and create the course, their time can be devoted to interacting with students and facilitating learning (Cole & Kritzer, 2009). There are also numerous strategies and best practices that faculty can employ in developing their blended courses to help with the transition, perceived barriers, and to increase student learning.

Best Practices for the Flipped and Blended Classroom

There are numerous ways in which faculty can deliver information in a blended course, however the question remains as to which information is best suited to online delivery versus face-to-face (Brothen & Wambach, 2007; Gecer & Dag, 2012; Masalela, 2009; Osguthorpe & Graham, 2003; Stacey & Gerbic, 2007; Strayer, 2012; Tao, Fore, & Forbes, 2011). Mortera-Gutierrez (2006) notes the most commonly used course elements in order of relevance include face-to-face meetings, reading assignments, self-paced content, online tools (e.g., discussion boards), video/audio conferencing, the virtual classroom, asynchronous instruction, and synchronous instruction. However, it is not enough to just randomly combine these elements (Tao et al., 2011), faculty need to be student-centered in their teaching methods (Beck & Ferdig, 2008). In other words, there may not be one format that fits all courses (Osguthorpe & Graham, 2003; Strayer, 2012). Some courses may require more face-to-face time than others, such as courses requiring more hands on demonstrations and practice (Beck & Ferdig, 2008; Senn, 2008). It is up to faculty to determine which blend is best suited to meet students' learning needs, with a focus on using the best methods from each delivery mode (Groves & O'Donoghue, 2009; Heinze & Procter, 2006).

Audio and visual materials: Faculty who use online audio and visual materials to help teach course concepts and/or to complement face-to-face material have found improvements in student learning (Mortera-Gutierrez, 2006). However, for such online learning to be effective, it is important that faculty educate themselves on this media and how to create and implement such online learning tools in order to help with ease of learning as well as to avoid lost class time (Mortera-Gutierrez, 2006). This includes aligning the use of online tools with course learning objectives (Groves & O'Donoghue, 2009; Strayer, 2012). In addition, faculty should help familiarize students with the online tools of the course and how they should use them to optimize learning. Heinze and Procter (2006) found such activities increase student online participation and depth of discussions.

Establish community and expectations: It is important to start the course with a face-to-face meeting in order to establish connections between students and faculty in order to create a sense of connection and foster interaction (Ackerman, 2008; Heinze & Procter, 2006; Mortera-Gutierrez, 2006; Rausch & Crawford, 2012). Building this sense of community, which is often lacking in online courses (Mortera-Gutierrez, 2006), has the potential to influence student perceptions of learning (Rausch & Crawford, 2012). It is also important to maintain that sense of connection throughout the course, such as through student collaborations (Ackerman, 2008; Beck & Ferdig, 2008) and continuing the discussion outside of the classroom (Osguthorpe & Graham, 2003). Online discussion boards can be a great way to establish a sense of community (Cole & Kritzer, 2009). For example, Heinze and Procter (2006) implemented a "Virtual Café" where students could meet and have informal discussions. This could be used as an area devoted completely to students so they do not feel hindered in their discussions. However, a disclaimer might be implemented regarding faculty involvement to the extent that discussions do not violate any school policies. Other designated discussion boards could be used in a similar way. For example faculty could create a "Getting to Know You" discussion board to foster introductions between students and faculty (Cole & Kritzer, 2009). Additionally, Cole and Kritzer (2009) used brief weekly video messages to help build a sense of presence and community. Although not a discussion board, the videos served a comparable role.

Students should also be made aware at the beginning of the course what is expected of them and what they can expect from the course (Strayer, 2012). For example, Lage and colleagues (2000) described to students the time and effort it would take to be successful in the flipped course and encouraged students to transfer to a different course section if they did not believe they would succeed with such a format. To help students with time management, faculty should include suggested timelines for viewing online lectures and materials so that students stay on track and are prepared to participate online and in class (Foertsch et al., 2002). One way to meet students' organizational needs is to create modules based on course themes (Cole & Kritzer, 2009). In addition, students might find it helpful if faculty explain the reasoning, or elaborate on learning objectives, course structure, or particular assignments (Groves & O'Donoghue, 2009). This might be especially useful in blended courses where there is not as much structure to in class routines as traditional courses (Strayer, 2012).

Assignments and learning objectives: To help reduce confusion and endless student emails, faculty should be as explicit in describing student assignments as possible (Mortera-Gutierrez, 2006). This includes how and where assignments should be turned in. Faculty who suggest the use of email to submit every assignment are often inundated with student emails (Mortera-Gutierrez, 2006). Beck and Ferdig (2008) also suggest switching from traditional assignments to more online projects.

It is also important that learning objectives align with the blended format, meaning adjustments will likely be needed for faculty transitioning to a blended format (Mortera-Gutierrez, 2006; Tao et al., 2011). For example, faculty may have to work to transition from content-focused to learner focused (Beck & Ferdig, 2008; Kim & Bonk, 2006). McDaniel and Caverly (2010) suggest focusing first on specifying the learning objectives to help guide in class and online materials. Furthermore, course objectives should be centered on student learning versus content; otherwise the online portion of the course could become a simple communication tool instead of a learning tool (Mortera-Gutierrez, 2006). Similarly, learning assessments will need to be modified to align with the new learning objectives (Kim & Bonk, 2006; Zapatero et al., 2012).

Faculty involvement: It is important for faculty to be involved in course elements, whether they are inside or outside the classroom. One way to stay involved outside of the class is to hold online office hours for students who might need help outside of class or has to work during regular office hours (Cole & Kritzer, 2009). In addition, faculty involvement in online discussion boards signals to students the importance of those course elements. However, it is important for faculty to determine the optimum amount of participation; too much involvement online may hinder participation and too little may reflect a lack of interest to students (Cole & Kritzer, 2009). Faculty can also increase student learning and continuity by ensuring in class activities are related to online discussions (Stacey & Gerbic, 2007). Although how to best be involved may require training, many faculty want and expect it to improve blended learning (Beck & Ferdig, 2008; Kim & Bonk, 2006).

Face-to-face and online elements: Tao and colleagues (2011) note that in blended teaching, more research has been devoted to studying the online methods of teaching than the face-to-face methods. They examined four different blended courses, with a focus on best practices during face-to-face classes. First, to motivate students to view the prerecorded lectures and read assigned texts, the authors suggest starting face-to-face classes with a short quiz. Students reported such methods helped them prepare for the face-to-face classes. If lectures are given during face-to-face classes, the focus should be on enhancing the prerecorded lectures as well as addressing material students found challenging. Tao and colleagues also encourage the use of laptops in the classroom by faculty and students, which has shown to increase student directed learning. Faculty can also employ the laptops for electronic testing, which the majority of students in this study preferred. Clickers, or classroom response devices, can also be used in the classroom as a metacognitive tool. Students use these devices to answer questions and get immediate feedback that allows them to assess their learning as well as helps faculty gauge student learning. Games and group work can also be integrated into course work to help with learning and engagement.

Students also report a number of steps faculty can take to improve learning through the use of online lectures. For example, students recommend faculty devise the online lectures so that students are able to interact with the material by pausing and rewinding, see the amount of needed to view the lectures, view the lectures without the internet in case there is a problem with connectivity (e.g., place lectures on a CD) (Foertsch et al., 2002). Additional student recommendations include the avoidance of simple webcam headshots (Schullery et al., 2011).

Course structure: Many faculty are also experimenting with inverting the classroom or using a flipped course structure. Basically, work that is traditionally completed in class is done outside of class and vice versa (Lage et al., 2000). For example, Cole and Kritzer (2009) used voiced-over slide presentations, readings, and online activities (e.g., discussion boards) that students completed outside of class. Face-to-face time was used to briefly review the materials students covered at home and work on applying the material in small groups. Students reported learning more in the face-to-face sessions in comparison to traditional lectures where students passively learn. McDaniel and Caverly (2010) flipped their developmental math course and propose how to best go about creating the class. First, they suggest adapting course objectives to specifically guide the creation of in-class and online materials. Second, they focused on in-class materials including activities and group work. Lastly, they created the prerecorded lectures. Their goal of these lectures was to introduce students to course concepts so they could build a foundation of knowledge to pull from during class activities.

Many faculty are adopting this structure in order to focus more on projects, problem-solving, and real-world applications and less on lectures and passive learning (Cole & Kritzer, 2009; Foertsch et al., 2002). However, Foertsch and colleagues note that even with a student-centered approach, lectures are still needed to convey foundational knowledge from which students can apply in projects, and group work. They argue that the content of lectures is not the problem, but when they are delivered to students. Students are most likely to have questions when they are working on problems versus when they are listening to a lecture. Therefore, one could argue that lectures should be viewed outside of class, much like reading a text, and class time should be devoted to students working on assignments where faculty are able to observe where students are struggling (Cole & Kritzer, 2009; Foertsch et al., 2002).

Employing such practices, Lage and colleagues (2000) flipped a microeconomics class. Students viewed prerecorded lectures on their own time and class time was devoted to covering the materials more in-depth. Students were also provided with PowerPoint slides for each unit that they could use for taking notes, raising questions in class, and as a reference. The beginning of each face-to-face class started with student questions that often lead to mini-lectures followed by hands-on labs and experiments, as well as worksheets and application questions that students completed individually and then reviewed in groups. To ensure attendance, worksheets and application questions were randomly collected. The instructors also created a course homepage to offer students more support with PowerPoint slides, assignments, optional interactive quizzes, a discussion board geared toward applying the material, and a chat room where instructors held online office hours. Overall student perceptions of the course were positive, with the majority of students reporting a preference for the flipped format in future courses and that they learned more with the flipped format and group work. It is also interesting to note that most students felt they put in about the same amount of time and work as they have in their traditional courses. The instructors' perspectives were also positive. They felt students were more motivated, possibly due to greater student responsibility for learning with the flipped format. They also believed student collaboration aided in learning, with students often referring to in class activities and experiments on tests. From their own perspective, faculty viewed the flipped course as more enjoyable to teach due to greater student involvement, unpredictable class discussions, and more one-on-one time with students.

Feeling like face-to-face time was not effectively being utilized, Foertsch and colleagues (2002) flipped their once lecture-based computer science course so that lectures and reading materials were viewed outside of class and face-to-face time was devoted to group work and problem-solving. Faculty and teaching assistants noted an increased workload, but the payoff was the face-to-face classes were more enjoyable to teach. In addition, the course format allowed faculty to better observe and facilitate student learning and intervene when help was needed. Overall, the majority of students also provided positive feedback on the course format. Student believed the flipped structure better allowed them to work at their own pace and to view lectures when they felt they were most receptive to learning. Most students reported watching the lectures, especially to prepare for face-to-face classes, and believed the prerecorded lectures were more helpful for taking notes because they could go back and replay sections as needed. However, some students did not like the flipped structure because they felt they could not ask questions as they arose when watching the lectures, struggled to pay attention to online lectures, and were less likely to take notes because online notes were provided.

Others have implemented the flipped course pedagogy to address many of the issues that arise with increasing student enrollment (Foertsch et al., 2002; Schullery et al., 2011). For example, Schullery and colleagues (2011) flipped their course structure because less and less faculty were willing to teach classes with hundreds of students, there were concerns that students were truly learning through passive lectures and multiple-choice exams, as well as a means to increase student engagement. The flipped course structure allowed for more student interaction through the faculty transitioning from lecturers to facilitators of learning. Students also reported feeling more connected to faculty as a result of this change. The course structure also provided opportunities for deeper learning by using the lectures to build foundational knowledge of course topics, which can be applied during face-to-face meetings. In addition, the authors note a flipped classroom better meets the needs of students with short attention spans who are looking for immediate gratification, incorporation of technology, and to be involved in their learning.

Keeping the advantages, barriers, and best practices in mind we developed a flipped classroom pedagogy to teach psychology statistics. In the upcoming section, the course is fully described. In addition, we assessed student outcomes, including understanding of statics content, cultural sensitivity, and student attitudes toward statistics. The results of the study are discussed as well as more general application of flipped classroom methodology and overall conclusions.

FLIPPED PSYCHOLOGY STATISTICS COURSE: A FIELD EXPERIMENT

A unique and nontraditional course was developed and administered to undergraduate students at a large, public, liberal arts university. The course was for Psychology Statistics and its structure followed a blended learning model that essentially flipped traditional homework with in-class work. The new course structure was designed to achieve a learner-centered environment, where the focus was on the student rather than the material being taught. Students viewed lectures online at home rather than passively learning in class. The lectures were video recordings of the two instructors that were then uploaded to a university webpage dedicated to the course. A lecture was generated for each of the major sections of the chapters in the textbook. PowerPoint slides were also created that accompanied each lecture. Students printed the slides and were encouraged to make note of questions or points of confusion to be discussed with the professor during face-to-face time. Viewing lectures at home created time in-class to work on problem sets that would normally be completed as homework assignments. They consisted of 15 multiple-choice questions, five open-ended questions, and 10 true or false questions. Answers to the questions were provided to students in the study guide. This allowed for immediate feedback to students on their performance, but also offered the opportunity for students to cheat. To circumvent this temptation and to foster deep processing of conceptual statistics understanding, students were required to elaborate on why the chosen answer was correct. Problem sets were turned in each week and students were required to show all work including an explanation of the correct answer for each problem.

A second unique aspect of the new structure was the focus placed on diversity inclusion into the curriculum. "Application days" were scheduled throughout the course where students applied the statistical principles they learned to real world situations related to social justice issues. For example, a guest faculty member presented research related to gender equity. On another application day, a graduate student presented research related to race discrimination. Students read articles written by the guest speaker's prior coming to class. Class time was then devoted to understanding the researcher's social issue and analysis of some of the speaker's data. Furthermore, a final course project required students to analyze quantitative information students collected regarding a social justice topic of their choice in which there was a "pro" side and a "con" side. The projects were shared with the class during a poster presentation session that modeled that of psychology professional conferences. In addition, students were individually responsible for writing a short American Psychological Association (APA) style manuscript describing their study, analyses, and results.

Method

Participants

Participants included undergraduate students at a liberal arts state university in the Northeast enrolled in Psychology Statistics courses (i.e., two flipped courses and two traditional courses). See Table 1 for participant demographics.

Materials and Procedure

Students completed a series of surveys at the beginning of the semester and again at the end of the semester. The first instrument was the Survey of Attitudes towards Statistics Scale (SATS; Schau,

Table 1. Participant demographics

	Hybrid (n **= 50)**	**Traditional** (n **= 59)**
Mean Age (*SD*)	19.04 (.90)	19.44 (2.46)
Gender (%)		
Male	16	15.3
Female	84	84.7
Year in School (%)		
First	42	49.2
Second	36	32.2
Third	18	11.9
Fourth	4	6.8
Race (%)		
African American	4	0
Asian	2	3.4
Latino/a	4	0
Caucasian	84	94.9
Other	4	1.7

Stevens, Dauphinee, & DelVecchio 1995, Schau, 1999). The SATS assesses four components of attitudes toward statistics. These include affect (e.g., positive and negative feelings about statistics); cognitive competence (e.g., students' intellectual knowledge and skills when applied to statistics); value (e.g., usefulness, relevance, and worth of statistics in personal and professional life); difficulty (e.g., difficulty of statistics as a domain). Items are answered on a 7-point Likert scale. In this study, pre and posttest Cronbach alphas for each subscale were .85 and .91 for affect, .89 and .89 for cognitive competence, .85 and .87 for value, and .82 and .79 for difficulty.

The second instrument the students completed was the Cultural Sensitivity Scale (Chen & Starosta, 2000). This scale consists of 24 items that measure six affective elements of intercultural sensitivity, including self-esteem, self-monitoring, open-mindedness, empathy, interaction involvement, and suspending judgment. An overall score is computed from this assessment with a higher score indicating higher levels of sensitivity in intercultural interactions (Chen & Starosta, 2000). Pre and posttest Cronbach alphas for the current study were found to be .97 and .72.

The third measure was an assessment of statistical content knowledge. This assessment consisted of 14 multiple-choice items that were developed by a faculty member who was considered an expert in psychology research and statistics. The faculty member was blind to the hypothesis of the study, thus creating an objective assessment strictly on the material in the textbook. In addition, all of the instructors were prohibited from seeing the assessment until after the study was complete. The assessment was scored for number of correct answers and was given to students at the beginning and end of the semester.

Differences between Course Structures on Outcome Measures

To understand how course structure, pretest scores (i.e., statistics knowledge, ISS, and SATS), and posttest scores (i.e., statistics knowledge, ISS, and SATS) the following analyses were performed. First, ANOVAs were performed to determine whether there were group differences on any of the pretest and posttest scores. Although there were no significant differences on pretest scores between groups, there were differences in the mean scores suggesting possible confounds (see Table 2). Specifically, the students in the flipped course scored slightly higher than the students in the traditional course on a number of the measures. Looking at just posttest scores, those in the flipped course scored significantly

Table 2. Mean scores on pretest and posttest measures for each statistics course

	Flipped (n = 50)	Traditional (n = 59)
Stat Knowledge		
Pre	9.12	8.22
Post*	16.04	14.22
Stat Attitudes		
Affect		
Pre	28.22	26.85
Post	26.34	26.63
Competence		
Pre	32.30	30.24
Post	29.80	29.36
Value		
Pre	43	43.27
Post	41.72	40.03
Difficulty		
Pre	29.88	29.07
Post	28.2	28.32
Cultural Sensitivity		
Pre	77	72.71
Post	99.68	94.14

Note (*) denotes $p < .05$.

higher on statistical knowledge ($F(1, 107) = 7.092$, $p = .009$, $\eta_p^2 = .062$) and the Intercultural Sensitivity Scale ($F(1, 107) = 6.026$, $p = .016$, $\eta_p^2 = .062$) at the end of the semester. All other differences were not significant. Next, a MANCOVA was performed to examine whether controlling for the initial slight confounds between course structure and pretest scores changes the posttest scores across the course structures. After controlling for pretest scores, statistical knowledge at the end of the semester was still higher in the flipped course ($F(1, 101) = 4.256$, $p = .042$, $\eta_p^2 = .040$), however scores on the ISS were no longer significantly different ($F(1, 101) = 3.238$, $p = .075$) and no other significant differences were revealed.

Exploratory Results

Exploratory analyses were also performed to examine whether demographic differences exist. No significant differences were found for gender. Looking at year in school, significant differences were found for a number of pretest scores using ANOVAs and post hoc Tukey tests (see Table 3). Generally, first year students were significantly higher on intercultural sensitivity ($F(3, 105) = 15.547$, $p < .001$, $\eta_p^2 = .314$), SATS: affect ($F(3, 105) = 4.228$, $p = .007$, $\eta_p^2 = .112$), SATS: cognitive competence ($F(3, 105) = 2.908$, $p = .038$, $\eta_p^2 = .076$), and SATS: difficulty ($F(3, 105) = 4.007$, $p = .010$, $\eta_p^2 = .103$). Similar analyses were performed to examine group differences on posttests revealing significant differences for SATS: cognitive competence ($F(3, 105) = 2.796$, $p = .044$, $\eta_p^2 = .075$) and trends for SATS: affect ($F(3, 105) = 2.527$, $p = .061$, $\eta_p^2 = .066$) and SATS: difficulty ($F(3, 105) = 2.261$, $p = .086$, $\eta_p^2 = .070$), with third year students scoring significantly higher than second year students on affect and cognitive competence and fourth year students tending to score higher than others on difficulty.

Table 3. Mean scores on pretest and posttest measures for each year in school

	First Year (*n* = 50)	**Second Year** (*n* = 37)	**Third Year** (*n* = 16)	**Fourth Year** (*n* = 6)
Stat Knowledge				
Pre	8.72	8.08	9.69	8.50
Post	15.26	14.22	16.75	14.00
Stat Attitudes				
Affect				
Pre*	29.34a	26.41	26.94	20.00a
Post*	27.00	24.08a	30.25a	27.17
Competence				
Pre*	31.84a	31.03	32.13b	24.17ab
Post*	29.52	28.14a	33.94a	27.00
Value				
Pre	42.88	45.38	40.13	39.67
Post	41.24	39.16	43.31	40.67
Difficulty				
Pre*	30.50a	29.59b	28.50	22.17ab
Post	27.94	27.08	30.88	31.33
Cultural Sensitivity				
Pre*	89.12abc	60.24a	66.81b	64.33c
Post	97.90	93.59	98.75	100.00

Note (*) denotes $p < .05$. Significant differences between groups are marked by matching subscripts.

DISCUSSION

Results from the psychology statistics course study suggest the flipped classroom structure significantly improved learning, but no differences were found between groups regarding attitudes toward statistics. Similarly, the flipped course showed a greater increase in intercultural sensitivity over the course of the semester, but after controlling for pretest scores was no longer significant. There were no significant differences between courses in regards to changes in attitudes toward statistics. However, this is not surprising. Previous studies have found small, if any, differences between pre and posttest scores (Schau, 1999). Schau suggests these findings may be due to students' overconfidence in their abilities to perform statistics at the beginning of the semester and/or their misunderstandings of what statistics can do for them. Interesting demographic differences were found regarding year in school that supports this claim.

At the beginning of the semester, it appears that first year students held the majority of positive attitudes. First year students held significantly more positive attitudes toward statistics than fourth year students. First and third year students also believed they had more cognitive competence, or statistical knowledge and skills, than fourth year students. In addition, first and second year students thought statistics were less difficult than fourth year students. However, by the end of the semester, the differences by years decreased so that only third year students had more positive attitudes toward statistics and believed more in their statistical knowledge than second year students. Looking at overall trends, it appears as though first year students began the semester feeling confident and positive about statistics in comparison to fourth year students. However, this appears to flip by the end of the semester. Examining mean changes by year, first and second year students' attitudes toward statistics become negative over the course of the semester, whereas third and fourth year students' attitudes became more positive. It could be that first year students who feel confident about their statistical knowledge are more likely to take the course early in their college career, versus those who put off taking statistics possibly due to their lack in confidence. In addition, over the course of the semester, those who overestimated their skills and knowledge come to find that statistics is harder than they thought, whereas those who lacked faith came to find how they had more skills and knowledge than they thought.

It is also important to discuss the additional learning opportunities the flipped course structure offered over the traditional course, without sacrificing course content (Lage et al., 2000). Common themes of these opportunities revolve around flexibility and students taking control of their learning. For example, as long as students maintained a minimum course grade, face-to-face workshop classes were optional. Brothen and Wambach (2007) also allowed students to do certain assignments online (vs. in class) as long as they maintained an acceptable grade. However, a number of students still chose to do work in class even though they had permission. We found similar results, with many students of varying talent still attending the workshops to complete their assignments. Some students likely needed the structure whereas others might have preferred having the instructor readily available in the event they needed assistance. It was also a time where students could work together and receive additional support, which are opportunities students reportedly appreciate (Groves & O'Donoghue, 2009; Strayer, 2012). We also created an informal online discussion area meant only for students for those who did not attend workshops and/or those working after class. Similarly, Heinze and Procter (2006) implemented a "Virtual Café" where students could have informal discussions online in an attempt to foster a sense of community.

The flipped structure also allows for greater flexibility in what is covered and how. For example, having the lectures online allowed for other face-to-face meetings to be used to apply statistics to diversity related research topics through readings, demonstrations, and guest speakers. Senn (2008) recommends using class time for hands on demonstrations or for examples in which students need to be shown step-by-step. Furthermore, these additional learning opportunities better prepared students to complete their own diversity related research project, which they picked as long as they met the course criteria. Giving students this control has been found to increase the variety of topics covered, examples used, and class discussions (Dengler, 2008). Similar to our experiences, Stacey and Gerbic (2007) found that students recognized the benefits of blending online and face-to-face formatting and employed the course elements that best addressed their needs. Specifically, students who were grouped together for a course project scheduled times to meet in person as well as shared important project documents online. This same collaboration has not been found in comparison to traditionally formatted classes (Strayer, 2012).

Application to Other Courses and Fields

The psychology statistics course described above is an example of a flipped classroom that utilizes blended learning though Internet technology. We suggest that any college level course could be flipped in a very similar way. Lectures can be assigned as homework, streamed online or as downloadable files. As was done in the statistics class, professors could video-record staged lectures created especially for the course. Another option is to record live-lectures that took place within real classes during a previous semester. These real, but recorded lectures, could then be posted online, or for students who have limited access to the Internet, the professor could provide the needed files to the students on a compact disk or a jump drive (Foertsch et al., 2002). Other options for lectures exist such as podcasts (audio recording only) or PowerPoint slides with voice over. Such lectures can be made on a PC using the Acrobat Pro program or on a Macintosh using the iMovie application (Lage et al., 2000).

To better understand how the flipped classroom might look in various academic domains, consider the following examples. In a science class, such as biology, chemistry or anatomy, students could view PowerPoint files with voice over prior to coming to class. Class time could then be used in a more traditional science lab situation. Students would have twice as much time to work on experiments or worksheets as they would in a traditional course. Or, consider a course taught in an art or design department. Students could view pre-recorded lectures of professors demonstrating artistic, skillful, and difficult techniques. Students would be able to study and re-watch the videos so that when they come into the classroom they are able to immediately practice the new skill. Time spent working on the projects would be increased. In this case, the professors are truly modeling skills for their students, who can learn through the observation and in-class practice.

In the above examples students are able to spend class time conducting experiments, working in groups, or individually on their own projects. Self-directed study could also be used during class time (Lage et al., 2000). If one chooses to spend class time in this way, we would suggest that interactions between the faculty and student should still be cultivated and remain a focus of the time spent together. Foertsch and colleagues (2002) argue that being able to ask questions, and receive timely answers is a key feature of a flipped classroom. Students often do not know they have questions until they are actively working on the material. This is when they first become aware that they have a misunderstanding. When work is being done in class (instead of at home), students will be able to generate questions and interact with the professor to get the answers they need. Asking questions and receiving immediate feedback should lead to a better understanding of the course material (Foertsch et al., 2002).

Class time can be spent in additional ways then those already described. For example, reading prior to coming to class is an important aspect of many college courses. Professors struggle to get their students to consistently read. The flipped classroom could help in this problem. In-class time could be used to quiz students or give them other low-stakes assessments. Use of such quizzing is thought to increases students reading at home. Studies have also found that repetitive quizzing of course material increases retention of that material later on, a phenomenon referred to as the testing effect (McDaniel, Anderson, Derbish, & Morrisette, 2007). If quizzing is not a desired method, professors could have students generate questions for review that the class spends time covering together.

Although most of the examples of flipped classes in the literature have been small we encourage professors to extend such pedagogy to courses with a larger numbers of students. Lage and colleagues (2000) suggest that their flipped economics course could be done with large class size, but that professors might break students up into smaller recitation sections. If recitation sections are not possible, professors could employ teaching assistants and implement random collection and grading of work. For example, if a course runs 16 weeks, and students work in class to complete weekly-assigned worksheets (problem based learning), a total of six assignments could be collected and graded. The collection times would be random and unannounced during the semester.

CONCLUSION

Foertsch and colleagues (2002) asked what could face-to-face classes be used for if they were not used for lecturing? They note lectures are most effective when used as another source of information, much like a textbook. In this sense, lectures can be viewed outside of class and “face-to-face class time may then be used for more pedagogically powerful interactive exercises" (p. 273). Similarly Cole and Kritzer (2009) note the flipped classroom provides, "a more efficient use of instructional time" (p. 38). Students work on gaining foundational knowledge on their own time so that class time can be used for deeper learning through application of the material they learned. Similarly, many students mark the success of a learning environment through opportunities in the course to apply what they have learned (Strayer, 2012). The research presented in this chapter suggests there are a number of additional learning opportunities that a flipped course structure offers over the traditional format. In the current study, both courses had the same homework assignments, tests, and textbook but the flipped course allowed for additional readings to apply the material, application days, and a final project.

However, it is important to note that the flipped course structure might not fit every course, instructor, or student (Beck & Ferdig, 2008; Osguthorpe & Graham, 2003; Strayer, 2012). As mentioned previously, faculty need to determine which blend of best practices is best suited to meeting the learning needs of students (Groves & O'Donoghue, 2009; Heinze & Procter, 2006). However, faculty might be hesitant to transition to a blended format for a number of reasons. Foertsch and colleagues (2002) note the increased time commitment and challenges to flipping a course, but believe teaching such a course is more fun because it allows faculty to better interact with students and facilitate learning. Flipped courses may be front loaded in terms of preparation, but this allows for more time throughout the rest of the semester to prep for in-class activities, tweaking the course, as well as decreases the amount of time needed for future courses (Cole & Kritzer, 2009). Faculty might also be concerned about whether students will view lectures if put online. However, the majority of students report watching most of the lectures, especially to prepare for face-to-face classes (Foertsch et al., 2002).

These are great examples demonstrating the importance of establishing course and student expectations at the beginning of the course so students can make an educated decision regarding whether they want to stay enrolled in the course. Addressing such concerns ahead of time will help make for a pleasurable learning experience for students, and decrease negative course evaluations (Foertsch et al., 2002).

REFERENCES

Ackerman, A. S. (2008). Hybrid learning in higher education: Engagement strategies. *Media Review*, *14*, 145–158.

Adderley, K. (1975). *Project methods in higher education*. Guildford, UK: Society for Research into Higher Education.

Allen, E., & Seaman, J. (2011). *Going the distance: Online education in the United States, 2011*. Retrieved from http://www.onlinelearningsurvey.com/reports/goingthedistance.pdf

Alonzo, F., Lopez, G., Manrique, D., & Vines, J. M. (2005). An instructional model for web-based e-learning education. *British Journal of Educational Technology*, *36*(2), 217–235. doi:10.1111/j.1467-8535.2005.00454.x

Anderson, L. W. L., & Krathwohl, D. R. (Eds.). (2001). *A taxonomy for learning, teaching and assessing: A revision of Bloom's Taxonomy of educational objectives*. New York, NY: Longman.

Anderson, L. W. L., & Sosniak, L. A. (Eds.), (n.d.). *Bloom's taxonomy: A forty-year retrospective*. Chicago, IL: University of Chicago Press.

Beck, D., & Ferdig, R. E. (2008). Evolving roles of online and face-to-face instructors in a lecture/lab hybrid course. *The Turkish Online Journal of Educational Technology*, *7*(1), 5–17.

Bersin, J. (2004). *The blended learning book: Best practices, proven methodologies, and lessons learned*. San Francisco, CA: Pfeiffer.

Betts, K., Hartman, K., & Oxholm, C. (2009). Re-examining and repositioning higher education: Twenty economic and demographic factors driving online and blended program enrolments. *Journal of Asynchronous Learning Networks*, *13*(4), 3–23.

Bloom, B. S. (1956). *Taxonomy of educational objectives: The classification of educational goals: Handbook I: Cognitive domain*. New York: Longmans, Green.

Boss, S., & Krauss, J. (2007). *Reinventing project-based learning: Your field guide to real-world projects in the digital age*. Eugene, OR: International Society for Technology in Education.

Brothen, T., & Wambach, C. (2007). Internet vs. classroom access in a hybrid psychology course for developmental students. *Research & Teaching in Developmental Education*, *23*(2), 15–22.

Callaway, S. K. (2012). Innovation in higher education: How public universities demonstrate innovative course delivery options. *The Innovation Journal: The Public Sector Innovation Journal*, *17*(2), 1–15.

Chamberlin, W. S. (2001). Face to face vs. cyberspace: Finding the middle ground. *Campus Technology, 15*(11).

Chen, G. M., & Starosta, W. J. (2000). *The development and validation of the inter cultural sensitivity scale*. Paper presented at the Annual Meeting of the National Communication Association. Seattle, WA.

Cole, J. E., & Kritzer, J. B. (2009). Strategies for success: Teaching an online course. *Rural Special Education Quarterly*, *28*(4), 36–40.

Davis, H. F. C., Deil-Amen, R., Rios-Aguilar, C., & Canche, M. S. G. (2012). *Social media in higher education: A literature review and research directions*. Retrieved from http://arizona.academia.edu/hfdavis/Papers/1290387/Social_Media_in_Higher_Education_A_Literature_Review_and_Research_Directions

Dengler, M. (2008). Classroom active learning complemented by on online discussion forum to teach sustainability. *Journal of Geography in Higher Education*, *32*(3), 481–494. doi:10.1080/03098260701514108

Foertsch, J., Moses, G., Strikwerda, J., & Litzkow, M. (2002). Reversing the lecture/homework paradigm using eTEACH web-based streaming video software. *Journal of Engineering Education*, *6*(9), 267–274. doi:10.1002/j.2168-9830.2002.tb00703.x

Foulger, T. S., & Jimenez-Silva, M. (2007). Enhancing the writing development of English learners: Teacher perceptions of common technology in project-based learning. *Journal of Research in Childhood Education*, *22*(2), 109–124. doi:10.1080/02568540709594616

Garrison, R. D., & Kanuka, H. (2004). Blended learning: Uncovering its transformative potential in higher education. *The Internet and Higher Education*, *7*, 95–105. doi:10.1016/j.iheduc.2004.02.001

Gecer, A., & Dag, F. (2012). A blended learning experience. *Educational Sciences: Theory and Practice*, *12*(1), 438–442.

Groves, M., & O'Donoghue, J. (2009). Reflections of students in their use of asynchronous online seminars. *Journal of Educational Technology & Society*, *12*(3), 143–149.

Heinze, A., & Procter, C. (2006). Online communication and information technology education. *Journal of Information Technology Education*, *5*, 235–249.

Helle, L., Tynjälä, P., & Olkinuora, E. (2006). Project-based learning in post-secondary education – Theory, practice and rubber sling shots. *Higher Education*, *51*(2), 287–314. doi:10.1007/s10734-004-6386-5

Hmelo-Silver, C. E. (2004). Problem-based learning: What and how do students learn? *Educational Psychology Review*, *16*(3), 235–266. doi:10.1023/B:EDPR.0000034022.16470.f3

Howard, L., Remenyi, Z., & Pap, G. (2006). Adaptive blended learning environments. In *Proceedings of the 9th International Conference on Engineering Education*. San Juan, Puerto Rico: IEEE.

Hussey, H. D., Fleck, B. K. B., & Warner, R. M. (2010). Reducing student prejudice in diversity-infused core psychology classes. *College Teaching*, *58*, 85–92. doi:10.1080/87567550903418560

Jackson, M. J., & Helms, M. (2008). Student perceptions of hybrid courses: Measuring and interpreting quality. *Journal of Education for Business*, *84*(1), 7–12. doi:10.3200/JOEB.84.1.7-12

Kerres, M., & De Witt, C. (2003). A didactical framework for the design of blended learning arrangements. *Journal of Educational Media*, *28*(2-3), 101–113. doi:10.1080/1358165032000165653

Kim, K., & Bonk, C. J. (2006). The future of online teaching and learning in higher education: The survey says. *EDUCAUSE Quarterly*, *4*, 22–30.

Krathwohl, D. R. (2002). A revision of Bloom's taxonomy: An overview. *Theory into Practice*, *41*(4), 212–218. doi:10.1207/s15430421tip4104_2

Lage, M. J., Platt, G. J., & Treglia, M. (2000). Inverting the classroom: A gateway to creating an inclusive learning environment. *The Journal of Economic Education*, *31*(1), 30–43.

Masalela, R. K. (2009). Potential benefits and complexities of blended learning in higher education: The case of the University of Botswana. *Turkish Online Journal of Distance Education*, *10*(1), 66–82.

McDaniel, M. A., Anderson, J. L., Derbish, M. H., & Morrisette, N. (2007). Testing the testing effect in the classroom. *The European Journal of Cognitive Psychology*, *19*(4/5), 494–513. doi:10.1080/09541440701326154

McDaniel, S., & Caverly, D. C. (2010). The community of inquiry model for an inverted developmental math classroom. *Journal of Developmental Education*, *34*(2), 40–41.

Mortera-Gutierrez, F. (2006). Faculty best practices using blended learning in e-learning and face-to-face instruction. *International Journal on E-Learning*, *5*(3), 313–337.

Muirhead, B. (2002). Promoting online interaction in today's colleges and universities. *USDLA Journal*, *16*(7), 43–47.

Niehuis, S. (2005). Helping white students explore white privilege outside of the classroom. *North American Journal of Psychology*, *7*(3), 481–492.

Ocak, M. A. (2012). Blend or not to blend: A study investigating faculty members' perceptions of blended teaching. *World Journal on Educational Technology*, *2*(3), 196–210.

Osguthorpe, R. T., & Graham, C. R. (2003). Blended learning environments: Definitions and directions. *The Quarterly Review of Distance Education*, *4*(3), 227–233.

Paoletti, J. B., Segal, E., & Totino, C. (2007). Acts of diversity: Assessing the impact of service-learning. *New Directions for Teaching and Learning*, *111*, 47–54. doi:10.1002/tl.285

Pierce, R., Fox, J., & Dunn, B. J. (2012). Vodcasts and active-learning exercises in a flipped classroom model of a renal pharmacotherapy module. *American Journal of Pharmaceutical Education*, *76*(10), 1–5. doi:10.5688/ajpe7610196 PMID:22412200

Poirer, C. R., & Feldman, R. S. (2007). Promoting active learning using individual response technology in large introductory psychology classes. *Teaching of Psychology*, *34*(3), 194–196. doi:10.1080/00986280701498665

Polman, J. L. (2000). *Designing project-based science: Connecting learners through guided inquiry*. New York, NY: Teachers College Press.

Proctor, C. (2003). Blended learning in practice. In *Proceedings of the Education in Changing Environment Conference*. ECE.

Rausch, D. W., & Crawford, E. K. (2012). Cohorts, communities of inquiry, and course delivery methods: UTC best practices in learning—The hybrid learning community model. *The Journal of Continuing Higher Education*, *60*, 175–180. doi:10.1080/07377363.2013.722428

Sadaghiani, H. (2012). Online prelectures: An alternative to textbook reading assignments. *The Physics Teacher*, *50*, 301–303. doi:10.1119/1.3703549

Schau, C. (1999). *Survey of attitudes toward statistics (SATS)*. Retrieved from http://www.unm.edu/~cschau/infopage.htm

Schau, C. G., Stevens, J., Dauphinee, T. L., & DelVecchio, A. (1995). The development and validation of the survey of attitudes toward statistics. *Educational and Psychological Measurement*, *55*, 868–875. doi:10.1177/0013164495055005022

Schullery, N. M., Reck, R. F., & Schullery, S. E. (2011). Toward solving the high enrollment, low engagement dilemma: A case study in introductory business. *International Journal of Business, Humanities, and Technology*, *1*(2), 1–9.

Senn, G. J. (2008). Comparison of fact-to-face and hybrid delivery of a course that requires technology skills development. *Journal of Information Technology Education*, *7*, 267–283.

Stacey, E., & Gerbic, P. (2007). Teaching for blended learning—Research perspectives from on-campus and distance students. *Education and Information Technologies*, *12*, 165–170. doi:10.1007/s10639-007-9037-5

Strayer, J. F. (2012). How learning in an inverted classroom influences cooperation, innovation, and task orientation. *Learning Environments Research*, *15*, 171–193. doi:10.1007/s10984-012-9108-4

Tao, J., Fore, C., & Forbes, W. (2011). Seven best face-to-face teaching practices in a blended learning environment. *Journal of Applied Learning Technology*, *1*(3), 20–29.

Walker, J. D., Cotner, S., & Beermann, N. (2011). Vodcasts and captures: Using multimedia to improve student learning in introductory biology. *Journal of Educational Multimedia and Hypermedia*, *20*(1), 97–111.

Warren, C. S. (2006). Incorporating multiculturalism into undergraduate psychology courses: Three simple active learning activities. *Teaching of Psychology*, *33*(2), 105–109. doi:10.1207/s15328023top3302_5

Zapatero, E. G., Maheshwari, S. K., & Chen, J. (2012). Effectiveness of active learning environment: Should testing methods be modified. *Academy of Educational Leadership Journal*, *16*(4), 101–114.

KEY TERMS AND DEFINITIONS

Blended Learning Theory (BLT): BLT is a pedagogical approach to instruction that is a combination of face-to-face, computer mediated activities, and online learning that is rooted in Active Learning Theory.

Blended Teaching: Integration of classroom face-to-face learning with online learning.

Cognitive Taxonomy Theory (CTT): A modified version of Bloom's original Cognitive Taxonomy. CTT categorizes and identifies six cognitive domains including remembering, understanding, applying, analyzing, evaluating, and creating.

Distance Learning: Courses that are taught away from an institutions physical campus including online and hybrid formats.

Flipped Classroom: Consists of a restructuring of traditional face-to-face classroom learning. Flipped classrooms employ blended learning by using the Internet to deliver content to the students, frequently assigning lectures to be viewed online while students are away from school.

Hybrid Classroom: Combines online and face-to-face delivery where by any amount of content is delivered online, while the rest is delivered in a reduced number of face-to-face class meetings.

Problem Based Learning Theory (PBLT): A student-centered pedagogy that focuses on a project or problem that is experienced by the students as means for instruction.

This work was previously published in Promoting Active Learning through the Flipped Classroom Model edited by Jared Keengwe, Grace Onchwari, and James N. Oigara, pages 23-46, copyright year 2014 by Information Science Reference (an imprint of IGI Global).

Chapter 8
Blended Learning and Technological Development in Teaching and Learning

Kennedy E. Umunadi
Delta State University, Nigeria

Nwachukwu Prince Ololube
University of Education, Nigeria

ABSTRACT

This chapter examines blended learning and technological development in teaching and learning. This study is based around the suggestion that technological development can emerge in Nigeria when an enabling environment and other necessary facilities for blended learning are made available in different institutions for teaching and learning. This chapter addresses the following topics: net generation and use of technology outside of schools, the digital environment, computer use and blended learning in schools, well-constructed digital environments, teaching and blended learning, the shift from teaching to learning, student-centered methods, theories supporting the new view of the learning process, play way method, group instructional methods, Vygotsky's socio-cultural theory, Skinner's theory of learning, Jean Piaget, Jerome Bruner, problem-based learning, anchored instruction, distributed cognition, cognition flexibility theory, cognitive apprenticeship, situated learning, self-regulated learning, and entry behaviour/residual knowledge.

INTRODUCTION

Blended technology-aided learning, as distinct from learning about technology, has the capacity to transform learning environments in ways that are still difficult for most educators to imagine (Ololube, 2011). Although children in today's schools have only known the digital world, many adults continue to experience great difficulty using basic computer functions such as email, search engines, and presentation software (Ololube, 2009). For the first time in human history, the young are thus more confident with and fluent in the dominant technologies of the day, than the adults charged to teach them.

DOI: 10.4018/978-1-4666-8246-7.ch008

Blended learning is regarded as a new concept in developing countries like Nigeria, although it is a concept that will greatly facilitate programme development in technology. Ausburn (2002) argues that the demand for mass customization of Technology-Based Learning (TBL) will require a shift from traditional models of instructional design and development to the new blended learning which brings together the traditional model and the ICTs that can lead to technological development in teaching and learning. This blended learning is in fact central to new and emerging paradigms of education. In this paper, blended learning is defined as the combination of different learning strategies to reposition learners for an optimal future in a technological society.

We live in a high-speed, wired world, where digital technology is interwoven into the fabric of our lives and our society. It is part of out homes, our businesses and our schools. Tapscott (1999) asserts that we need to look to youth in relation to how best to use technology in education. He refers to youth as the Net Generation or N-Geners – the first generation to grow up surrounded by digital media and to assume that it is part of the natural landscape of life (p.7).

Prensky (2001) refers to young people today as Digital Natives for they are "all native speakers" of the digital language of computers, video games and the Internet (p. 1). Those who entered and adopted this networked, digital world, in other words those who were not born into it, are deemed Digital Immigrants (Pensky, 2001). Ololube et al. (2012) and Prensky (2001) notes that there are important, never-before seen differences between Digital Natives and Digital Immigrants and that the new abilities, skills and preferences of the former are to a large extent misunderstood or ignored by the current generation of educators. These educators are, at the same time, being challenged to think differently about teaching and learning with technology.

Preparing teachers for 21st century blended learning requires a close look at what it means to teach and learn in increasing networked, technology-rich, digital classrooms, e-libraries, and auto-CAD rooms (Ololube & Egbezor, 2009). Teacher preparation programs need to create intentional learning environments where pre-service teachers can explore relevant issues and develop pedagogies that are effective for an era of blended learning. These teachers need an opportunity to develop new images and expertise to design and facilitate meaningful technology-aided blended learning (Ololube, 2011).

NET GENERATION AND USE OF TECHNOLOGY OUTSIDE OF SCHOOLS

Growing up with digital media and the Internet has resulted in the Net generation's ubiquitous use of new technologies. Youth do not necessarily approach digital media and network technologies as add-ons in their worlds, but rather as integral components of their world. Thus, according to Tapscott (1999), youth use the Internet to manage their personal finances, organize protest movements, check facts, discuss issues, check the scores of their favourite team and chat online with its superstars, organize groups, cast votes, learn more about illnesses, attend a virtual birthday party, or get video clips from a soon-to-be-released movie (p.7).

In a study by The Future of Children (2000), 72 children ages 5 to 18 were surveyed from Plugged In and The Computer Clubhouse in late 1999 and early 2000. These children reported participating in a variety of computer-based activities associated with blended learning including traditional educational projects such as writing and researching school projects and seeking homework assistance online. Their hobbies included e-mail, online chats, programming and Web-page development and they noted that drawing pictures, surfing the Web, writing letters and game playing were some of their favourite computer activities.

THE DIGITAL ENVIRONMENT

A most promising finding from Watson (2008) and Ololube and Egbezor (2009) concerns the effectiveness of well-designed digital and online environments in engaging pre-service teachers in the range of issues that surround teaching and learning with technology. Whether these environments provided the primary structure for courses, as in the case of social studies and virtual field trips, or provided a collaborative and mentored planning environment, the findings were remarkably consistent: well constructed digital environments can enhance face-to-face teaching and learning. It is clear that continued attention to the design of such environments and increasing use of them to create media rich, interactive environments for learning holds great promise in terms of addressing many contemporary education problems. Watson (2008) also revealed that students valued computers in their lives for entertainment, as a tool for accomplishing the goals of blended learning, and as a vehicle leading to present and future competence, autonomy, and empowerment.

Audio books offer another example of the creative use of digital technology with youth. The Calgary Herald recently reported that teenagers are accessing audio book Websites and digital books using MP3 technology (Harris, 2004). Thus we know that in addition to reading books, youth are listening to them. The richness of the multimodality provided by digital media, however, extends both more deeply and more broadly, in the lives of children and youth today.

Clifford (2004) suggests that digital experiences that are a regular part of students' lives outside of school represent fundamentally different ways of thinking and interacting with others. First, hypertext, graphics and sound have created knowledge structures that are three dimensional. Every student who surfs the net knows about this, even if they cannot articulate it in these academic terms. Second, students are far less interested in receiving information that others think they should have, and far more interested in creating personalized spaces where they can download what they want, when they want it, how they want it. They want to be immersed in environments in which they can direct perspectives, request others to provide information they need, and surround themselves with interesting sound and pictures. They want to make things happen in these environments. As part of a postmodern culture, they expect to be able to re-use and re-purpose digital objects at will. Third, their literate world includes time as a crucial dimension. News is reported to the tenth of a second and they like to jump quickly between and among sequences; they multi-task. Fourth, they are increasingly creating a public, not just an audience, for their work. They contribute to fan fiction sites that invite others around the world to view episodes of favourite film and television shows through different lenses. They critique dominant power structures in phenomena called "Culture Jamming" or "Sniggling." They chat with one another in real time and maintain complex asynchronous relationships in gaming and other digital environments. They wear computers, and they carry their handheld devices and cell phones everywhere.

COMPUTER USE AND BLENDED LEARNING IN SCHOOLS

Given financial investment in ICT in schools and students immersion in technology outside of school, how are they using ICT in schools? It has been argued that a disconnect exists between youth use of technology in their personal lives and use of technology in schools. Technology tends to be marginalized and used in instrumental ways only within the conventional educational framework. Becker (2000), looking at the 1998 Teaching Learning and Computing (TLC) U.S.A National Survey, reports that word processing was the most common application used in schools and that analytic or product-oriented software was used less often.

Corbett and Williams (2002) reported that in 2000, approximately one third of students used computers to assist them in learning school materials, while only a quarter used them for programming, drawing, painting, graphics, or analyzing data with spreadsheets (p. 15). Plante and Beattie (2004) concur and note that the three most frequently integrated technology applications in Canadian teaching practices according to school principals are word processing, using the Internet/intranet to distribute information, and using software for blended learning for the special needs of students and/or remedial programs. The least frequently used applications were "software supporting creative works" and "spreadsheets and database software for simple data manipulation and statistical analysis" (Plante & Beattic, 2004, p. 23).

WELL-CONSTRUCTED DIGITAL ENVIRONMENTS PROVIDE ENGAGING AND MEANINGFUL INTERACTION FOR STUDENTS

A number of particular post-secondary innovations point to the power of well-designed online and digital learning environment to enhance teaching and learning processes. These innovations and their advantages are explored next with students and faculty from the University of Lethbridge, the University of Calgary and the University of Alberta.

At the University of Lethbridge Online, students enrolled in introductory courses reported experiencing their online environment as so engaging and their relationship with their instructor so meaningful that they felt little need for the face-to-face sessions that had been built into the program to facilitate the development of such relationships. Student teachers noted that rather than having lectures and too many class discussions that are dry, they were in the lab on computers answering interesting questions, seeing videos from the classroom, and hearing other education students talk about their experience. For these students, their online experiences were almost as valuable as student teaching because they were able to observe students interacting and hear other student teachers. Students at the University of Alberta likewise spoke especially highly of their work with video clips involving classroom teachers, categorizing these clips as opportunities to find out what real teachers think and do.

When participants cite such a range of experiences as deeply engaging and satisfying, we must pay attention to the design of those learning experiences and what they have in common. First, these experiences created an opportunity for students to engage in sustained digital environments in which they were, in one way or another, relating issues of technology integration directly to issues of teaching and learning perceived as immediately relevant and meaningful. They learned about technology integration and explored a range of applications within a context of purposeful use that had something of the character of a "just-in-time" in-service. This replaces the "just-in-case" structure of conventional technology courses and workshops of which students were generally quite critical.

Second, each of the courses involved some kind of mentorship by faculty and sometimes by others. The emphasis on meta-teaching at the University of Lethbridge made students feel that their instructor was deeply involved in the particular issues, questions and problems that were important to them. They developed relationships with their instructor, and with one another, through the work they were doing individually and collectively.

At the University of Calgary, face-to-face mentorship by both the instructor and professional development mentors was readily available to students on a "pull" basis as they and their co-operating teachers collaborated in constructing and teaching technology-rich inquiries. Here, the social studies virtual tour immersed students in genuine problems of practice in social studies teaching, and the combination of resources available through the tour – carefully structured assignments and complementary course work – created for students, an experience they characterized as real and as deeply engaging. Both their instructor and the lab assistant were easily accessible for support consultation and problem solving.

Third, each of the environments was carefully structured and deliberately open-ended. None had the flavor of older versions of computer assisted learning in which participants move through static content and are tested for mastery. Rather, each was in some sense an immersive environment in which students made significant choices about the kinds of interactions they would structure for themselves.

Faculty reported that it was not easy to turn dissatisfaction with conventional methods of teacher preparation into new (online) environments where conventional best practice skills tend to replicate course delivery as a defining metaphor. Changing this thinking was identified as one of the significant challenges each university encountered, and characterized both the scholarly and the pragmatic nature of work that faculty must do in order to create new learning environments for their students. We were struck by how each environment, in very different ways, was designed to force students to encounter key problems of practice in a problem solving mode.

Fourth, each enabled students to move at their own pace, to engage more or less deeply in the environment or to "pull" what they needed, how they needed it. Both proficient and inexperienced technology users described this advantage, sometimes explaining that the course was designed to let you go as deeply as you needed, or to quickly get past required applications and ideas that were already familiar so as to try new and more difficult things. It was also acknowledged that if students wanted to meet the basic standards set by the course, they could do that and direct greater attention to other courses or areas in which they did not feel so strong.

In a similar vein, University of Calgary students and field supervisors reported that the addition of the online planning and communications environment enhanced communication between students and their field supervisor, between practicing teachers and students, between practicing teachers, students and professional development mentors, and among students themselves. In this case, the work of experienced teachers to understand effective ICT integration in inquiry-based classrooms was openly acknowledged as a professional development initiative that paralleled those of pre-service teachers. Here, educators working together addressed the fact that teachers must learn to make more deeply informed observations and decisions about curriculum design, classroom instruction, and ICT integration, not just superficial judgements about student and teacher behaviour or digital add-on's that fail to meet the spirit of the C Level of the Program of Studies. In all three cases, digital environments of a particular character seemed well suited to help pre-service teachers learn to make the necessary informed decisions, observations and integrations.

Many faculty also turn to products such as WebCT and Blackboard to bring course content online. Their use of these platforms is however, what Norton and Wiberg (1998) call "second generation" technology use – doing familiar things in digital ways. A study on successful faculty development for the use of WebCt at Purdue University (Hua Bai, Chuvessiriporn, Lehman, 2002) confirms this picture of the ways in which the online environment is often used for teaching and learning. Most (59%) used WebCT for basic content presentation such as putting course notes, syllabi and assignments online. Many (41%) posted and organized student's grades and used the quizzes and survey features. WebCT email (71%) and discussion forums (82%) were among the most popular features. Few faculty members had experimented with the WebCT live chat feature.

TEACHING AND BLENDED LEARNING

Teaching is both a science and an art. As noted, the emphasis of teacher education is to improve the quality and effectiveness of teaching which in turn influences the quality of learners. No educational system can rise above the quality of its teachers (FRN, 2004). Teaching consists of the teacher behaviour or activities designed and performed to produce a change in student (learners) behaviour. In a formal sense, it is the organized work adults do in the school system in the form of conscious efforts to help the learners in their care to acquire desirable knowledge, skills, habits and values in an atmosphere of mutual freedom, trust and respect.

Teaching is a service profession and the teacher guides and directs learning activities for the development of the learner. He does this by motivating and arousing the learners' desire to learn, helping them to establish goals and giving them the stimulus and opportunity to ask questions so as to obtain information and propose possible solutions to problems. Through teaching, the learner is led to practice technological skills, draw inferences, acquire valuable habits/attitudes, analyze results and achieve other desirable outcomes (Opute–Imala, 1997).

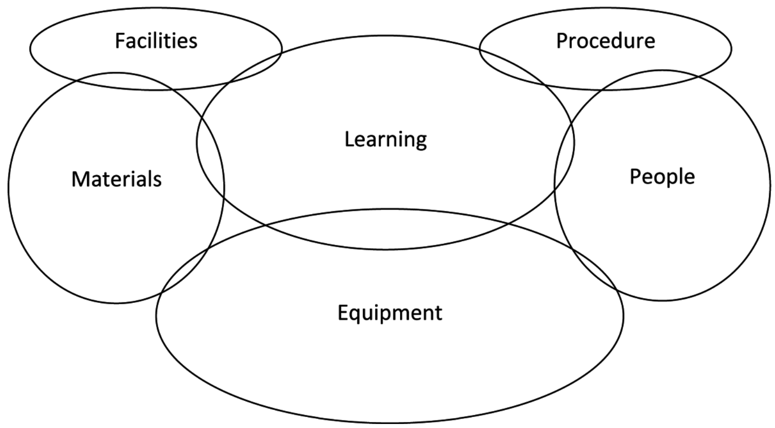
Teaching is a complex art of guiding learners through a variety of selected experiences geared towards the balanced development of the individual. In teaching today the emphasis is on the learner hence the notion of "child-centered education" in curriculum literature. It is also a science in that it involves the possession of technological skills as a specialized body of knowledge. Since the schools cannot be stronger than their teachers (as the operator/key agents in the implementation of the curriculum and those responsible for blending different types of teaching methods in the classroom), the teacher can be viewed as the hub of the educational system. The effectiveness of any system depends on the quality and devotion of the individuals involved in teaching, blending different skills and methods towards the development of learners.

Teaching, according to Nweke (1990), is an occupation based on specialized intellectual study and training, the purpose of which is to supply skilled service and advice to others for a definite fee or salary. Teaching is an essential social service that helps to socialize the individual. Since education through teaching prepares individuals for various occupational roles, teaching then is a profession par excellence – the key to all other professions, for through it, others come to realize their aspirations.

Blended learning can be realized through the blending of old and current methods with emerging technology for the actualization of the educational objectives. In practice, blended learning is often education that combines face-to-face classroom methods with computer-mediated activities. According to its proponents, this strategy creates a more integrated approach for both instructors and students. The goal of blended learning is to provide an efficient and effective instruction experience by combining delivery modalities. In teaching, the term blended learning describes a solution that combines several different methods, such as collaboration software, Web-based courses, EPSS, and knowledge management practices. Blended learning also is used to describe learning that mixes various event-based activities, including face-to-face classrooms, live e-learning, and self-paced instruction.

To design blended training, instructional designers start by analyzing the training or course objectives and breaking them down into the smallest possible pedagogically (for children) or andragogically (for adults) appropriate segments (learning object). After the course or training has been segmented, the best approach for delivering each segment (learning object) is identified. In some cases the best approach might be online learning but in others it might be live instruction. The course is then aggregated by grouping the

Figure 1. Learning systems simplified (source: Davies, et al., 1974)



instruction logically while taking into account the medium of delivery. In this way, one may require a few lessons online and some others live (Olugbenga, 2012).

LEARNING

Learning in pursuit of knowledge can modify the behaviour of the learner. There is a general consensus that learning means modification of behaviour as a function of practice. Thus, it takes place when the performance of the organism is changed through stimulating contacts with the environment. Learning accounts for differences in behaviour which are not due to factors such as maturation, sensory adaptation or other phenomena which may produce observable changes in the activities of the organism. Learning may be motor muscular (or kinesthetic), cognitive/mental/intellectual and effective (attitudinal) or a combination of these (Blended Learning). All basic elements of curriculum are designed around the learner and interact to achieve balanced and full development of the learner (See Figure 1).

Learning is an on-going process of thinking, acting, doing and responding to different situations. To lead to a happy and full life, individuals must acquire habits or ways of behaving through adaptation to their environment (learning). Learning is the relationship between stimulus (s) (independent variable) and response (dependent variable) and thus determines how new stimulus-response connections are formed. It requires meaningful stimulus to elicit meaningful response and is a process of perceptual organization and re-organization, structuring and re-structuring and the re-organization of the cognitive field of the learner. It is imaginative, creative and purposive enterprise and includes conceptualization of concepts and shifting of responses to new stimuli. It is pervasive and because of its pervasiveness, people see it in different ways as determined by the environment.

Learning is process that is complimentary to other processes like motivation and perception. In line with the prior, it is a relatively permanent desirable change in behaviour or conduct as a result of past experience or training. Learning can manifest as a change in performance which is an index of learning through general activity, practice and experience. This change is more or less permanent in nature.

In order to fully understand the concept of learning, a series of basic questions can be posed. These include who, what why, when, where and how of human learning?

Table 1. Teacher-centered learning and learner-centered learning environments

	Teacher-Centered Learning Environment	Learner-Centered Learning Environment
Classroom activity	Teacher-centered didactic	Learner-centered interactive
Constructional emphasis	Facts, memorization	Relationships, inquiry and invention
Concept of knowledge	Accumulation of facts quantity	Transformation of facts
Demonstration of success	Norm referenced	Quality of understanding
Assessment	Multi-choice items	Common referenced portfolio and performance
Technology use	Drills and practice	Communication, access, collaboration, expression

- **WHO:** The learner and his characteristics
- **WHAT:** Content and subject matter to be learnt
- **WHY:** Readiness (tasks given should be proportional to learners readiness)
- **WHERE:** Learner environment (natural or physical, political and social)
- **HOW:** Learning process/method

Psychologists have identified eight types of learning. These are signal, stimulus-response, chaining, verbal association, discrimination, concept learning, rules, and problem solving. Some of the factors or conditions that influence learning are:

- **Learner Factor:** Personality (age, gender, interest, readiness, social relationships, home environment, general disposition etc.).
- **Internal Factor:** Closely linked with the prior, this includes intellectual/mental achievement level or ability and heredity.
- **External Factor:** Environment (rural/urban, in/outside classroom, instructional resources, teacher's perceptions, etc.). Poor environments result in low quality learning and anxiety, fear, stress, and anger inhibit learning. The absence of these in addition to conducive environments, emotional stability, and social drives promote learning.

A SHIFT FROM TEACHING TO LEARNING

As technology has created change in all aspects of society, so it has changed our expectations of what students must learn in order to function in the new global economy. Students today must learn to navigate large amounts of information, to analyze and make decisions, and to master new increasingly technological knowledge domains. It is important that students grow into lifelong learners, collaborating with others to accomplish complex tasks and effectively using different systems for representing and communicating knowledge to others. A shift from teacher-centered instruction to learner-centered instruction has thus been required to enable students to amass 21st century knowledge and skills.

Table 1 (Sandholtz, Ringstaff, and Dwyer, 1977) articulates the dynamics involved in the shift from a focus on teaching to a focus on learning. Shifting from teaching to learning can create a more interactive and flexible learning environment for teachers and learners. This new environment also involves a change in the roles of both teachers and students. As shown in Table 2 (adapted from Newby et al., 2000), the role of the teacher changes from that of knowledge transmitter to that of learning facilitator, knowledge guide, knowledge navigator and co-learner. This new role does not diminish the importance

Table 2. Changes in student and teacher roles in learning-centered environments

	Teacher Role	
	A shift from:	**A shift to:**
1.	Knowledge transmitter, primary source of information, content expert and source of answers	Learning facilitator, collaborator, coach, mentor, knowledge navigator and co-learner
2.	Teacher controls and directs all aspects of learning	Teacher gives students more options and responsibilities for their own learning
	Student Role	
	A shift from:	**A shift to:**
1.	Passive recipient of information	Active participant in the learning process
2.	Reproducing knowledge	Producing and sharing knowledge, participating at times as expert
3.	Learning as a solitary activity	Learning collaboratively with others

Source: Adopted from one developed by Newby et al. (2000)

of the teacher but requires new knowledge and skills, particularly in technological development. Students assume greater responsibility for their own learning in this environment as they seek out, find, synthesize, and share their knowledge with others. ICTs provide powerful tools to support the shift to student-centered learning and the new roles of both teacher and learner.

Student-Centered Learning

Student-centered learning includes several teaching methods such as discovery, play-way, and group instruction.

Discovery Method

This method, as the name implies, is a method through which the pupils discover things for themselves. Pupils are put in the position of pioneers and find their way along the path of knowledge as did those who first discovered the facts, principles and laws which are now known to all.

Play-Way Method

This method often involves a game played to enable pupils to carry out real life situations. It is a pleasurable activity with a definite purpose. The play-way method can involve games, drawing, dramatization, modeling with clay, etc.

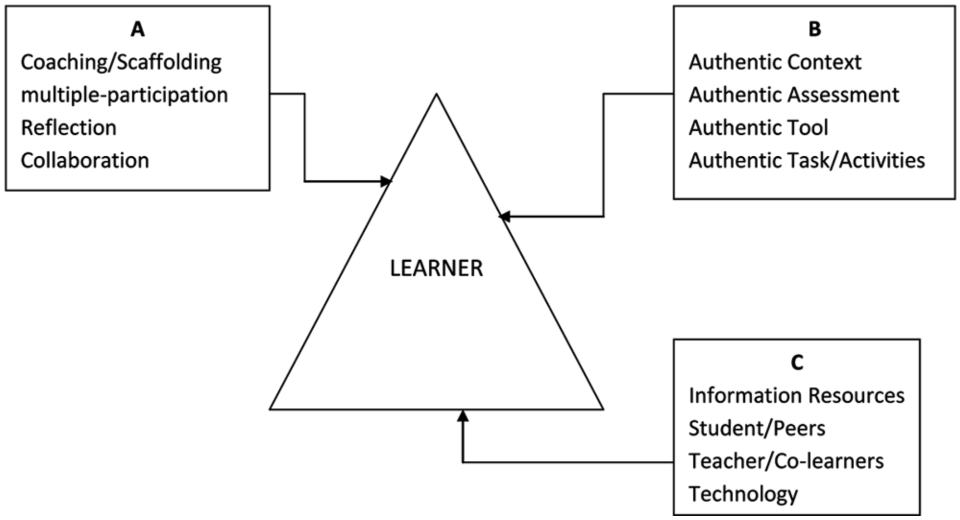
Group Instructional Methods

Group instructional methods include methods like storytelling, lectures, demonstrations, discussions and folklore.

THEORIES SUPPORTING NEW VIEWS OF THE LEARNING PROCESS

New perspectives on the learning process and the shift to student-centered learning have emerged based on cognitive learning research and the confluence of several theories that have informed our understanding of the nature and content of learning. Some of the most prominent theories include socio-cultural theory (based on Vygotsky's intersubjective and zone of proximal development), constructivism theory, self-regulated learning, situated cognition, cognitive apprenticeship, problem-based learning (cognitive and technology group at Vanderbilt), cognitive flexibility theory (Spiro et al, 1988) and distributed cognition

Figure 2. Modified triangular student-centered learning environment



(Salomon et al., 1993). Each of these theories is based on the same underlying assumptions that learners are active agents, purposefully seeking and constructing knowledge within a meaningful context. The learning environment that may be derived from this view of learning is show in Figure 2.

The student-centered environment illustrated in Figure 2 shows that learners interact with other learners, teachers, information resources, and technology. The learner engages in authentic tasks, in authentic contexts using authentic tools and is assessed through authentic performance. The environment provides the learner with coaching and scaffolding in the development of his or her knowledge and skills. It provides a rich collaborative environment enabling the learner to consider diverse and multiple perspectives for addressing issues and solving problems. It provides learners with blended opinions of ideas that can lead to new concepts. This is the thrust of this work. The environment also provides opportunities for students to reflect on their learning. It is important to note that this new learning environment can be created easily through the use of old technology. At the same time, it is clear that ICTs are powerful tools for helping learners to access vast knowledge resources, collaborating with others, consulting with experts, sharing knowledge and solving complex problems using cognitive tools. ICTs also provide learners with powerful new tools to represent their knowledge through text, images, graphics and video.

Theories of Learning

Learning is the process by which we acquire and retain attitudes, knowledge, skills and capabilities that cannot be attributed to inherited behaviour patterns or physical growth. Capacity for learning is related to innate physiological factors, while rate of learning depends on both inherited and environmental factors (Farrant, 1981). Each type of learning goes by a different name:

1. Affective learning has to do with feelings and values and therefore influences attitudes and personalities.
2. Cognitive learning is achieved through mental processes such as reasoning, remembering and recall. It aids in problem solving, developing new ideas, and evaluation.
3. Psychomotor learning has to do with the development of skills which require effi-

cient coordination between our brains and muscles, as when we read or write or carry out physical skills such as balancing, skipping or jugging.

There are two main ways of learning:

1. **Deductive Learning:** This describes the process by which a learner is presented with a hypothesis or general principle and applies a number of tests to it to discover whether or not it is true.
2. **Inductive Learning:** This describes the reverse process of deductive learning. In it, the learner examines related matters to see whether any general conclusion can be drawn.

A number of theories have been put forward to explain how we learn. All of them have conceived of learning as a process that progresses in stages. John Fedrick Herbert, a German philosopher and educator who worked in the early part of the nine tenth century, saw learning as a progression through five stages.

1. **Preparation:** Setting the scene for new knowledge by drawing together previous knowledge that is relevant.
2. **Presentation:** Introducing the selected new knowledge to the learner.
3. **Association:** Relating the new knowledge to existing knowledge.
4. **Systematization:** Making sense of the new knowledge in readiness for its use.
5. **Application:** Using new knowledge.

Constructivist Views of Learning

The new view of the learning process is based on research that has emerged from theoretical frameworks related to human learning. Many reflect a constructivist view of learning. In this view, learners are active agents who engage in their own knowledge construction by integrating new information into their schema or mental structures. The learning process is seen as a process of "meaning-making" in socially, culturally, historically and politically situated contexts. In a constructivist learning environment, students construct their own knowledge by testing ideas and approaches based on their prior knowledge and experience, applying these ideas and approaches to new tasks, context and situations, and blending or integrating the new knowledge gained with pre-existing intellectual constructs.

A constructivist environment involves developing communities comprised of students, teachers and experts who are engaged in authentic tasks in authentic contexts closely related to work done in the real world. A constructivist learning environment also provides opportunities for learners to experience multiple perspectives. Through discussion or debate, learners are able to see issues and problems from different points of view so as to negotiate meaning and develop shared understanding with others. The constructivist learning environment also emphasizes authentic assessment of learning rather than the traditional paper/pencil test. Some of the most influential theories that relate to new constructivist views of the learning process include:

Vygotsky's Socio-Cultural Theory

Vygotsky's socio-cultural theory of human learning describes learning as a social process and as the origination of human intelligence in society or culture. The major theme of Vygotsky's theoretical framework is that social interaction plays a fundamental role in the development of the cognitive. Vygotsky believed that everything was learnt on two levels: first through interaction with others, and then integrated into the individual mental structure. Vygotsky also contended that the potential for cognitive development is limited to a "Zone of Potential Development" (ZDPD). This zone is the area of exploration for which the student is cognitively prepared, but requires help and social interaction to fully develop (Briner, 1999). A teacher or more experienced peer provides the learner with "scaffolding" to support the learner's evolving understanding of knowledge domains or his or her development of complex skills. Collaborative learning, discourse, modeling and scaffolding are thus seen to support the intellectual knowledge and skills of learners and facilitate intentional learning.

Given Vygotsky's theory, learners should be provided with socially rich environments in which to explore knowledge domains with their fellow students, teachers and outside experts. ICTs can support this type of learning environment by providing tools for discourse, discussions, collaborative writing, and problem-solving, and by providing online support systems to scaffold students evolving understanding and cognitive growth and development.

Skinner's Theory of Learning

Skinner, a contemporary American psychologist looked upon learning as a series of experiences each of which influences behaviour in the same way that conditioning does. Thus, in his view, each learning experience is a stimulus that produces a behavioural response. Those who see learning in this way belong to the behaviourist school of psychology. It is this learning theory that has given rise to programmed learning as a system of instruction (Farrant, 1981).

Jean Piaget

Jean Piaget based his research on the development of children's cognitive functions. His work is regarded by many as the founding principles of constructivist theory. He observed that learning occurs through adaptation to interactions with the environment. Disequilibrium (mental conflict which demands resolution) gives rise to the assimilation of a new experience (which is added to the existing knowledge of the learner) or to accommodation (modification of existing understanding to allow for the new experience).

Jerome Bruner

Bruner, similar to Piaget, believed that learning is an active process in which learners construct new ideas or concepts based on their prior knowledge and experience. He identified three principles to guide the development of instruction: (1) instruction must be concerned with the experiences and context that make the student willing and able to learn (readiness); (2) instruction must be structured so that the student can easily grasp the material (spiral organization); and (3) instruction should be designed to facilitate extrapolation and/or fill in the gaps (going beyond the information given).

Problem-Based Learning (PBL)

Problem-based learning is intended to help students in different fields to develop higher order thinking skills by providing them with authentic and complex problems and cases. This approach to learning provides a more authentic context for learning and engages students in authentic tasks. Through this process of working together, using blended ideas, articulating theories and critical ideas, creating hypotheses, discussing the ideas of others, students move to deeper levels of understanding of the problem.

Anchored Instruction

Anchored instruction is a real world approach to solving problem. It is designed instruction anchored in a real world context, problem or real situation. This can be done, for example, through the use of video to create "real world context" for subsequent learning and instruction (Bransford & Stein, 1993).

Distributed Cognition

Distributed cognition emphasizes that cognitive growth happens through interaction with others and involves dialogue and discourse, making private knowledge public, and developing new understandings. In support of distributed cognition, tools for online collaboration have been designed to support collaborative knowledge construction and sharing in the classroom (Oshima, Bereiter, & Scardamalia, 1995).

Cognition Flexibility Theory

Cognition flexibility theory asserts that people acquire knowledge in ill-structured domains by constructing multiple representations and linkages among knowledge units. It also notes that learners revisit the same concepts and principles in a variety of contexts. Cognition flexibility theory is useful in understanding how knowledge is transferred in ill-structured knowledge domains (Spiro et al., 1988).

Cognitive Apprenticeship

Cognitive apprenticeship refers to the instructional process in which the teacher or more experienced or knowledgeable peers provide "scaffolds" to support learners' cognitive growth and development. Cognitive apprenticeship permits students to learn through their interactions, construct knowledge and share knowledge-building experiences with other members of the learning community. ICTs provide powerful new tools to support cognitive apprenticeships, enabling groups to share online workspaces to collaboratively develop artifacts and intellectual products. These tools also make possible tale-apprenticeships, in which an expert or mentor is able to work with a student who may be thousands of miles away.

Situated Learning

Situated learning occurs when students work on authentic tasks that take place in real-world settings (Winn, 1993). It emphasizes the use of apprenticeship, coaching, collaboration, real world contexts, tasks, activities and cognitive tools (Brown, Collins and Duguid, 1989). Situated learning provides an authentic context for the learner and encourages social interaction and collaboration in the learning environment. Through this kind of collaborative problem solving, dialogue and discussion students are able to develop deeper levels of understanding of a problem or knowledge domain.

Self-Regulated Learning

Self-regulated learners are those who are aware of their own knowledge and have an understanding of what they know and what they do not know or still need to know. It combines self-observation and self-reaction. Self-regulation plays a crucial role in all phases of learning and has the potential to increase the meaningfulness of students' classroom learning (Schoenfeld, 1987). ICT tools can be used to make students' tacit knowledge public and to help them to develop meta-cognitive skills and become more reflective and self-regulated learners (Hsiao, 1999).

Entry Behaviour/ Residual Knowledge

Entry behaviour/residual knowledge is a concept proposed in this paper to represent the entry behaviour of graduates at both the secondary and primary school level in terms of ICT use. This basic knowledge that students carry with them from one educational level to the next will assist them in improving their learning abilities relative to those who are not literate and/or skilled in computer use. Entry behaviour/residual knowledge supports the situated learning theory in which a learner can work on an authentic task with basic knowledge acquired from the conventional method of teaching.

Teaching Circuits/Electronics

Matos (2001) developed workbenches and instructional and learning software for teaching electronics to educators. Today students and electronics teachers rely on electronic workbenches and printed circuit board layout software for circuit analysis, design, and simulation. His is the only electronics' design automation for designing electricity and electronic circuits that includes features specifically for education and teaching. Software use has become the standard in education and teaching at the university, college and high school level. It is highly effective in education, economical, easily integrated into a curriculum, mimics today's digital environments, and most importantly, is easy to use. Students tend to learn faster and retain course content longer when they use circuits and electronics workbench software. Teachers teaching electricity and electronics prepare circuits, changing values as needed and so can demonstrate the changing electrical behaviour of a circuit in a digital environment.

Cedra and Sabonnadiere (2002) constructed Cedrat-circuits for teaching and learning circuits in schools. Cedrat-circuits are geared toward instruction in computation and the design of static converters for power electronics (pulse generators, converters, rectifiers, inverters and equivalent circuits of electric motors). The versatility of Cedrat-circuits makes them well suited to teaching and learning electricity and electronics.

Using Cedrat-circuits increases the number of circuits one can study and allows for more detailed examination of each circuit. Cedrat-circuit analysis is much faster than repeated construction and examination of prototypes. By allowing the rapid modification of the circuit, adding or deleting components or changing their values, one can gain a greater understanding of the operation of the circuit. Consequently, Cedrat-circuits are of great interest to colleges.

With the Cedrat-circuit, the user can focus on the design of the device by selecting its components and positioning them on a grid. Once the schematic design is finished, the designer can then define the characteristics of each component, such as values, control frequencies, phase shifts, and switching times. During this characterization, the user may employ parameters and vary them between different simulations. Computation of the solution is completely automatic.

Attia (1995) developed Mat lab for teaching electronics. Mat lab is numeric computation software for electricity and electronics calculation. It is being used to teach circuit theory, filter design, random processes, control systems and communication theory. Mat lab matrix functions are shown to be versatile the analysis of data obtained from electronic experiments.

The purposes of incorporating these packages into the curriculum are twofold: (1) to enhance the theoretical understanding of electricity and electronics principles and concepts; (2) to allow students to solve fairly complex problems that would otherwise be impossible without computer-aided designs and computer-aided technology. Since Mat lab is also a programming environment, users can extend the functional capabilities of Mat lab by writing new modules. Mat lab thus has a large collection of toolboxes for a variety of applications. A tool box consists of functions that can be used to perform computations in the tool box domain, including signal processing, image processing, neutral networks, control systems, statistics, symbolic mathematics, and optimization and system identification.

These theories and tools supporting the new views of learning help to shape new pedagogies for learning. Ultimately, the power of ICTs will be determined by the ability of teachers and learners to use these new tools to create rich and engaging learning environments. According to the UNESCO World Education Report (1998) these new technologies could have radical implications for conventional teaching and learning processes; in reconfiguring how teachers and learners gain access to knowledge and information, these technologies challenge conventional conceptions of teaching and learning materials, methods and approaches. The biggest challenge for ICTs, blended learning and education today, particularly in the developing world is to ensure that the new generation of learners and teachers are well prepared to use these new methods, technologies, processes and materials.

CONCLUSION

In this chapter, a broad spectrum of topics has been examined, although the focus has been on technology and blended learning. Blended learning with technology as distinct from learning about technology has capacity to transform learning environments in ways that are still difficult for many educators to imagine. Prospects for blended learning and technological development in teaching and learning appear slim in Nigeria as we advance into the 21st century. The major fabric of technology education involves training in the process of applying technological skills to practical problems from primary through to the tertiary level of education. As there are no innate barriers to technological development in Nigeria, it will only be able emerge when the enabling environment and its necessary facilities are made available in different institutions of teaching and learning.

REFERENCES

Attia, J. O. (1995). *Teaching electronics with MATLAB*. Prairie View, TX: Prairie View APM University Press.

Ausborn, I. J. (2002). Fast, flexible and digital: Forecasts for occupational and workplace education. *Workforce Education Forum, 29*(20), 29-49.

Becker, H. J. (2000). Who's wired and who's not: Children's access to and use of computer technology. *Children and Computer Technology, 10*(2). Retrieved May 10, 2012, from http://www.futureofchildren.org/usr.doc/vol1-no2art3.pdf

Bown, J. S., Collins, A., & Duguid, P. (1989). Situated cognition and the culture of learning. *Education Researcher*, *18*, 32–42. doi:10.3102/0013189X018001032

Bransford, J. D., & Stein, B. S. (1993). *The idea problem solver*. New York: Freeman.

Briner, M. (1999). *Constructivism: The theories*. Retrieved November 10, 2001, from http://curriculum.calstacla.edu/faculty/psparks/theorists/501const.htm

Cedrat, S. A., & Sabonnadiere, J. C. (2002). *Computer aided design package for power electronic circuits: Teaching in power electronics*. Retrieved from http://www.cedrat.com/software/circuit/circuit.htm

Clifford, P. (2004). Where's the beef: Finding literacy in computer literacy. In *Proceedings of the Learning Through Literacy Summer Institute*. Toronto, Canada. Retrieved September 9, 2004, from http://www.galileo.org/research/LTL/LTL-presentation.pdf

Clifford, P., Friesen, S., & Lock, J. (2004). *Coming to teaching in the 21st century: A research study conducted by the galileo educational network*. Retrieved from www.galileo.org

Corbett, B. A., & Willms, J. D. (2002). Canadian students access to and use of information and communication technology. In *Proceedings of the 2002 Pan-Canadian Educational Research Agenda Symposium*. Montreal, Canada. Retrieved May 10, 2004, from http://www.cmec.ca/stats/pcera/RSEvents02/BcorbettOEN.pdf

Davis, R. N., Alexander, L. T., & Yelson, S. L. (1974). *Learning system design: Approach to the improvement of instruction*. New York: McGraw Hill Book Co.

Farrent, J. S. (1981). *Principles and practice of education*. London: Morrison and Gibb.

Harris, M. (2004). *Teens turn on to digital audio books*. Calgary, Canada: Herald.

Hornby, A. S. (2006). *Oxford advanced learner's dictionary of current English* (7th ed.). Oxford, UK: Oxford Dictionary Press.

Hsiao, J. W. D. (1990). *CSL (computer support for collaborative learning) theories*. Retrieved October 10, 2001, from http://www.edb.utb.utexas.edu/csc/student/Dhsiaso/theories.htm/#construct

Hua, B., Chuvessiriporn, S., & Lehman, J. D. (2002). *Impactof P3T3 on faculty use of web course tool*. Retrieved September 12, 2004, from http://p3t3soepurdue.edu/Web.tool.pdf

Jean Piaget Society. (n.d.). Retrieved October 8, 2001, from http://ww.piaget.org/

Matos, J. S. (2001). *Teaching and learning software for electronics*. Retrieved July 9, 2002, from http://www.intertiv.com/htm/ccvol5.html

Newby, T., Stepich, D., Lehman, J., & Russel, J. (2000). *International technology for teaching and learning*. Upper Saddle River, NJ: Merrill/Prentice Hall.

Norton, P., & Wiberg, K. (1998). *Teaching with technology*. Orlando, FL: Harcourt Brace College Publishers.

Nweke, R. N. (1990). *Teaching practice in educational institutions*. Benin-City, Nigeria: Illupeju Press.

Ololube, N. P. (2009). Computer communication and ICT attitude and anxiety among higher education students. In A. Cartelli & M. Palma (Eds.), *Encyclopedia of information and communication technology* (pp. 100–105). Hershey, PA: IGI Global.

Ololube, N. P. (2011). Blended learning in Nigeria: Determining students' readiness and faculty role in advancing technology in a globalize educational development. In A. Kitchenham (Ed.), *Blended learning across disciplines: Models for implementation* (pp. 190–207). Hershey, PA: IGI Global. doi:10.4018/978-1-60960-479-0.ch011

Ololube, N. P., Amele, S., Kpolovie, P. J., & Egbezor, D. E. (2012). The issues of digital natives and tourists: Empirical investigation of the level of IT/IS usage between university students and faculty members in a developing economy. In A. Usoro, U. G. Majewski, P. Ifinedo, & I. Arikpo (Eds.), *Leveraging developing economies with the use of information technology: Trends and tools* (pp. 238–255). Hershey, PA: IGI Global. doi:10.4018/978-1-4666-1637-0.ch015

Ololube, N. P., & Egbezor, D. E. (2009). Educational technology and flexible education in Nigeria: Meeting the need for effective teacher education. In S. Marshall, W. Kinuthia, & W. Taylor (Eds.), *Bridging the knowledge divide: Educational technology for development* (pp. 391–412). Charlotte, NC: Information Age Publishing.

Opute-Imala, F. N. (1997). *Basic concepts in education: Principles, methods and strategies for effective teaching. Agbor*. Kmensuo Educational Publishers.

Oshima, J., Bereiter, C., & Scardamalia, M. (1995). Information-access characteristics for high conceptual progress in a computer-networked learning environment. In *Proceedings of the CSCL' 95 (Computer Support for Collaborative Learning) Conference*. IEEE.

Oyegwe, E. E. (1997). *Principles, methods and strategies for effective teaching: Unit plan and its preparation. Agbor*. Kmensuo Educational Publishers.

Plante, J., & Beattie, D. (2004). Connectivity and ICT integration in Canadian elementary and schools: First results from the information and communications technologies in schools survey, 2003-2004. *Statistics Canada–Catalogue No. 18-595-MIE- No. 017*. Retrieved July 10, 2004, from http://www.statcan.ca/english/research/81-595-MIE/81-595-MIE 2004017.pdf

Prensky, M. (2001). Digital natives, digital immigrants. *On the Horizon, 1*(5), 1-6. Retrieved July 10, 2004, from http://ww.marcprensky.com/writing/prensky%20-%20digital%20natives.%20digital%20immigrants%20-%20part2.pdf

Salomon, G. (1993). *Distributed cognitions: Psychological and educational considerations*. Cambridge, UK: Cambridge University Press.

Salomon, G., Perkins, D. N., & Globerson, T. (1991). Parties in cognition: Extending human intelligence with intelligent technologies. *Educational Researcher*, *20*(3), 2–9. doi:10.3102/0013189X020003002

Sandholtz, J., Ringstaff, C., & Dwyer, D. (1997). *Teaching with technology*. New York: Teachers College Press.

Schoenfeld, A. H. (1987). What's all the fuss about metacognition? In A. H. Schoenfeld (Ed.), *Cognitive science and mathematics education* (pp. 189–215). Hillsdale, NJ: Lawrence Erlbaum Associates.

Spiro, R. J., Coulson, R. L., Feltovich, R. J., & Anderson, D. (1988). Cognitive flexibility theory: Advanced knowledge acquisition in ill-structured domains. In V. Patel (Ed.), *Proceeding of the 10th Annual Conference of the Cognitive Science Society*. Hillsdale, NJ: Erlbaum.

Tapscott, D. (1999). Educating the net generation. *Educational Leadership*, *56*(5), 6–11.

The Future of Children. (2000). Appendix B: What children think about computers. *Children and Computer Technology, 10*(2), 186-191. Retrieved May 10, 2004, from http://www.futureofchildren.org/usrdoc/vol10no2AppB.pdf

Umunadi, E. K. (2007). *Effect of teacher-constructed circuits on students achievement in basic electricity and electronics in technical colleges in Nigeria*. (Unpublished Thesis). UNN.

UNESCO. (2001). *UNESCO report: Teacher education through distance learning technology—curriculum—cost—evaluation*. Paris: UNESCO.

UNESCO-UNEVOC e-Forum. (2012). *Blended learning*. Retrieved January 20, 2013, from http://www.unevoc.unesco.org/e-forum

Vygotsky, L. S. (1978). *Mind in society*. Cambridge, MA: Harvard University Press.

Watson, J. (2008). Blending learning: The convergence of online and face-to-face education. In *Promising practices in online learning*. North American Council for Online Learning. Retrieved March 3, 2013, from http://www.inacol.org/research/promisingpractices/NACOL_PP-BlendedLearning-lr.pdf

Winn, W. (1993). A constructivism critique of the assumptions of instructional design. In T. Duffy, J. Lowyek, & D. Honassen (Eds.), *Designing environment for constructive learning*. Berlin: Springer-Verlag. doi:10.1007/978-3-642-78069-1_10

ADDITIONAL READING

Barr, R. B., & Tagg, J. (1995). From teaching to learning—A paradigm for undergraduate education. *Change*, *27*, 12–25. doi:10.1080/00091383.1995.10544672

Consulting, S. (2008). *T.I.P.S. for online learning: Total implementation of a practical system*. Stealth Consulting.

Council for Higher Education Accreditation. (2001). *Distance learning in higher education: CHEA update, 3*. Retrieved March 3, 2013, from http://www.chea.org/Commentary/distance-learning-3.cfm

Davis, E. L. (2001). *The future of education*. Retrieved March 3, 2013, from http://www.wco.com/~mktentry/edfutur.html

Dick, W., & Carey, L. (1985). *The systematic design of instruction* (2nd ed.). Glenview, IL: Scott-Foresman.

Huebner, K. M., & Weiner, W. R. (2001). Distance education in 2001. *Journal of Visual Impairment and Blindness, 95*(9). Retrieved March 3, 2013, from http://www.afb.org/JVIB/JVIB950902.asp

Jones, C., & Timpson, W. M. (1991). Technologically mediated staff development: A retrospective case study. *American Journal of Distance Education*, *5*(1), 51–56. doi:10.1080/08923649109526732

Kerres, M., & DeWitt, C. (2003). A didactical framework of the design of blended learning arrangements. *Journal of Educational Media*, *28*(2-3), 101–113. doi:10.1080/1358165032000165653

McConnell, S., & Schoenfeld-Tachner, R. (2001). Transferring your passion for teaching to the online environment: A five step instructional development model. *e-Journal of Instructional Science and Technology, 14*(1). Retrieved March 3, 2013, from http://ascilite.org.au/ajet/e-jist/docs/vol4no1/mconnell.html

Ololube, N. P. (2009). Computer communication and ICT attitude and anxiety among higher education students. In A. Cartelli & M. Palma (Eds.), *Encyclopedia of information and communication technology* (pp. 100–105). Hershey, PA: IGI Global.

Ololube, N. P., Amaele, S., Kpolovie, P. J., & Egbezor, D. E. (2013). The issues of digital natives and tourists: Empirical investigation of the level of IT/IS usage between university students and faculty members in a developing economy. In *Digital literacy: Concepts, methodologies, tools, and applications* (pp. 1384–1401). Hershey, PA: IGI Global.

Ololube, N. P., Ubogu, A. E., & Egbezor, D. E. (2007). ICT and distance education programs in a Sub-Saharan African country: A theoretical perspective. *Journal of Information Technology Impact*, *7*(3), 181–194.

Palloff, R. M., & Pratt, K. (2003). *The virtual student: A profile and guide to working with online learners*. San Francisco, CA: Jossey-Bass Publishers.

Schlosser, C. A., & Anderson, M. L. (1994). Distance education: A review of the literature. Ames, IA: Iowa Distance Education Alliance, Iowa State University. (ERIC Document Reproduction Service No. ED 382 159).

Smith, S. B., Smith, S. J., & Boone, R. (2000). Increasing access to teacher preparation: The effectiveness of traditional instruction methods in an online learning environment. *Journal of Special Education Technology*, *15*(2), 37–46.

Teaching, L., & the Technology (TLT) Group. (n.d.). *Seven principles collection of TLT ideas.* Retrieved March 3, 2013, from http://www.tltgroup.org/seven/5_Time_Task.htm

Williams, M., Paprock, K., & Covington, B. (1999). *Distance learning: The essential guide*. Thousand Oaks, CA: Sage.

KEY TERMS AND DEFINITIONS

Blended Learning: Any form of learning process that combines f2f teaching and learning with computer mediated instruction aimed at knowledge dissemination.

Digital Environment: A promising, effective and well-designed digital and online environments that engage teachers and students in a range of issues that surrounds teaching and learning with technology.

Enabling Environment: A set of interrelated conditions that allows f2f and computer mediated effective learning to take place.

Problem-Based Learning: A process intended to help students in different fields to develop higher order thinking skills that provides them with authentic and complex problems solving methods.

Quality Learning: A central issue in every modern society. A powerful instrument that engages, rewards and enjoyable to our personal and collective experiences.

Quality Teaching: A teaching process that captivate students with subject matter drawn out of themselves, catches their environment like a passing train. A teaching process that do not tie students down, rather pull students along. Teaching that inspire students to compete against themselves and take up tasks that seem to exceed their grasp.

Technological Development: A process that improves the quality of education, social, economic, religion, politics etc. through the diversification of contents and methods that promotes experimentation, innovation, diffusion of information and best practices for the successful development of economies and societies.

This work was previously published in Advancing Technology and Educational Development through Blended Learning in Emerging Economies edited by Nwachukwu Prince Ololube, pages 213-231, copyright year 2014 by Information Science Reference (an imprint of IGI Global).

Chapter 9
Online Learning in Illinois High Schools:
The Voices of Principals!

Anthony G. Picciano
City University of New York (CUNY), USA

Jeff Seaman
Babson College, USA

Scott L. Day
University of Illinois – Springfield, USA

ABSTRACT

The purpose of this chapter is to examine the role that online learning plays in addressing the thoughts, concerns, and issues facing Illinois high school principals. Data were collected from a sample of high school principals who were members of the Illinois Principals Association with respect to the extent, nature, and reasons for participating in online learning programs. An important aspect of this study was to compare the findings in Illinois to those collected from a national sample of high school principals. It concludes that online learning and blended learning are making inroads into the high schools in Illinois comparably to those in other parts of the country. The results of this study indicate that online and blended learning are becoming integral to a number of high school reform efforts, especially with regard to improving graduation rates, credit recovery, building connections for students to their future college careers, and differentiating instruction.

INTRODUCTION

On April 24, 2011, an article in the *Chicago Tribune* entitled, *Online Learning for Illinois High Schoolers Inspires Praise and Suspicion*, appeared that provided a brief overview of the state of online learning in Illinois high schools. As the title suggests, there were the positives and negatives, the yeas and the nays, that typically arise whenever the use of the latest technology is suggested for changing the way children are educated in this country. Online learning, however, has elicited more than

DOI: 10.4018/978-1-4666-8246-7.ch009

its fair share of proponents and detractors. In the opening paragraphs, this article covered well the state of the debate:

[Online learning] 'can personalize for each student and have incredible rigor,' said Michael Horn of the Innosight Institute…

It's a data-rich environment. You can constantly see what does and doesn't work.

Critics say the trend is more about saving money than improving education, and that the effectiveness of online courses remains unproven.

'We have yet to see a vendor who has made the case that students who lack the motivation to do homework, to engage in class, to manage their time efficiently… will be more successful in online learning,' said Samantha Dolen of Palatine-based District 211 (Keilman, 2011).

This debate is being played out throughout the country as state policymakers and school administrators try to find solutions to improve education especially during severe budgetary times. Newspaper and other media reporters who cover this issue frequently will develop their stories around several individuals (students, teachers, union representatives, principals) who are happy to provide opinions for and against the use of online learning.

The *Chicago Tribune* article goes on to describe that while the state of Illinois introduced a virtual high school initiative in 2001, enrollments and enthusiasm have been modest at best. However, as more and more states move forward with apparently successful virtual schools (i.e., The Florida Virtual School), state and local policymakers are reconsidering this mode of learning. The data nationally are mixed with only a handful of studies (see Picciano & Seaman 2007, 2009, 2010) examining the big picture. Surely, more research is needed at the local school level.

BACKGROUND

The Role of Online Learning in American High School Reform

In the past several years, there has been a growing interest in the role that online learning can play in American high school reform efforts. Education policymakers at the federal, state, and local levels have all began to examine how online learning can improve academic programs, to improve graduation rates, and to provide more options to students. By the same token, these same policymakers have expressed concerns about the viability and efficacy of online learning to make substantial improvements in the American high school. A study by Picciano & Seaman (2010) examining these issues was conducted based on a national survey of high school principals. A summary of the results of this study serves as an appropriate backdrop for the study of online learning in Illinois high schools.

ISSUES, CONTROVERSIES, PROBLEMS

Improving Graduation Rates and Credit Recovery

Improving the graduation rate is perhaps the most important aspect of many high school reform initiatives. The term "credit recovery" refers to courses and other activities that students take to make up courses that they need to graduate. While the need for these courses varies, the primary motive for offering these online courses relates to students having not completed required coursework earlier in their high school careers due to illness, scheduling conflicts, academic failure, and etc. Students needing such courses make up a significant portion of the high school student population that subsequently drops out or are late in graduating. The findings in the Picciano and

Seaman (2010) and Watson and Gemin (2008) indicate that credit recovery has evolved into the most popular type of online course being offered at the secondary level.

A relatively new phenomenon, online credit recovery courses were practically non-existent a few years ago and have now become a dominant form of online course offerings in many high schools. What is particularly interesting is that urban high schools, which historically have the lowest graduation rates of any schools in the country, appear to be embracing online credit recovery as a basic part of their academic offerings (Balfours & Legters, 2004). This finding is corroborated by reports from several providers of online courses that are seeing significant increases in demand for credit recovery courses. Gregg Levin, vice president for sales for Aventa Learning, a for-profit provider of online services to K-12 schools, in a recent article said that demand for online credit recovery courses had increased "eight-fold between 2005 and 2008" (Zehr, 2010). Many high schools have been forced to find solutions to their high school drop-out problems due to pressure from state education departments and federal mandates to improve student outcomes. Online credit recovery appears to be an integral part of the solutions for many of these schools.

Building Bridges to College Careers

An important aspect of the high school reform dialogue has centered on the importance of advising students to stay in school and move onto a college career upon graduation. Students who have set the goals of attending college for themselves are more likely to do well in school and graduate. Rather than waiting for graduation, educators have been developing programs to bridge the high school and college experiences at an earlier time. Whether through advanced placement or registration in college courses as electives, there has been a growing population of high school educators seeking to expand the opportunities for their students to start their college careers while still in high school. While many models for this exist, there have always been logistical issues with regards to transporting students to colleges, training high school teachers to teach college-level courses, articulating courses taken in high school for college credit, and etc. It appears from the Picciano and Seaman (2010) study that online and blended learning courses are increasingly being used to overcome these logistical issues. By enrolling in online and blended learning courses, high school students no longer need to be transported to a college campus, can enroll in college courses taught by college professors, and can be given college credit immediately upon completing and passing their coursework. Data from this study indicate that high school administrators see online elective college-level courses as an effective way for some of the more able students to begin their college careers.

Differentiating Instruction

Christensen, Horn, and Johnson (2008) in a major book on this topic, see online learning as an integral part of high school reform specifically by allowing high schools to customize instruction and to differentiate course offerings to meet a wide variety of student needs. However, while offering a wide breadth of courses is most desirable, doing so in face-to-face mode can be quite expensive. Offering some courses online allow for greater breadth of course offerings without necessarily incurring the same costs. For example, to offer a face-to-face elective course generally requires that there be a certain amount of student interest and enrollment for the course in order to make it cost effective. A student interested in taking elective coursework in chemistry might not be interested in taking an advanced foreign language course and vice versa. To meet the needs of both students, high school schedulers would have to offer both an advanced chemistry and a foreign language course and then hope that there are enough students registered to make them cost-effective. Online and blended courses, on the other hand, can be made available for just a single student and only incur the cost for that one student. The data from the Picciano and Seaman (2010) study consistently indicate that high school administrators see online learning as meeting the diverse needs of their students whether through advanced placement, elective college courses, or credit recovery. Likewise, Watson and Gemin (2008) state "online learning programs are designed to expand high-quality educational opportunities and to meet the needs of diverse students" (p. 3). Indeed, the data indicate that the major reason for offering online and blended courses is to offer courses that otherwise would not be available. This supports strongly the concept promulgated by Christensen, Horn, and Johnson (2008) of the role that online technology can play in differentiating instruction and providing more choices for high school administrators in developing their academic programs.

Financial and Policy Issues

Financial and policy issues continue to be major concerns for high school administrators as they consider online learning. On the one hand, offering online and blended courses makes a good deal of financial sense especially when trying to meet specific needs for small groups of students. This enables schedulers to maximize their full-time faculty resources in required and other popular courses and to minimize offering courses in face-to-face mode for small numbers of students.

On the other hand, administrators, the respondents to the survey, clearly see costs and funding formulae as barriers to expanding and implementing online and blended courses. If administrators decide to develop their own online courses, substantial financial investment needs to be made in hardware and software infrastructure, teacher training and support services. The initial investment for these can be prohibitive. However, if a school contracts out for the majority of its online and blended learning courses, the cost of the provision of local support services might be offset by the savings incurred by having to offer fewer courses in face-to-face mode. With so many providers of online courses, especially those that are non-profit, such as state-supported virtual schools and local colleges and universities, most schools do not find it necessary to develop an in-house online learning program.

The financial issues of more concern may have to do with state and local education policies that follow strict attendance-based funding formulae and do not easily accommodate students taking courses beyond a school district. While most states have developed policies regarding funding formula for online courses, some have not. State virtual schools have proliferated, but the funding formulae for them and the schools that contract with them have not necessarily been optimized. Several reports from agencies and organizations such the Southern Regional Education Board (Thomas, 2008) and the Evergreen Consulting Group (Watson & Gemen, 2009) highlight the fact that policies even in states with well-established virtual schools, need to be reviewed and refined in order to support online learning programs for their K-12 school districts.

The Pedagogy of Online Learning

For a number of years, the pedagogy of online learning has been the subject of concern at every level of education. Educators express concerns and perceptions that online learning is not as effective as face-to-face instruction. Their concerns relate to the students' motivation and maturity levels, study habits and organizational skills, as well as their academic preparedness. These concerns will not likely disappear and exist as a given among many educators. Regardless of the concerns, the decision to embrace online learning has been made and the vast majority of schools are moving forward with their programs and looking to expand them in the future. Picciano and Seaman (2010) suggest that many schools and school districts see benefits to online learning programs that overshadow concerns about pedagogical value. Online learning is seen as a means to broaden and expand student experiences. Beldarrain (2006) also concludes that "new models of teaching can accommodate the needs of the 21st century learner by including activities that allow students to contribute to the learning process at any time, from anywhere" (p. 145). Online learning allows students looking for more advanced work to test and challenge their skills by taking more demanding instructional material. It also allows students who might be at risk to make up coursework that they have missed in order to graduate. These policy decisions are based on the rationale that providing broader access to a secondary education may be of more importance than the concerns and perceptions regarding the pedagogical value of online learning.

Rural Schools in the Vanguard

While online and blended learning are increasingly being seen as an important component of high school reform for all schools, rural schools have been in the vanguard in offering these programs to their students. Researchers (Brown, 2012; De la Varra, Keane, & Irvin, 2010; Picciano & Seaman, 2010), have consistently provided insights into the issues that rural schools have faced and the role that online technology plays in addressing them. These schools have had to overcome significant problems related to funding, teacher certification, and small enrollments that forced them to address creatively the needs of their students. While high schools in all locales (cities, towns, and suburbs) are facing serious challenges, the rural schools probably have the most difficult challenges. With limited tax bases, low enrollments, and difficulty in attracting and keeping certified teachers, their issues are fundamental and can jeopardize their very existence. The data suggest that they are making valiant efforts to overcome these issues and online and blended learning are among the strategies for doing so while providing quality educational programs for their students.

METHODOLOGY

This study of Illinois high schools used descriptive analysis relying extensively on a modified survey instrument designed specifically for our original studies Picciano and Seaman (2007, 2009, 2010). This survey was conducted for the 2010–2011 academic year. For purposes of this study the following definitions were used:

- **Fully Online Course:** A course where most or all of the content is delivered online, and typically has no face-to-face meetings.
- **Blended/Hybrid Course:** A course that blends online and face-to-face delivery, and where a substantial proportion of the content is delivered online, sometimes uses online discussions and typically has few face-to-face meetings.

The "universe of interest" for this study included all public high schools in Illinois. Information on these schools was taken from the Common Core of Data (CCD) from the U.S. Department of Education's National Center for Education Statistics (http://nces.ed.gov/ccd/ccddata.asp).

In the first phase of data collection email survey invitations were sent to 506 high school principals who were members of the Illinois Principal's Association (IPA). Principals who had not responded were sent up to two email reminders. A second stage of data collection was then undertaken sending invitations to all non-IPA member public high schools in Illinois as well as those IPS members that had not yet responded. These invitations allowed the high principal to respond by completing a paper version of the survey and return it in a postage-paid mailer, or by responding online. Both the paper and web-based versions of the survey contained a unique survey identification number.

All potential respondents were informed that the Illinois Principal's Association was sponsoring the survey, that "all participants will have access to a free copy of the survey report, comparing Illinois results to the earlier national studies," and that, "All individual survey responses remain anonymous, only aggregated data are reported." The survey form was composed of two portions, one that applied to all respondents and a second section to be completed only by those schools with online or blended course offerings. The invitation letter and the survey form itself were carefully worded to encourage responses from all school representatives, regardless of their view towards online instruction or whether they were involved with online learning or not.

All data collected were entered into a database, either directly by the respondent if the school responded using the web version or, in the case of paper-based responses, by the researchers. Each entry included the unique survey ID number that was used to link the response to the description data of that school contained in the Education's National Center for Education Statistics Common Core of Data. The data linked from this source included location information (city, town, urban/rural), the grade range for the school, and the number of students enrolled.

All data were investigated for missing or out of range values. All missing data were coded as either structural missing (the question did not apply to the respondent) or as non-response missing (the question did apply, but the respondent did not provide any data). After the survey data were merged with the CCD data, cleaned, and all missing value codes added, they were input into the SPSS statistical package for analysis.

Two-hundred and ten high school administrators participated in this study. This represents 23 percent of all public high schools in Illinois. Sixty-two percent of the principals reported that at least one student in their schools was enrolled in an online course between July 1, 2010, and June 30, 2011. Almost 23% of the responding administrators reported that they had students enrolled in a blended learning course.

RESULTS

Importance for Offering Online or Blended Courses

Figure 1 provides a summary of the responses from the Illinois principals to the question: "Regardless of whether your school is currently offering online or blended/hybrid courses, please indicate how important you believe each of the following items would be to your school in offering or potentially offering online or blended/hybrid courses. Do not consider web-enhanced courses for this question." The options receiving the highest test responses were:

- Permit students who failed a course to take it again - Credit Recovery (74%),
- Provide courses that otherwise were not available (72%),
- Provide additional Advanced Placement courses (60%), and
- Provide for the needs of specific students (58%).

These responses represent the significance of online learning in meeting a variety of student needs whether making up courses that they had previously failed (i.e., credit recovery) or for advanced placement. For the former, the term "credit recovery" has become very popular in recent years and is a fairly new phenomenon in online learning. Meeting needs related to other basic school issues such as extending the school year, finances, pedagogical benefit, and alleviating classroom space were perceived as being of less importance.

Figure 1 provides comparisons of Illinois and national data. In general, the responses in Illinois are comparable to the national data. Additional information on the characteristics of the Illinois sample is available in Table 1.

Figure 1. Importance for offering online or blended/hybrid courses

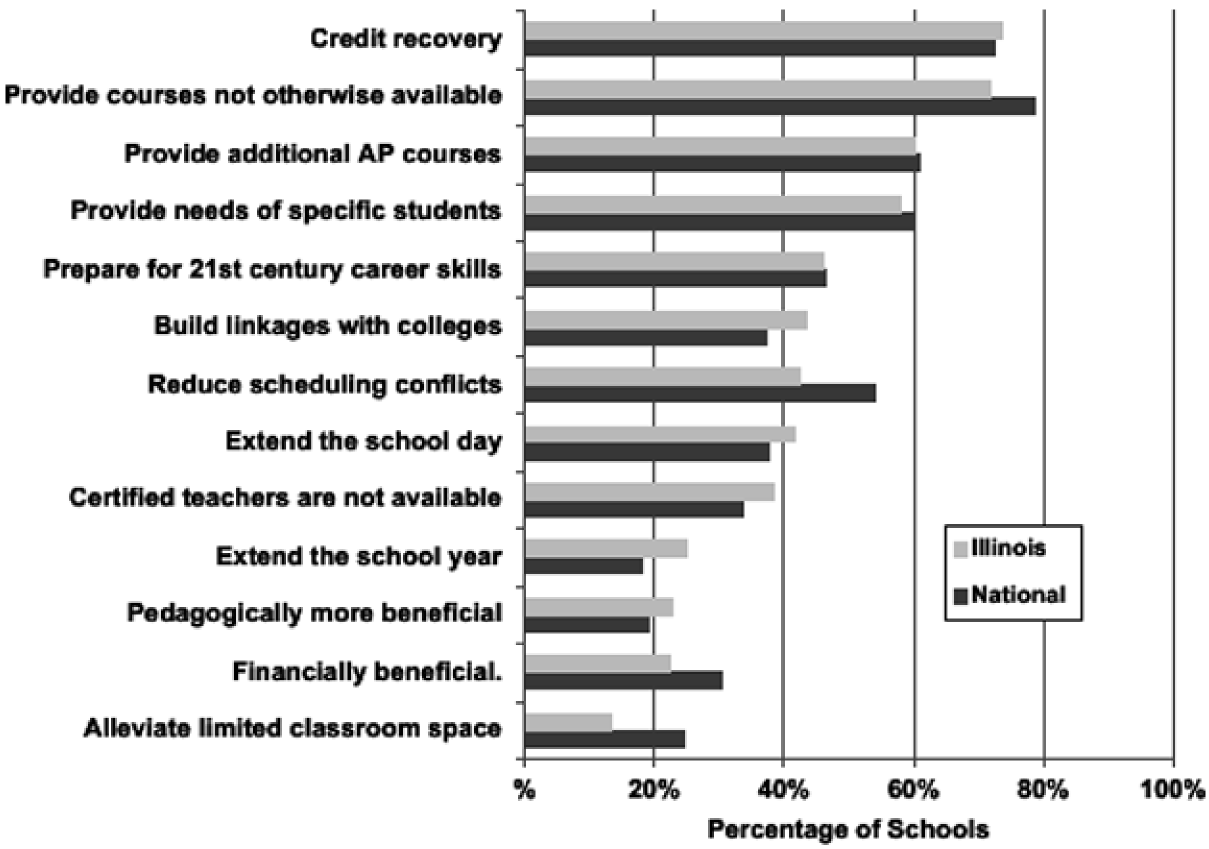


Table 1. Characteristics of Illinois responding high schools

Size Based On		Percent
Student Enrollment	Under 200	28.6
	201 to 500	28.1
	501 to 1200	19.5
	1201 +	23.3
Location	City	8.1
	Suburb	21.1
	Town	27.8
	Rural	43.1

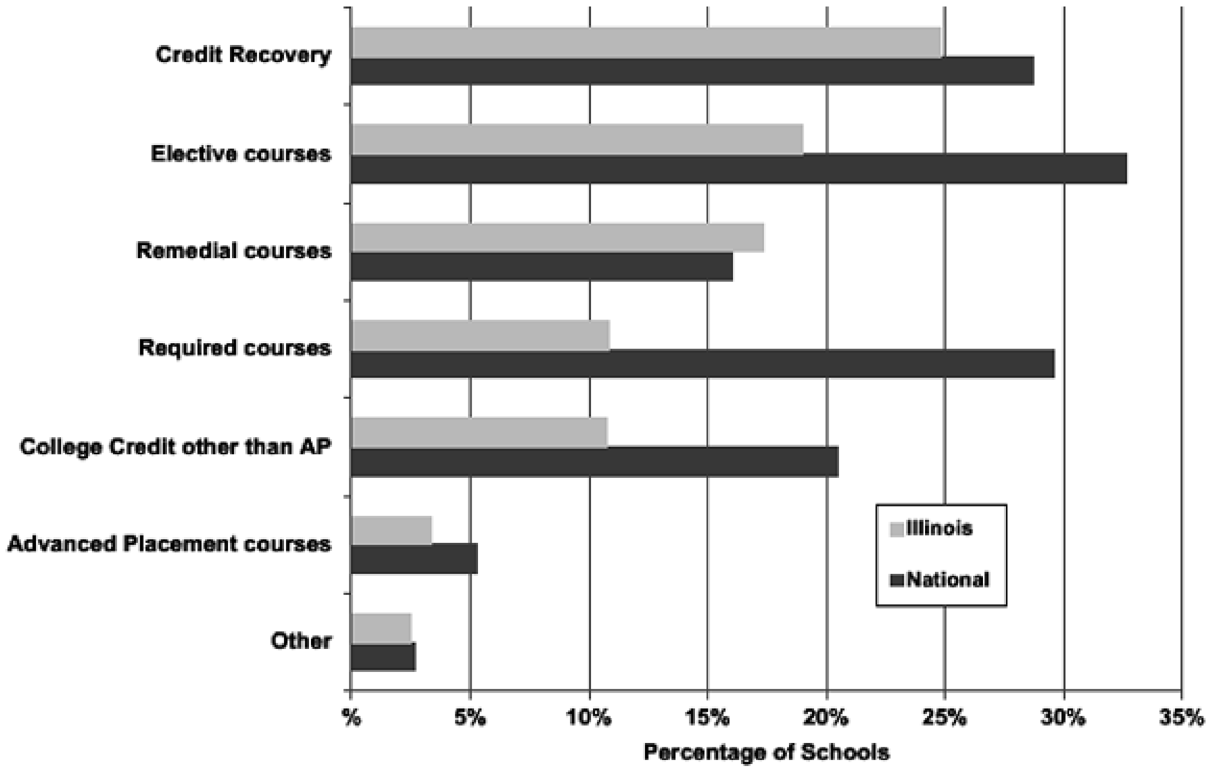
Types of Online and Blended Courses Offered

Figure 2 provide summaries to the question: "What is the nature of online and blended/hybrid courses taken by students in your school (check all that apply)". For both online and blended learning courses, the most popular courses in order of importance were:

- Credit recovery,
- Elective courses, and
- Remedial courses.

Seventy-five percent of the principals reported that fully online courses were being used for credit recovery courses. Results also provide a comparison to the national data. Differences

Figure 2. Types of blended/hybrid courses offered



between the Illinois sample of high schools and the national sample are apparent for elective and required courses.

Providers of Online Courses

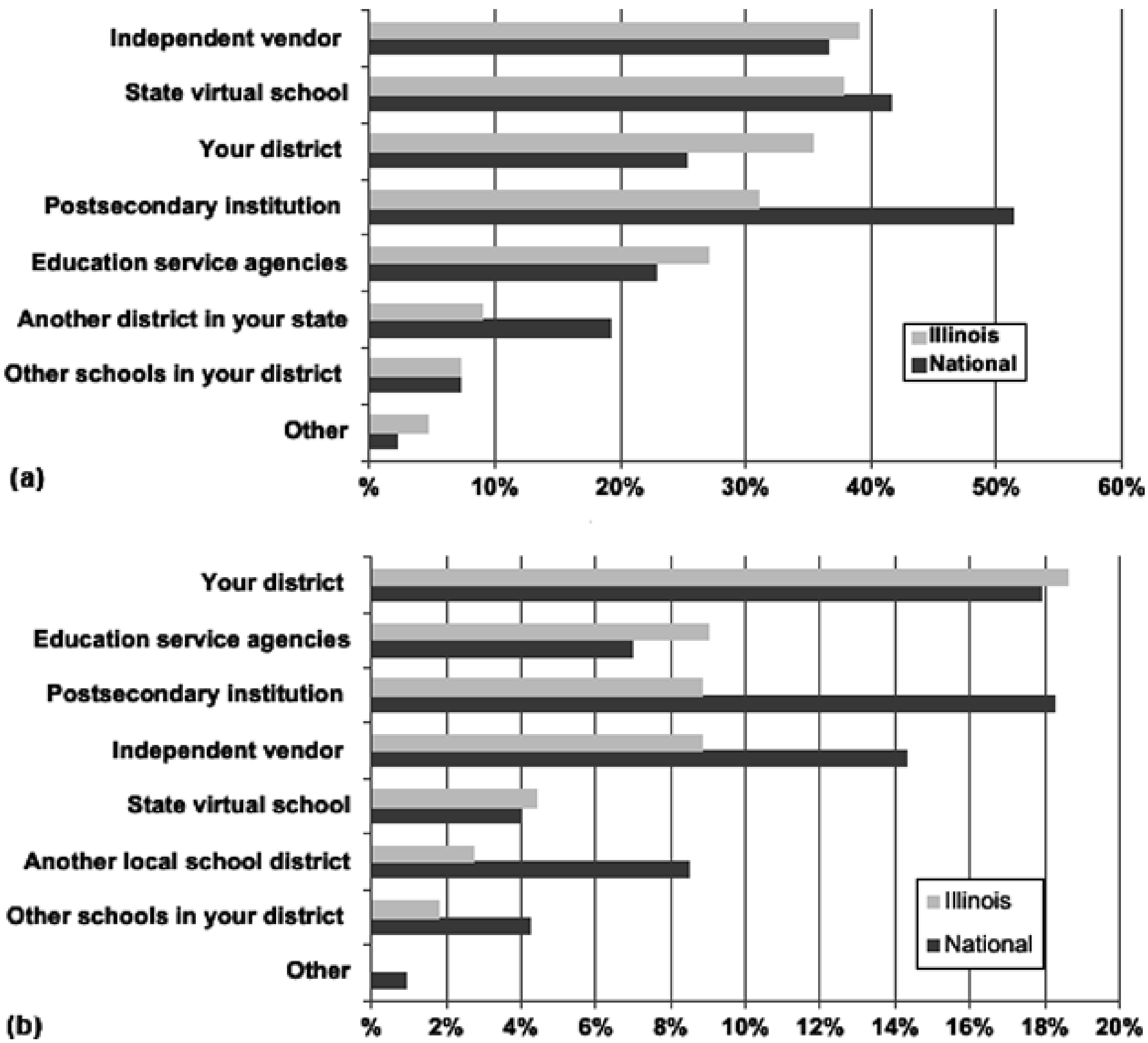
K-12 school districts generally contract out with a number of different providers of online learning programs and courses. Table 2 provides percentage comparisons of samples of Illinois and national high schools in terms of the number of online learning providers being used by the respondents.

Figures 3 (a) and 3 (b) offer summaries of the providers of online and blended learning courses. There are clear differences in the nature of the providers of the two modes of learning. While Illinois high schools use a number of different providers, more fully online courses are provided by independent vendors, state virtual school, and their own school district. Blended learning courses on the other hand, are more often provided by their own school district followed by education service agencies, postsecondary institutions and independent vendors. The rationale for this for blended learning courses is that school districts are tending to utilize in-house teachers and other staff to develop and teach these courses. It also provides a comparison to a national sample of high schools. The most significant difference in these comparisons is the greater reliance on postsecondary institutions at the national level especially for fully online courses.

Table 2. Number of providers of online courses

	National	Illinois
1	35%	47%
2	37%	31%
3	15%	15%
4 or More	14%	7%

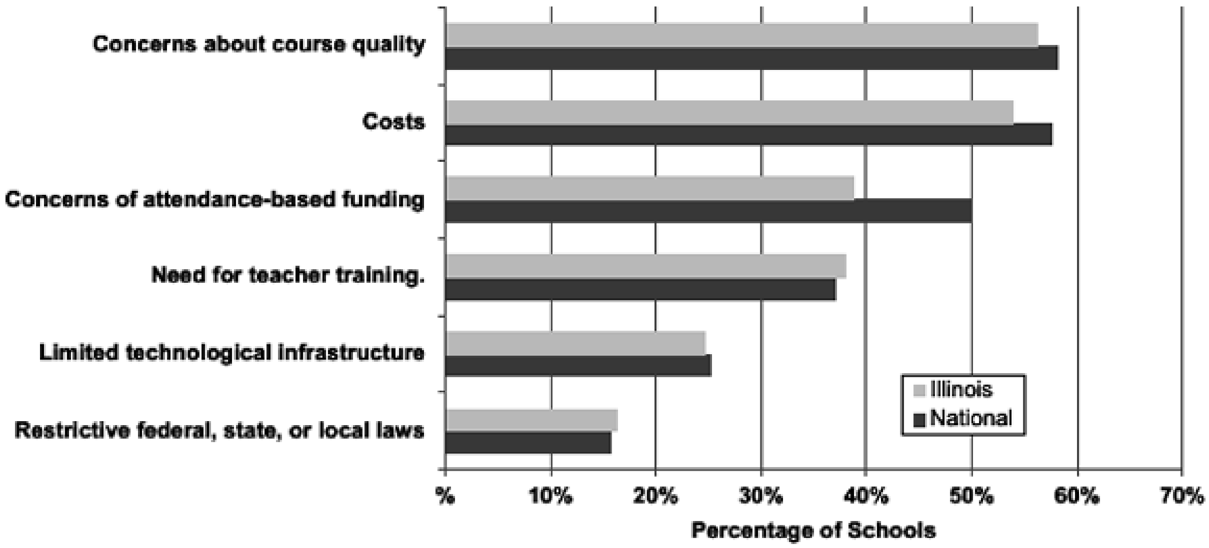
Figure 3. (a) Providers of online courses (b) providers of blended/hybrid courses



Barriers to Online and Blended Learning

Figure 4 provides a summary of the responses to the question: "Regardless of whether or not your school is currently offering online or blended/hybrid courses, how much of a barrier are the following areas to offering or potentially offering fully online or blended/hybrid learning courses? Do not consider web-enhanced courses for this question." Concerns about course quality at 56.2% and cost factors at 53.8% were identified by a majority of the respondents. The need for teacher training and concerns about attendance-based funding also were mentioned by a substantial percentage of principals. The same figure also compares the responses of the Illinois principals to the national sample. The responses are comparable with the exception of "concerns for attendance-based funding" which was considered a more significant barrier among the national sample of principals.

Figure 4. Barriers to offering online and blended learning courses



The Nature of Online and Blended Course Offerings

As part of the planning for this survey, colleagues at the University of Illinois – Springfield asked if the survey could contain several questions regarding the nature of the online and blended learning course offerings specifically related to:

Where (i.e., at home, in school) students take online and blended learning courses?

Type (i.e., led by teacher or adult or self-contained) of online and blended courses?

Interaction (i.e., allow for student interactions or students work independently) within online and blended courses?

Figures 5 (a), 5 (b), and 5(c) provides summaries of the responses to these questions. The responses indicate that students work in several environments at the school (supervised and unsupervised) and at home although the highest response (74.4%) indicated that students work in these courses under the supervision of an adult at the school. Note that any single school could report more than one response for each of these questions – they are "check all that apply." In terms of the type, respondents indicated that 61.1% were self-contained and 46.0% were led by a teacher or tutor. In terms of interaction, the vast majority (86.1%) indicated that students worked independently and did not interact with other students in online and blended courses.

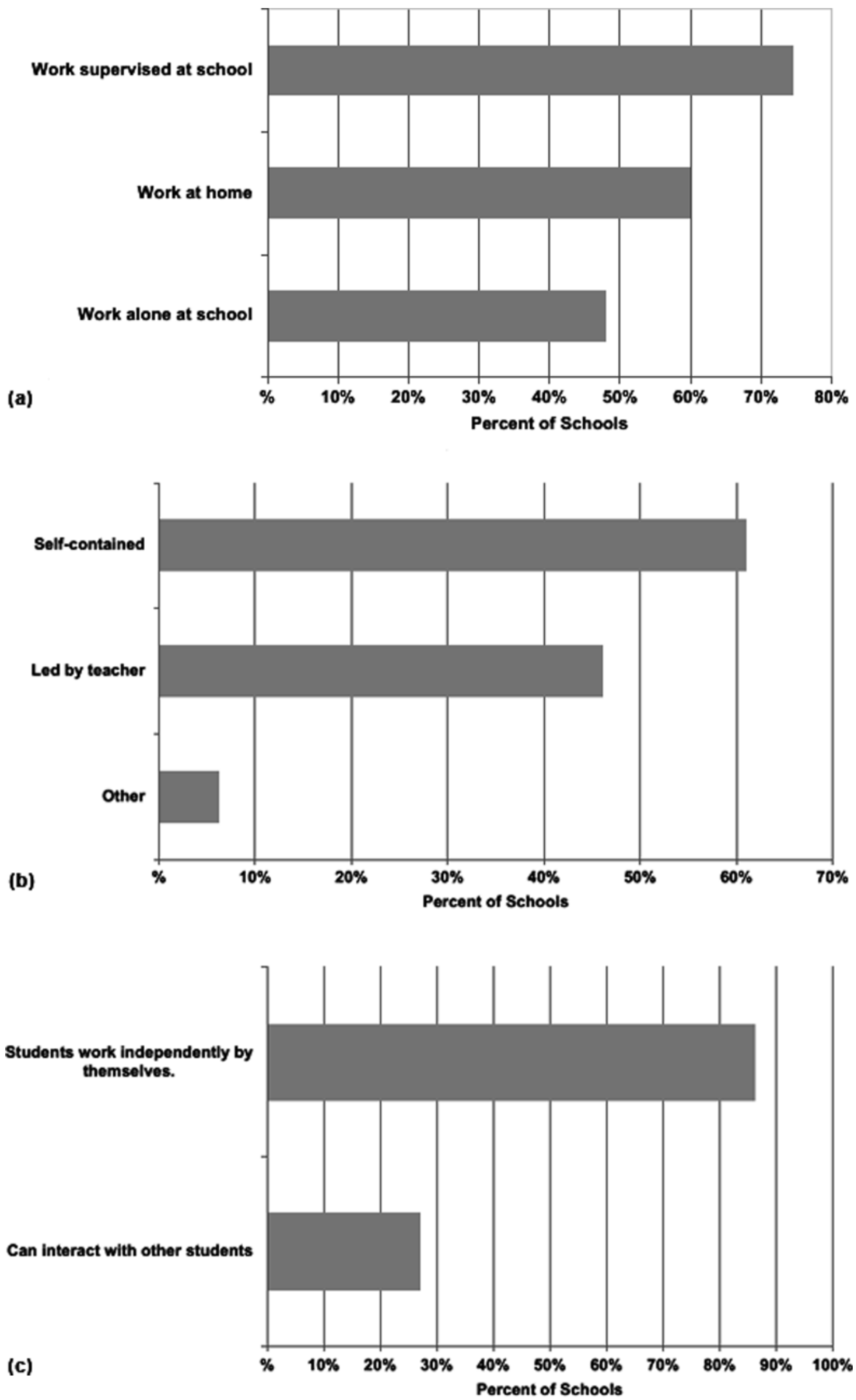
Voices from the Schools

As part of this study, respondents were asked to comment and to offer their voices on any aspect of online or blended learning. Eighty-three principals offered their comments and insights. It is important for the readers of this study to get a feel for the voices of these respondents. The following quotes are presented in an order to provide a balanced view both positive to and expressing concerns about online learning.

Positive Comments

Any time we can enhance the quality of education for our students, we should do so! We are a small school and need to continue offering these opportunities for our kids.

Figure 5. (a) Where students take online courses in Illinois (b) type of online courses (c) type of interaction for online courses



Great for credit recovery and to offer courses not otherwise available at the school.

I believe that online and blended courses are the future of secondary education. Many colleges and universities utilize this type of course, and exposure to these types of courses for college bound students would help them better prepare for their college experience. This may also be a key for reaching students who are independent learners.

Online courses have allowed our higher level students to take college level classes and gain college credit and high school credit at the same time. This opportunity is great for our students and expands our curriculum.

Some students do not learn within the traditional school structure. Offering credit recovery courses via online is going to be an important component for us to graduate more students.

We are a very small rural high school and these type courses allow our students to take more advanced classes and classes we are unable to offer otherwise.

We primarily use technology for credit recovery for students that have failed classes, some students that are homebound, and considering the thought of online courses for foreign language courses.

Expressing Concerns

Whereas these courses are important and teach the use of technology and can expand the curriculum, direct instruction can't be duplicated as far as teaching students the value of face to face communication and contact. Students are losing this skill of interpersonal relationships and communication.

My concern with online courses is that they violate practically every tenet we believe to be true about effective teaching and learning. Research has consistently shown that the quality of the teacher is the greatest determining factor in the quality of a child's education.

Face to face instruction monitors student concerns, problems, and/or impressions about instruction more effectively. Online, seemingly, is more of a "superficial" type of instruction.

Generally, I like them as long as students cannot cheat. They are costly to schools however.

In my personal and professional experiences, including taking some on-line and hybrid courses in my graduate work, the rigor is not there yet. It is also very difficult in and not beneficial for education to limit (correct word) the interaction between pupil and teacher for quality engaged learning and formative feedback.

The real issue is challenging instruction with a union who feels such movement may impact jobs.

My biggest concern would be that if we're going to do something new let's make sure that we do it to the best of our abilities. Right now, with limited or no training, we would not do it correctly and our students would not benefit.

DISCUSSION

Overall Comparison between Illinois and National Samples

In comparing the data in this study with those of a national sample of principals, most of the findings are comparable even though the present study was conducted two years later (2010-2011 academic year vs. 2008-2009 academic year). Online credit recovery courses are proliferating across the country as well as in Illinois. Concerns about costs and course quality continue to dominate the opinions of the principals in both Illinois which are similar to views of administrators across the country. However, these concerns are not preventing the expansion of online learning. Unlike higher education which relies largely on in-house development of online and blended courses, high schools in Illinois and nationally use a number of providers rather than develop courses in house. This is especially true for fully online courses.

Credit Recovery Leads the Way

Credit recovery courses are becoming without a doubt the major type of application for online and blended learning in high schools. In Illinois, the picture supports fully and even shows an acceleration of the use of credit recovery as a means to give students a second chance to complete necessary coursework. The need for these courses varies but relates to students having not completed required coursework earlier in their high school careers due to illness, being homebound, scheduling conflicts, academic failure, and etc. Students needing such courses make up a significant portion of the high school student population that subsequently drops out or is late in graduating. Many high school principals especially those in urban areas are under pressure from state education departments and because of federal mandates to improve student outcomes and to stem the number of drop-outs. When done well, online credit recovery can be a cost-efficient strategy for addressing the drop-out issue mainly because these courses can be purchased on a per student basis as needed rather than funding entire traditional courses taught by a full-time teacher.

While it would be easy to state that the advance of online credit recovery was a positive finding in the study, some caution is needed. The data suggested that while high school administrators are providing more opportunities for students to enroll in online courses, they also have concerns about the quality of online courses and indicate that students need maturity, self-discipline, and a certain command of basic skills (reading and mathematics) in order to succeed in these courses. Many of the students who need to recover credits are those who may not have these characteristics.

Questions have also been raised by teachers and others about credit recovery providing a shortcut to move students quickly through to graduation (Gootman & Coutts, 2010; Winerip, October 24, 2011). The students are happy because they graduate; principals are happy because they improve their graduation rates; and credit-recovery providers are happy because they have increased their profits. However, the students (and their parents) may have been duped into believing that their work was worthy of graduation. One New York City principal stated that: "I think that credit recovery and the related topic independent study is in lots of ways the dirty little secret of high schools. There's very little oversight and there are very few standards." (Gootman & Coutts, 2010) The issue was raised in 2010 and 2011 when nearly 80% of the students entering the City University of New York's (CUNY) community colleges failed at least one basic skills examination in reading, writing or mathematics. Furthermore, the situation was getting worse with more high school graduates or 22.6% of CUNY entrants needing to take remedial coursework in all three basic skill areas, up from 15.4% in 2005. In October, 2011, the New York City Department of Education, using its own set of metrics concluded that 75% of its graduates in 2010 were not ready for college-level work (Winerip October 24, 2011). One observer blamed lax standards, the dumbing down of New York State Regents Examinations required for graduation, and an expansion of credit-recovery programs. David Bloomfield, a professor of education leadership at Brooklyn College, likened credit recovery to "giving out credits like candy…The graduation rate has increased, but without the subject mastery… It amounts to social promotion" (Edelman, 2011).

A local newspaper analysis concluded: "it does the failing kids no favors, either -- turning them loose on the streets wholly unprepared for what they'll face" (New York Post Editorial, 2011).

Online Learning Providers

In earlier national studies of online learning in K-12 school districts, postsecondary institutions and state virtual schools were the major providers of online and blended learning. Both this study of Illinois high school principals and the national study indicate that this has begun to change. While postsecondary institutions and state virtual schools continue to be major providers, independent vendors riding the credit recovery wave are evolving into the number one provider of online learning to high school students in Illinois and many other states especially those that do not have a well-established state-supported virtual high school. Private companies such as Aventa Learning, ALEKS, and EdOptions appear to be providing quality credit recovery programs. In the future, it is likely that these companies will be providing other online courses beyond credit recovery. A major reason for the popularity of outside vendors is that few school districts have the technology or personnel infrastructure to develop high-quality online course content. Outside vendors provide a more efficient way to offer online courses quickly rather than having to invest in a district's capacity to develop their own.

The Pedagogy of Online Learning vs. Graduation Rates

This study provides important insights into the pedagogy of online learning. Principals in Illinois express concerns about the quality of online instruction and at the same time choose to use it more. Some administrators see online learning as beneficial only for "higher-level students," while others view it as "superficial." Regardless, the data demonstrate that online learning especially for lower-performing students via credit recovery is increasing in popularity. As indicated in this chapter, other factors especially the desire to improve graduation rates for all students have pushed educators to use online courses for those most at risk of not completing their high school educations.

The data collected from the Illinois principals also indicate that the pedagogy of online learning is evolving differently in the high schools than, say in higher education, where it has been used for many years. High schools are making greater use of adults (teachers, tutors, other supervisors) to assist students physically in their schools as they participate in online course activities. Students are more likely to be working on their online courses in their school's computer lab or library. This is desirable especially if many of the students enrolled in these courses need extra assistance as might be typical of those in credit recovery courses. The adult in the room can assist both for technical as well as for content or learning issues. This might also be desirable if many of the online courses are not teacher-led, student-to-student interactive environments but are self-contained, programmed instruction type courses where most if not all of the interaction is computer moderated and controlled. Much of the literature on online learning in higher and adult education documents the benefits of student interactions with each other as an important aspect of the benefits of their learning experiences. In the Illinois high schools, it appears that students are not relying on the online course so much as face-to-face contact in school facilities. This needs to be examined further.

Barriers to Online Learning

In addition to pedagogical value, the Illinois principals in this study also expressed concerns about cost, the need for teacher training, and attendance-based funding. Their concerns are similar to those expressed in the national sample. However, their concern about attendance-based funding policies is considerably lower than principals in the national sample. Across the country, funding formulae for primary and secondary education vary from state to state. Some states have not established clear guidelines for funding online courses. The fact that Illinois high schools make significant use of blended learning and use teachers and other adults for supervising online learning students might reduce the concern regarding funding since some face-to-face instruction is still being used.

CONCLUSION

The purpose of this study was to examine the role that online learning was playing in addressing the thoughts, concerns and issues facing Illinois high school principals. Data were collected from a sample of high school principals who were members of the Illinois Principals Association with respect to the extent, nature, and reasons for participating in online learning programs. An important aspect of this study was to compare the findings in Illinois to those collected from a national sample of high school principals. It is our conclusion that online learning and blended learning are making inroads into the high schools in Illinois comparably to those in other parts of the country. The results of this study indicate that online and blended learning are becoming integral to a number of high school reform efforts, especially with regard to improving graduation rates, credit recovery, building connections for students to their future college careers, and differentiating instruction. However, while high schools especially in rural Illinois, are depending upon online and blended learning for many of their programs, concerns remain among administrators about the quality of online instruction. Future study and evaluation should concentrate especially on the efficacy of online credit recovery courses as they continue to evolve into the dominant type of online learning for the students at greatest risk. There need to be assurances that online credit recovery is not being used strictly as a convenient vehicle for improving graduation rates. In sum, the benefits, concerns, and costs related to online and blended learning are prime areas for future research as they become a significant focus in the dialogue on reforming the American high school at national, state, and local levels. Research concentrating on studying these issues is welcome at all levels.

REFERENCES

Balfanz, R., & Legters, N. (2004). *Locating the dropout crisis: Report of the center for research on the education of students placed at risk.* Baltimore, MD: Johns Hopkins University Press.

Beldarrain, Y. (2006). Distance education trends: Integrating new technologies to foster student interaction and collaboration. *Distance Education*, *27*(2), 139–153. doi:10.1080/01587910600789498

Brown, D. W. (2012, March). Rural districts bolster choices with online learning. *Learning and Leading with Technology*, 13–17.

Christensen, C. M., Horn, M. B., & Johnson, C. W. (2008). *Disrupting class: How innovation will change the way the world learns*. New York: McGraw-Hill.

De la Varre, C., Keane, J., & Irvin, M. J. (2010). Enhancing online distance education in small rural US schools: A hybrid, learning-centered model. *ALT-J. Research in Learning Technology.*, *15*(4), 35–46.

Edelman, S. (October 22, 2011). 'Remedial class' nightmare at CUNY. *New York Post*. Retrieved from http://www.nypost.com/p/news/local/remedial_class_nightmare_at_cuny_5JruiGppYWONCT1gE5xcyL

Gootman, E., & Coutts, S. (April 11, 2008). Lacking credits, some students learn a shortcut. *New York Times*. Retrieved from http://www.nytimes.com/2008/04/11/education/11graduation.html

Keilman, J. (2011). Online learning for Illinois high schoolers inspires praise and suspicion. *Chicago Tribune*. Retrieved from http://articles.chicagotribune.com/2011-04-24/news/ct-met-onlineclass-20110424_1_effectiveness-of-online-courses-innosight-institute-online-classes

New York Post Editorial. (October 15, 2011). Cheaters sometimes win. *New York Post.* Retrieved from http://www.nypost.com/p/news/opinion/editorials/cheaters_sometimes_win_LVQR6EVGE32UnyKKpQZ62L

Picciano, A. G., & Seaman, J. (2007). *K-12 online learning: A survey of school district administrators*. Needham, MA: The Sloan Consortium.

Picciano, A. G., & Seaman, J. (2009). *K-12 online learning: A 2008 follow up of the survey of U.S. school district administrators*. Needham, MA: The Sloan Consortium.

Picciano, A. G., & Seaman, J. (2010). *Class Connections: High School Reform and the Role of Online Learning*. Retrieved from http://www3.babson.edu/ESHIP/researchpublications/upload/Class_connections.pdf

Thomas, W. R. (2008). *Making the critical transition to stable funding for state virtual schools*. Atlanta, GA: Southern Regional Education Board.

Watson, J., & Gemin, B. (2008). Promising Practices in Online Learning: Using Online Learning for At-Risk Students and Credit Recovery. North American Council for Online Learning, 1-16.

Watson, J., & Gemin, B. (2009). Promising practices in online learning: Policy and funding frameworks for online learning. Vienna, VA: International Association for K-12 Online Learning.

Winerip, M. (2011). In college, working hard to learn high school material. *The New York Times*. Retrieved from http://www.nytimes.com/2011/10/24/education/24winerip.html?ref=nyregion

Zehr, M. A. (2010). District embracing online credit recovery options. *Education Week*. Retrieved from http://www.edweek.org/ew/articles/2010/06/21/36credit.h29.html

ADDITIONAL READING

Allen, M., Bourhis, J., Burrell, N., & Mabry, E. (2002). Comparing student satisfaction with distance education to traditional classrooms in higher education: A meta-analysis. *American Journal of Distance Education*, *16*(2), 83–97. doi:10.1207/S15389286AJDE1602_3

Beeson, E., & Strange, M. (2003). Why rural matters 2003: The continuing need for every state to take action on rural education. *Journal of Research in Rural Education*, *18*(1), 3–16.

Berge, Z., & Huang, Y.-P. (2004). *A model for sustainable student retention: A holistic perspective on the student dropout problem with special attention to e-learning*. Retrieved from http://www.ed.psu.edu/acsde/deos/deosnews/deosnews13_5.pdf

Bernard, R. M., Abrami, P. C., Lou, Y., Borokhovski, E., Wade, A., & Wozney, L. et al. (2004). How does distance education compare to classroom instruction? A meta- analysis of the empirical literature. *Review of Educational Research*, *74*(3), 379–439. doi:10.3102/00346543074003379

Cavanaugh, C., Gillan, K., Kromrey, J., Hess, M., & Blomeyer, R. (2006). *The effects of distance education on K-12 student outcomes: A meta-analysis [Electronic Version]*. Retrieved from http://faculty.education.ufl.edu/cathycavanaugh/docs/EffectsDLonK-12Students1.pdf

National Center for Education Statistics. (2002). Distance education course for public education and secondary school students. *National Center for Education Statistics*. Retrieved from http://nces.ed.gov/surveys/frss/publications/2005010/

Picciano, A. G., Seaman, J., Shea, P., & Swan, K.Sloan Foundation. (2012). Examining the extent and nature of online learning in American K-12 education: The research initiatives of the Alfred P. Sloan Foundation. *The Internet and Higher Education*, *15*(2), 127–135. doi:10.1016/j.iheduc.2011.07.004

KEY TERMS AND DEFINITIONS

Blended/Hybrid Learning: Instruction that blends online and face-to-face instructional methods.

Credit Recovery: Courses students take to make up requirements needed to graduate.

Graduation Rate: The percentage of students within a cohort who graduate during their expected graduation year.

Online Learning: Instruction provided through online methods.

Online Providers: Companies who provide online course services to school districts.

Rural Schools: Includes districts with average daily attendance of fewer than 600 students, or districts in which all schools are located in counties with a population density of fewer than 10 persons per square mile and all schools served by the districts are located in a rural area.

Virtual Schools: Coursework from an accredited private school or accredited not-for-profit or publicly funded institution, taught primarily through online methods.

This work was previously published in Exploring the Effectiveness of Online Education in K-12 Environments edited by Tina L. Heafner, Richard Hartshorne, and Teresa Petty, pages 1-18, copyright year 2015 by Information Science Reference (an imprint of IGI Global).

Chapter 10
Learning Theory and Online Learning in K-12 Education:
Instructional Models and Implications

Alex Kumi-Yeboah
University at Albany – SUNY, USA

ABSTRACT

Several questions need to be asked about how the applications of learning theories in online learning and how it impacts student learning. Online learning has the ability to promote rapid growth of student academic performance using instructional strategies such as differentiated instructions to meet the specific needs of students. However, less is known about the integration of learning theory and online learning in K-12 schools and its impact on student learning. This chapter seeks to demonstrate the integration of learning theories, online learning and its effects on student academic performance. In this chapter, researchers trace the trend of online learning in K-12 schools, discuss how instructional models are used to promote online learning in K-12 education, and provide discussion on the prospects and challenges facing online learning in the United States. Recommendation for future studies and conclusion are discussed.

INTRODUCTION

Online learning is a form of distance education in which all instruction and assessment are carried out using online, Internet-based delivery (Picciano & Seaman 2009; U. S. Department of Education, 2007). It includes teacher-led instruction and resources designed to instruct without the presence of a teacher in the classroom. Learning and teaching in an online environment are, in many ways, much like teaching and learning in any other formal educational context. Similarities include: learners' needs assessed; content is negotiated or prescribed; learning activities are orchestrated; and learning is assessed (Anderson, 2004). Institutions can use online learning to shape the 'space' and influence learner use.

According to Wicks (2010), about 1.5 million students enrolled in one or more online courses in the 2010 school year in the United States. It is estimated that about 37 percent of school districts in the United States have students tak-

DOI: 10.4018/978-1-4666-8246-7.ch010

ing technology-supported, distance education courses during school 2004/2005 (Zandberg & Lewis, 2008). It should be noted that as of 2012, Alabama, Florida, and Michigan offered full or part-time delivery options to students in grades K-12 (Watson et al., 2010). The National Center for Education Statistics (NCES, 2003) reports that about 62.6% of K-12 students between age groups 3-14, and 72.2% between age groups 15-19, and 59.6% between age group 20-24 have access to Internet.

Increased student population in K-12 schools has created financial constraints for most school districts to cater to the needs of all students; thus, these schools have to find alternative ways to reduce educational costs. This educational environment has increased the desire for online/virtual education for K-12 schools, helping to ease the financial burden as well as reduce problems related to growth in student enrollment (Watson, 2010). Online learning has become popular because of the following reasons: (a) increasing the availability of learning experiences for those who cannot or choose not to attend traditional schools; (b) assembling and disseminating instructional content more efficiently; and (c) increasing student-instructor ratios while achieving learning outcomes equal to those of traditional classroom instruction (Riel & Polin, 2004; Schwen & Hara, 2004). Proponents of online learning argue that it provides students individualized and differentiated instruction with immediate formative feedback about student's performance (Dennen, 2005). This chapter explains the integration of learning theories and online learning and its impact on student learning. In this study, researchers will trace the trend of online learning in K-12 schools, discuss how instructional models are used to promote online learning in K-12 education, and provide discussion on the prospects and challenges facing online learning in the United States. Recommendation for future studies and conclusion will be discussed.

Trends of Online K-12 Education in United States

According to Horn and Staker (2011), about 50 percent of all high school courses will be delivered in an online format by 2019. The International Association for K-12 Online Learning (2012) report estimates that about 275,000 students nationwide are enrolled in full-time, publicly funded virtual schools with a growth trend of enrollment of about 30 percent a year. As of 2012, 27 states have state virtual schools with 740,000 course enrollments in 2012-2013, and 30 states plus Washington DC have at least one full-time online school operating statewide in the 2013-2014 school year (iNACOL, 2013). According to the International Association for K-2 Online Learning (iNACOL), there were 310,000 students enrolled in online programs in the states that serve students from across districts in the 2012-13 school year, which is an increase of 13 percent from the previous year.

According to Keeping Pace (2012), currently 32 states and the District of Columbia offer virtual public schools with 40 percent more enrollments than in the previous year with most of the growth attributed to Florida and North Carolina, which have been aggressively pushing their programs. For example, Florida alone now records more than 220,000 enrollments in its virtual schools. Florida is one of only four states requiring students to take an online course in order to graduate, and allows students to go beyond their local areas and pick online courses from other districts across the state (iNACOL, 2012). According to Watson (2010), individual choice for online courses is likely to increase in the years ahead through ambitious state programs like the one established in Louisiana, as well as through the increasing array of options in existing state and district programs. For example, during the 2009-2010 school year, there were 1,816,400 enrollments in distance education. There are currently 27 state virtual schools, and fulltime online schools in 31 states and Washington, D.C.

With regard to the cost or tuition for enrolling in an online course, the procedures for funding are different in all 50 states. According to iNACOL (2012), many states fund online learning at 30-50% less than traditional education, creating inequity and lack of sufficient support for addressing student characteristics. Currently, the average expenditure for one student is about $6,400 for full online models. Blended learning averages $8,900. This number in comparison to traditional school models average expenditure per student of $11,282 makes online learning less expensive.

Online learning at the K-12 level is highly embraced because the rise of new educational technologies in the 21st century classroom has made the future of K-12 education dependent on online learning. Our classrooms and pedagogical approaches heavily depend on the use of web-based tools aim to promote efficient collaboration and interaction between teachers and students. Interest in online learning will continue to rise in the coming decades, because teachers and students in K-12 schools have access to "virtual spaces" where they collaborate through computers, laptops, mobile devices, and tablet computers. It is estimated that future classrooms will rely on educational technologies to help deliver instructional content, giving students and teachers access to educational materials as well as providing personalized feedback to students about their assessment (i.e., their academic performance).

The tables below depict the numbers of students enrolled in full online courses, state virtual schools, and the percent of students in online class by state. As indicated in Table 1, there are considerable increases in full online school enrollments at the K-12 level from 2008 to 2012 academic school years. For example, online school enrollments in Arizona State increased from 30,076 in 2008-2009 to 39,000 in 2011-2012 with a four percentage change of +30. In Florida there was an increase from 1,079 in 2008-2009 to 9,666; Ohio state online school enrollments grew from 27,037 in 2008-2009 to 35,322 in 2011-2012. In the state of Pennsylvania there was an increase of 22,205 in 2008-2009 to 32,322 in 2011-2012. However, the number of students in online schools in Kansas decreased from 3,100 in 2008-2009 to 2,952. Additionally, states such as New Hampshire, Louisiana, Tennessee, and in certain years for Washington, and Massachusetts did not provide data on online school in K-12 schools.

Table 2 shows state virtual schools and the number of course enrollments in the 2011 to 2012 academic year. As seen in Table 2, Florida had the most number of course enrollments at 303,329 in 2011-2012, followed by North Carolina (97,170); Alabama (4,332); Georgia (20,876); Michigan (19,822). States such as Colorado (1,564); Missouri (1,562); Iowa (1,431); and Vermont (769) had the least number of course enrollments.

Table 3 depicts a sampling of states with prominent virtual schools in the 2012 academic year. Florida virtual schools had the largest course enrollment of 303,329 with an annual growth of 17% followed by North Carolina at 97,170 with annual growth of 10%; Alabama ACCESS 44,332; Georgia virtual school 20,876; Michigan virtual school 19,822; Idaho digital learning 17,627; South Carolina 15,831; New Hampshire virtual learning academy 15,558; and Montana digital academy with the least growth of 6,797.

Table 4 reveals sample of state with state virtual schools that have remained small in 2012 school year. State virtual schools in Connecticut, Illinois, Texas, and Kentucky all had negative annual growth rates.

Table 5 shows states with multi-district, full online schools in 2012-2013. States such as Arizona, California, Ohio, Pennsylvania, Florida, Colorado, and Georgia had a significant number of course enrollments for the 2012-2013 academic year, while Virginia, New Hampshire, Massachusetts, Iowa, New Mexico, Alaska, and Arkansas received minimal course enrollments.

Table 6 shows state-supported, supplemental options for 2013 school year. States of Florida, North Carolina, Alabama, Michigan, and Idaho

Table 1. Multi-district fully online school enrollment 2008; 2009-2010; and 2011-12

State	2008-09	2009-10	2010-11	2011-12	Percent change 2010-11 and 2011-12	4-year % change 2008-09 to 2010-12	% of state students in FT online schools**
Arizona*	30,076	30,338	36,814	39,000	+6	+30	3,62%
Arkansas	500	500	500	500	0%	0%	0.10%
California*	10,502	15,000	19,000	23,228	+22%	+121%	0,37%
Colorado*	11,641	13,093	15,249	16,221	+6%	+39%	1.95%
Florida	1,079	2,392	4000	9,666	+142%	+796%	0.37%
Georgia	4,300	5,010	5,000	10,591	+112%	+146%	0.64%
Hawaii	500	500	1,500	1,500	0%	+200	0.83%
Idaho	3,611	4,709	4,728	5,200	+10%	+44%	1.88%
Indiana*	*no FT*	200	470	3,733	+694%	*n/a*	0.36%
Kansas*	3,100	2,300	2,800	2,952	+5%	-5%	0.62%
Louisiana	*no FT*	*no FT*	*no FT*	2,000	*n/a*	*n/a*	0.29%
Massachusetts	*no FT*	220	318	484	+52%	*n/a*	0.05%
Michigan	*no FT*	*no FT*	800	4,049	+406%	*n/a*	0.25%
Minnesota	5,042	8,248	9,559	8,146	-15%	+62%	0.97%
Nevada	4,603	6,256	7,122	8,735	+23%	+90%	2.04%
New Hampshire	*n/a*	*n/a*	*n/a*	103	*n/a*	*n/a*	.05%
Ohio	27,037	31,852	31,142	35,322	+14%	+31%	2.01%
Oklahoma*	1,100	2,500	4,456	4,810	+8%	+337%	0.73%
Oregon	*no FT*	3,861	4,798	5,577	+16%	*n/a*	0.96%
Pennsylvania	22,205	24,603	28,578	32,322	+13%	+46%	1.81%
South Carolina	1,981	5,781	7,690	7,985	+4%	+303%	1.10%
Tennessee	*no FT*	*no FT*	*no FT*	1,800	*n/a*	*n/a*	*n/a*
Texas	1,997	4,558	5,133	6,209	+21%	+211%	0.23%
Utah	500	1,475	1,572	3,075	+96%	515%	0.53%
Virginia	*no FT*	*no FT*	400	484	+21%	*n/a*	0.04%
Washington*	1,840	2,260	2,515	*n/a*	*n/a*	*n/a*	0.24%
Wisconsin	3,100	2,927	4,328	4,482	+4%	+45%	0.51%
Wyoming	100	807	964	1,138	+18%	+1,038%	1.29%

** Total student population 2009-10, National Center for Education Statistics, http://nces.ed.gov/programs/stateprofiles/ AZ, CO, and OK are unique student counts of both full- and part-time students. AZ 2011-12 enrollment data is an estimate. CA data source changed from 2011; 2010-11 data is an estimate. IN numbers include some blended schools run by national EMOs. KS and WA started separating FT enrollments in its most recent year's reporting; previous years are estimates of FT users based on the same percentage of the unique student count. WA 2011-12 enrollment data not yet available and MO was removed from FT table because the majority of full-time enrollments are private pay.

Table 2. State virtual schools and number of course enrollments in school year 2011-12

State	Number of Course Enrollments
Florida	303,329
North Carolina	97,170
Alabama	44,332
Georgia	20,876
Michigan	19,822
Idaho	17,627
South Carolina	15,831
New Hampshire	15,558
Texas	12,419
Utah	12,190
Louisiana	9,179
Montana	6,797
Virginia	6,460
Wisconsin	5,151
South Dakota	3,822
Mississippi	3,382
West Virginia	3,376
Arkansas	3,000
North Dakota	3,000
New Mexico	2,802
Illinois	2,795
Connecticut	2,049
Hawaii	1,844
Kentucky	1,700
Colorado	1,564
Missouri	1,562
Iowa	1,431
Vermont	769

Source for HS population: http://nces.ed.gov/programs/stateprofiles/

[1]The ND state ratio was calculated based on the number of in-state student course enrollments which was 1,200.

Table 3. A sampling of states with a prominent virtual school in 2012

State Virtual School	Course Enrollments	Annual Growth	Ratio to State Population
Florida Virtual School	303,329	+17%	38.7
New Hampshire Virtual Learning Academy	15,558	+35%	24.2
North Carolina Virtual Public School	97,170	+10%	22.6
Idaho Digital Learning	17,627	+22%	21.6
Alabama ACCESS	44,332	+31%	20.2
Montana Digital Academy	6,797	+49%	15.5
South Carolina Virtual School	15,831	+41%	7.5
Georgia Virtual School	20,876	+45%	4.4
Michigan Virtual School	19,822	+12%	3.7

Source: State high school population, http://nces.ed.gov/programs/statesprofile/

Table 4. Sample of states with state virtual schools that have remained or become small in 2012

State Virtual School	Course Enrollments	Annual Growth	Ratio to State Population
Connecticut Virtual Learning Center	2,049	-7%	1.2
Illinois Virtual School	2,795	-7%	.4
Texas Virtual School Network	12,419	-27%	.9
Kentucky Virtual Schools	1,700	-1%	.9

Source: State high school population, http://nces.ed.gov/programs/statesprofile/

had large numbers of state virtual school enrollments in K-12 schools, while Connecticut, Vermont, Colorado, and Iowa had fewer enrollments. However, Arizona and Minnesota provided no enrollment numbers for the 2013 academic school year.

Table 7 reveals the percentage of students enrolled in distance education courses (online learning) and the number of enrollments in 2002, 2003, 2004, 2005, and 2009-2010 school years. There was a steady progression of students enrolled in distance education from 2002-2003 (36%),

Table 5. States with multi-district fully online schools in 2012-13

	Enrollments 2012-13	Annual growth SY 2011-12 to SY 2012-13	5-Year Growth (2008-2013)	2013% of State K-12 Population
Alaska	166	+95%	-53%	0.14%
Arizona	42,000	+8%	+40%	4.28%
Arkansas	499	0%	0%	0.12%
California	40,891	+76%	+289%	0.71%
Colorado	17,289	+7%	+49%	2.31%
Florida	14,000	+45	+1,197	0.58%
Georgia	13,412	+27%	+212	0.89%
Idaho	5,213	0%	+44%	2.06%
Indiana	6,733	+80%	n/a	0.7%
Iowa	302	New in 12-13	n/a	0.07%
Kansas	4,689	+18%	+15%	1.1%
Louisiana	2,562	+28%	n/a	0.42%
Massachusetts	476	-2%	n/a	0.06%
Michigan	7,850	+94%	n/a	0.55%
Minnesota	9,196	+13%	+82%	1.21%
Nevada	10,414	+19%	+126%	2.61%
New Hampshire	125	+21%	n/a	0.07%
New Mexico	498	New in 12-13	n/a	0.16%
Ohio	38,519	+9%	+42%	2.42%
Oklahoma	6,298	+31%	473%	1.11%
Oregon	6,637	+19%	n/a	1.27%
Pennsylvania	34,694	+7%	+56%	2.11%
South Carolina	8,130	+2%	+310%	1.26%
Tennessee	1,679	-7%	n/a	0.19%
Texas	8,441	+36%	+323%	0.2%
Utah	3,336	+8%	+567%	0.63%
Virginia	447	+8%	n/a	0.04%
Washington	2,745	+9%	+49%	0.29%
Wisconsin	6,721	+50%	+117%	0.88%
Wyoming	1,377	+21%	+1,277%	1.7%

Source: http://nces.ed.gov/programs/stateprofiles/

to 2004-2005 (37%), to 2009-2010 (55%). The number of students in all instructional levels also increased from 317,070 in 2002-03 to 1,816,390 in 2009-10. As seen in Table 7, students at elementary schools in distance education/online learning increased from 2,780 to 78,040 (from 2002-03 to 2009-10); 6,390 to 154,970 in 2002-03 to 2009-10 for middle grades or junior high schools; 214,140 to 1,348,920 in 2002-03 to 2009-10 in high schools; and at combined or graded schools student population increased from 93,760 in 2002-03 to 234,460 in 2009-10. There was a significant increase in the number of student in poverty concentration taking online learning in 2009-10 academic year.

Table 6. State-supported supplemental options 2013

State	SVS Enrollments 2012-13	SVS Annual Change	State Supplemental Options Factor
Florida	410,962	+35%	54.6%
North Carolina	94,716	-3%	21.9%
Alabama	51,910	+17%	23.4%
Georgia	25,877	+24%	5.5%
Michigan	20,872	+5%	4.1%
Idaho	19,036	+8%	23.3%
New Hampshire	17,626	+13%	27.9%
South Carolina	16,818	+6%	8.0%
Virginia	13,026	+102%	3.4%
Utah	10,308	-15%	7.2%
Texas	11,312	+102%	0.8%
Minnesota	-	-	3.5%
Montana	7,993	+8%	18.5%
Louisiana	6,414	-30%	3.5%
West Virginia	6,039	+34%	7.4%
Wisconsin	5,036	-2%	1.8%
South Dakota	4,052	+6%	10.6%
North Dakota	3,200	+7%	10.6%
Mississippi	3,121	-8%	2.3%
Illinois	2,992	+7%	0.5%
New Mexico	2,697	-4%	2.7%
Arkansas	2,000	-33%	1.5%
Hawaii	1,834	-15	3.5%
Missouri	1,623	+4%	0.6%
Iowa	1,240	-13%	0.8%
Colorado	1,007	-36%	0.4%
Vermont	940	+22%	3.3%
Connecticut	135	-29%	0.1%
Arizona	-	DNA	DNA

Source for HS population: http://nces.ed.gov/programs/stateprofiles/. The state supplemental options factor calculates the number of course enrollments, divide by the state's high school student population, multiplied by 100. This allows for a quick comparison between states of different sizes.

GA, All courses Choice enrollments are through GAVS.

LA, Louisiana Virtual School evolved into the Course Choice programs; it no longer offers courses as of SY 2013-14.

AR, Arkansas Virtual High School relaunched as Virtual Arkansas.

AZ, Data not available.

Table 7. Percentage of public school districts with students enrolled in technology-based distance education courses and number of enrollments in such courses, by instructional level and district characteristics: 2002-03, 2004–05, and 2009-10

District Characteristic	Percent of Districts Enrolling Distance Education Students	All Instructional Levels	Elementary Schools	Middle or Junior High Schools	High Schools	Combined or Graded Schools\2\
2002-03 Total	36	317,070 (27,437)	2,780 ! (977)	6,390 (1,067)	214,140 (16,549)	93,760 (22,593)
2004-05 Total	37	506,950 (56,959)	12,540 ! (6,107)	15,150 (3,367)	309,630 (24,350)	169,630 ! (51,753)
2009-10 Total	55	1,816,390 (251,054)	78,040!(25,180)	154,970 (30,828)	1,348,920 (135,979)	234,460 !(164,589)
District Enrollment Size						
Less than 2,500	1	509,030 ! (167,570)	‡ (†)	‡ (†)	408,030 ! (123,883)	6,570 ! 2,753
2,500 to 9,999 ...	66	579,250 ! (185,243)	25,320 ! (12,669)	23,960 ! (9,196)	312,130 (50,963)	‡ (†)
10,000 or more	4	728,110 (27,105)	11,540 (1,862)	77,750 (4,730)	628,760 (23,545)	10,060 2,756
Metropolitan Status						
City	37	653,660 ! (201,665)	‡ (†)	40,400 ! (15,671)	405,740 (79,507)	‡ (†)
Suburban	47	527,250 (34,188)	527,250 (34,188)	62,210 (4,106)	434,260 (30,904)	7,880 2,347
Town	67	306,840 ! (145,000)	‡ (†)	‡ (†)	246,850 ! (107,079)	9,310 ! 3,908
Rural	59	328,640 (36,233)	‡ (†)	15,360 (2,420)	262,070 (27,077)	‡ (†)

continued on following page

As indicated earlier, most states have adapted online learning at the K-12 level as a measure to reduce the ratio of teacher-student and to promote collaboration and effective teaching of content of subject matter. Online learning serve as a way to reduce the cost of providing education to the increasing population of students in K-12 schools. Many school districts are struggling to fulfill the specific educational needs of students due to financial restrictions and other budgetary allocations. Data shows that online learning is growing in popularity, thus, providing an opportune time for teachers, educators, administrators, and policy makers to devise ways to train new and existing teachers on best practices and strategies for teaching online courses. Teachers must be trained on the effective use of learning management system and introduced to online teaching certification programs for pre-service teachers in colleges of education. Unfortunately, online teaching experience can feel like starting over for many teachers. Teachers must get formal structures as well as informal connections. Additionally, various school districts must equip and train administrators in order to understand online learning and blended instruction.

Table 7. Continued

District Characteristic	Percent of Districts Enrolling Distance Education Students	All Instructional Levels	Elementary Schools	Middle or Junior High Schools	High Schools	Combined or Graded Schools\2\
Region						
Northeast	39	77,670 (7,358)	‡ (†)	4,970 (989)	71,330 (6,651)	‡ (†)
Southeast	78	518,770 (63,187)	12,070 ! (4,154)	57,500 (9,828)	443,770 (50,079)	5,440 ! 1,678
Central	62	697,140 ! (235,103)	37,920 ! (18,915)	‡ (†)	416,550 (122,633)	‡ (†)
West	51	522,810 (42,673)	‡ (†)	41,620 (3,384)	417,270 (33,400)	36,510 ! 14,278
Poverty Concentration						
Less than 10 percent	54	287,.680 (34,577)	‡ (†)	12,620 (2,997)	231,890 (27,672)	‡ (†)
10 to 19 percent	56	1,009,290 (193,646)	23,540 ! (11,116)	97,220 (16,126)	682,380 (78,795)	‡ (†)
20 percent or more	56	519,420 (146,507)	‡ (†)	‡ (†)	434,640 (108,046)	5,750 ! 2,484

SOURCE: U.S. Department of Education, National Center for Education Statistics, Fast Response Survey System (FRSS), Technology-Based Distance Education Courses for Public Elementary and Secondary Schools: 2002–03 and 2004–05 and "Distance Education Courses for Public Elementary and Secondary School Students: 2009–10," FRSS 98. (This table was prepared November 2011).

†Not applicable.

#Rounds to zero.

!Interpret data with caution. The coefficient of variation (CV) for this estimate is 30 percent or greater.

‡Reporting standards not met. The coefficient of variation (CV) for this estimate is 50 percent or greater.

\1\Based on students regularly enrolled in the districts. Enrollments may include duplicated counts of students, since districts were instructed to count a student enrolled in multiple courses for each course in which he or she was enrolled.

\2\Combined or ungraded schools are those in which the grades offered in the school span both elementary and secondary grades or

NOTE: Percentages are based on unrounded numbers. For the 2002–03 FRSS study sample, there were 3 cases for which district enrollment size was missing and 112 cases for which poverty concentration was missing. For the 2004–05 FRSS study sample, there were 7 cases for which district enrollment size was missing and 103 cases for which poverty concentration was missing. Detail may not sum to totals because of rounding or missing data. Some data have been revised from previously published figures. Standard errors appear in parentheses.

BACKGROUND

Vygotsky, implied through his theory that "cognitive development and the ability to use thought to control our own actions requires first mastering cultural communication systems and then learning to use these systems to regulate our own thought process" (Cavanaugh et al., 2004, p. 7-8). Vygotsky contended that learning takes place for children when they are working within their zone of proximal development. Tasks within the zone of proximal development are ones that children cannot do alone and thus need or seek the guidance or assistance of their peers or adults (Cavanaugh et al., 2004).

Constructivism was further developed through the works of Bruner, Vygotsky and Papert (Neo, 2007). Vygotsky's fundamental contribution to constructivism was the formal introduction of a social aspect to learning. Constructivism, a learning theory that is widely used in distance learning, is founded on the premise that "by reflecting on our experiences and participating in social dialogical process we construct our understanding of the world we live in" (Cavanaugh et al., 2004, p. 8). According to Wang (2008), in an educational context, pedagogy often refers to the teaching strategies, techniques or approaches that teachers use to deliver instruction or facilitate learning (p. 412). Constructivism, stated simply, contemplates how the learner constructs knowledge in a meaningful way. According to Hoci-Bozic (2009), the educational system includes "elements of behaviorism, cognitivism, and constructivism"; however, "constructivism is the most widely accepted model of learning in education today" (p. 21). The constructivist school recognizes the learning as an active process of constructing meaning and where students construct own versions of the learning matter (Hoci-Bozic, 2009). Gulati (2008) contend that learning theories in online content are often termed as "socially constructivist experience" because students are actively communicating with one another through an online medium or as a result of blended online and traditional classes (p. 184). In social constructivism, "individuals make meaning in dialogues and activities about shared problems or tasks" (Helland, 2004, p. 619). It offers students the chance to dialogue with their peers. Cavanaugh (2009) states, "only students who were typically successful in online learning environments were those who had independent orientations towards learning" (p. 13). In addition, students were most successful when they had "strong time management, literacy, and technology skills" (Cavanaugh, 2009, p. 21). Web-based technology offers many opportunities to expand on students' conceptual and experiential backgrounds (Cavanaugh et al., 2004).

In 1957, Jean Piaget (1957) proposed cognitive constructivism as the process through which students learn by interacting with the environments in which they find themselves. He described cognitive processing of environmental interactions and the construction of mental structures to make meaning of what they learn. Jean Piaget called these mental structures schema that occurs through the processes of assimilation and accommodation. Assimilation is the process through which new knowledge is incorporated into existing schemas. In accommodation, new knowledge conflicts with existing schemas that eventually must be altered to incorporate it. For example, Piaget stated that:

Fifty years of experience have taught us that knowledge does not result from a mere recording of observations without a structuring activity on the part of the subject. Nor do any a priori or innate cognitive structures exist in man; the functioning of intelligence alone is hereditary and creates structures only through an organization of successive actions performed on objects. Consequently, an epistemology conforming to the data of psychogenesis could be neither empiricist nor preformationist, but could consist only of a constructivism. (Piaget, 1980, p. 23)

Based on the above theory, social constructivism reminds us that learning occurs through social activity, that is, student knowledge is constructed through communication, collaborative activity, and interactions with others that occur whenever students enroll in an online class. One of the major tenets of constructivism theory is the social aspect of learning. Online learning for K-12 students provides opportunity for students to construct knowledge through discussion forums, interacting with teachers, and peers, using learning management systems and others. Instructional models allow students in online classes to engage learning as an active process through which students construct their own versions of the subject matter or content by using online discussions or working in groups as stated by Hoci-Bozic (2009). Cognitive constructivism locates learning in the mind of the individual as well as promotes learning as an active process of mental construction that is linked to interactions with the environment. Thus, student interaction in an online class helps trigger construction of knowledge through interrelated process of assimilation and accommodation. It also helps students in an online class to naturally organize and construct knowledge. The inclusion of constructivism in online learning models facilities communication by allowing students to present their beliefs and products to broader audiences. Constructivism in online learning exposes students to diverse opinions of people in the real world beyond the classroom, school, and the local community.

Online Learning in K-12 Environment

According to O'Dwyer, Carey and Kleiman (2007), K-12 students in online instruction outperformed their counterparts in the traditional face-to-face instruction. The study used quasi-experimental design to compare the learning of students participating in Louisiana Algebra 1 Online initiative with the learning of students in comparison classrooms with similar mathematics ability, environment, and size. In a quasi-experimental study conducted by Rockman et al. (2007) to evaluate the effectiveness of Spanish courses offered to 463 middle school students (seventh and eighth graders) in the West Virginia Virtual School System, researchers employed a blended model of instruction that combined face-to-face and virtual instruction with Web-based activities. A three-member teacher team consisting of a certified Spanish lead teacher designed and delivered lesson plans as well as conducted weekly conversations with students. Another certified Spanish teacher, an adjunct, provided content-related feedback through e-mail and voice-mail, and graded students tests and quizzes. The third teacher, a non-Spanish certified classroom facilitator, guided students both online and offline to complete assignments and projects on time. In this study, the blended learning component was offered in 21 schools with inadequate resources to provide face-to-face Spanish classes for students. Face-to-face group instruction included seven schools with adequate resources for virtual schools, specifically in regards to language arts achievement and school size. The results indicated that students in the face-to-face instruction performed significantly higher than those receiving instruction in the online blended section of the course.

In contrast, a study conducted by O'Dwyer, Carey and Kleiman (2007) using quasi-experimental design methods to compare students' mathematics ability in a fully online Algebra class (seventh and eighth grades) with students in a traditional face-to-face instruction yielded different results. The findings from a comparison of 463 students (231 seventh and eighth graders from the treatment group, 232 seventh and eighth graders from the comparison group) indicated that students in the online program performed better than those in the traditional face-to-face classrooms.

Similar findings were observed in a study designed to examine the effectiveness of virtual Web-based learning as compared to traditional face-to-face instruction in a science laboratory class with 113 fifth-grade students in Taiwan (Sun, Lin, & Yu, 2008). The study utilized a quasi-experimental method that included a treatment (56 students) and a controlled group (57 students) in four classrooms from two randomly sampled schools. Students in the treatment group used the virtual Web-based science lab time and conducted virtual experiments and projects with teacher supervision, while students in the control group performed similar science experiments using traditional face-to-face lab equipment. Results from the study reflected a higher performance for students engaged with the virtual Web-based lab as opposed to those in the control whose experiments involved traditional lab equipment.

INSTRUCTIONAL MODELS (THEORY) AND ONLINE LEARNING IN K-12 EDUCATION

In the 21st century, teachers are expected to be creative and innovative in order to deliver instruction to meet the needs of students. One of the instructional approaches that can be use is the inclusion of technology in their lessons. Instructional models serve as guidelines or strategies that teachers can use as their instructional approaches. The time has come for teachers to use instructional models in online learning in K-12 schools. Instructional models in online learning serve as a principal guide for teachers in the development or re-design of courses for K-12 learning environments.

According to Patrick (2011), the New Models Using Online and Blended Learning TPAC framework developed by (iNACOL) is one of the instructional models that can be used in K-12 school settings. With this model, the student is at the center with support from each of the elements. Technology represented as (T) in the model forms an important core element in the model; the "P" represents people, new pedagogical models, and professional development to transform the old traditional system into an engaging student-centered models.

The "A" represent assessment and "C" embraces online content or course information. Overall, the new models using blended and online learning TPAC framework operates as (a) Technology platforms – this consists of enterprise architecture which involves the design of courses, learning management system comprising of the virtual learning environment, teacher to student interaction online, technicalities or technical know how of broadband Internet infrastructure, and instructional models as related to standards-based and competency-based approaches to student learning and performance; (b) People/Pedagogy – this part of the model encompasses the need for teachers to acquire new skills to be able to teach online, the need for administrators to understand and use new skills to manage online programs, the ability to response to intervention models (RTI) through online or blended learning, and the idea of personalizing instruction that allows students to learn at their own pace; (c) Assessment –this include online/adaptive assessment tools to be used to assess students as well as performance-based principles; and (d) Online Content – this consists of online courses, dual enrollment, credit recovery, and common core curriculum for students in K-12 schools.

The TPAC framework comes with design principles of new learning models based on a 2013 iNACOL survey on online and blended learning in K-12 education. The design principles of the new models are categorized into personalized, student-centered, opportunities for inclusion, high performance, technology-enhanced, sustainable at scale, innovative educator roles, and demonstrating competency.

The personalized section in the model comprised ten essential components of personalization as: (1) student agency (student has voice and choice on level of standards/lesson and some control over how they learn); (2) differentiated instruction; (3) immediate instructional interventions and supports for each student is on-demand, when needed; (4) flexible pacing; (5) individual student profiles (personalized learning plan); (6) deeper learning and problem solving to develop meaning; (7) frequent feedback from instructors and peers; (8) standards-based, world-class knowledge and skills; (9) anywhere, anytime learning can occur; and (10) performance-based assessments, such as project-based learning and portfolios of student work.

The student-centered section includes: (a) learning environments that respond to each student's needs and interests, making use of new tools for doing; (b) embracing the adolescent's experience and learning theory as the starting point of education; (c) harnessing the full range of learning experiences at all times of the day, week, and year; (c) expanding and reshaping the role of the educator; and (d) determining progression based upon mastery.

In addition, the opportunities for inclusion section consists of the ability of teachers to: (a) meet the individual learning needs of each student, including students with disabilities; (b) engage in equally or more rigorous learning opportunities for students; (c) provide multiple methods of instruction (context, content, and instructional methodology) to ensure that students from different cultures and life experiences have the opportunity to succeed; and (d) ensure digital content is designed using the principles of Universal Design for Learning (UDL) so that the content is accessible to all students.

Higher performance comprises the following: (a) use competency-based models to ensure student mastery; (b) utilize data to drive instruction through the analysis of frequent and varying forms of assessment; (c) apply valid and reliable assessments in ways that are meaningful to students; and (d) assess students on their performance in multiple ways and multiple times to ensure they have reached proficiency (i.e., the implementation of adaptive assessments, formative assessments, imbedded assessments, performance-based assessments and summative assessments).

Technology provides opportunities for students to collaborate with teachers and peers, unlimited by proximity. Students engage with digital content, which can occur anytime, anyplace, and have multiple pathways that are competency-based and not tied to a fixed school calendar. In addition, technology integrates student information and learning management systems designed around competency-based approaches, providing data to support students, teachers, and schools for improving performance.

Sustainable at Scale includes (a) approaches to add productivity and value to ensure cost-effectiveness. (It is important to monitor the relationship between results and services and spending in order to be effective); (b) integration of blended and online learning into essential K-12 education funding process; (c) allowance of funding to follow students down to the course level; (d) performance-based funding that may tie (at least part of) K-12 funding to student growth, rather than "seat time"; (e) use of public and private partnerships to achieve efficiencies and avoid "re-inventing the wheel"; and (f) new learning models that are sustainable on recurring public revenue after four years of launching and implementation.

The innovative educator roles section of the model presents the following elements: (a) teachers "[coordinating] student learning" through the expanded use of technology-based tools and content, as well as the effective use of outside experts, out-of-school and/or community resources; (b) environments providing flexibility to mix schedules of online and physical instruction and with a highly flexible schedule, instruction and learning; (c) structures (e.g., online tutoring, home mentors, and technical support services) supporting 24/7 in addition to teacher support; (d) revised human resources policies including a team approach to educating students, shifting educator roles, with reconsidered expectations for teaching staff to have greater expertise in instruction and assessment, and greater flexibility in hiring; and (e) adequate support for educators including integrated student information and learning management systems, coaching in instruction and assessment, and opportunities for educators to build a common understanding of proficiency.

The last part of the new model is demonstrating competency, which includes: (a) academic and efficacy standards; (b) structured learning objectives so that they are explicit and measurable; (c) alignment with standards benchmarked for college readiness and success after high school, such as Common Core State Standards, college entrance requirements, or globally-benchmarked standards; (d) outcomes Include Understanding and Application of Knowledge, Skills, and Dispositions Through Demonstration of Deeper Learning and Evidence Toward College and Career-Ready, World-Class Standards; and (e) rigorous, developmentally appropriate content based on the science of learning (Sturgis, Rath, Weisstein, & Patrick, 2010).

Instructional models could be adapted to part of the K-12 online learning curriculum as it provides for students the ability to construct knowledge at their own pace. The instructional models allow teachers to design a variety of methods to support the learning needs of students such as English language learners, students with disabilities, and gifted students. As stated in the literature above, online learning in K-12 education allows students to progress at different paces. The use of instructional models in K-12 online education allow teachers to design courses that make room for students to personalize their learning with specific individual student's interests and provide opportunity for teachers and students to maximize time. For example, teachers could design online learning models to transfer activities such as test preparation and class activities teacher-based to independent online learning activities.

Based on the above models, it is important for teachers and administrators as well as other leadership in K-12 education to prepare and develop instructional approaches in online learning. In the context of online instruction, teachers could design instructional process to involve students in the learning process and assess their progress to meet instructional objectives as stated in the literature about cognitive and social constructivism. Teachers using online instructional model must be aware that knowledge is not constructed in isolation; rather, students must be given the opportunity to interact with their peers for knowledge to be constructed. Teachers should lead students towards construction of new knowledge in order to increase students desire to learn on their own.

PROSPECTS

As indicated above, online learning has come to stay in K-12 schools. In the 21st century we cannot deny the existence and use of online/virtual learning in K-12 schools. For example, as a result of the growing trend of online course enrollments and active participation of teachers and administrators in K-12 schools, online education in K-12 schools is increasing across statewide with most states implementing online teaching certification for teachers. Online education has proven to be viable to both teachers and students as it is a viable way to enhance the curriculum by providing live events such as online homework help as well as the convenience it creates for both teachers and students.

Online education provides opportunity for students to engage in learning and meaningful dialogue among students. For example, students can use communication tools such as IM or e-mail through a chat room to work together to complete class project assignment. A constructivist approach to online course design has distinct advantages over other types of approaches, but it is important to focus on the approach when designing online content. One of the strengths of online learning is that it allows diverse learners to communicate without necessarily being in the same building or even the same country. A teacher that can establish and manage this type of learning environment can see the benefits for students as they interact with their peers in constructing knowledge. Students are able to interact and experience a variety of media from online resources and computer simulations. These resources, coupled with the interaction of the other students, leads students through the course as their new knowledge is infused with prior knowledge. Through online discussion and interactions, students can construct meaning with others in the course. Thus, such environments enable students who are mostly quiet in class to be active participants in online discussion forum, especially English language learners and students with certain form of disability.

Online learning has the potential to help students in rural schools by broadening the educational courses available to them through online classes. Students can communicate with experts in the field. Online collaboration also enables underrepresented population to contribute in equal proportion with their peers (Anderson & Lin, 2009).

Online education creates the opportunity for some school districts that are facing financial or budgetary allocation problems to have access to open education resources that enable teachers and students to access and use textbooks and other educational resources online. This helps school districts, facing financial problems, save money. Online classes offer a more flexible and personalized form of education, allowing students to progress at their own pace and on their own time. For example, it provides an extensive course structure and quality far beyond what many school districts can provide for students. It also creates flexibility in course scheduling for students by extending learning via digital world, which is available in 24 hours a day, seven days of the week. Online learning offers K-12 students feedback and communication about their performance. Communication tools such as discussion boards and chat rooms in online learning can be effective in inter-team collaboration as well as in teacher-student communication. The use of online assessment at the K-12 level allows efficient data collection about individual and group performance that would be difficult to collect in the traditional classroom. For instance, online quizzes and tests give students and teachers instant feedback about their scores. Teachers do not have to go through the long process of calculating grades or quizzes.

Online learning has the potential to help students in rural K-12 schools where funding may limit students' access to varied courses. Online education and resources provide opportunity for students who live in rural areas, allowing them to receive the same educational resources as students in urban areas. Online learning provides students learning resources that they can use for homework and other individual class projects. Furthermore, the rising costs of books and cash-strapped budgets in K-12 schools have made most school district in the country rethink the use of online textbooks, thus leading to the rise of open educational resources (OER). The OER creates a smooth and efficient pathway in delivering engaging and up-to-date content to students. This method has proven to be cost effective as compared to paper-based textbooks for students and teacher.

CHALLENGES

Online education in K-12 schools has contributed immensely to the teaching and learning process by providing many students access to a high school education and diploma. It promotes student-centered learning, provides access to dual credit and advanced placement courses for college credit, and offers K-12 students the opportunity to engage in technology as part of their learning. However, it comes with some challenging experiences for students, teachers, administrators, and policymakers in the school system. For example, Payne (2008) states, "the danger that student-to-student interaction will be stifled or overwhelmed by instructor/facilitator postings is real" (p. 158). Instructor needs to find a balance between being available for communication and answering questions, but also be aware of how much they are contributing or leading the discussion. Students should build their own knowledge by using class resources more than relying wholly on the instructor.

Developing such programs often proves difficult as online communities of students and teachers try to take root in school systems that have long operated brick-and-mortar schools at local taxpayer expense and with local school board control. According to Watson (2010), funding of online learning for students at the K-12 level in several states is a major issue. Watson (2010) further explains that it is due to the fact that online schools sometimes draw students across district lines, and funding often follows the student. Thus, students leave "home" school district for the online school, resulting in a drop in funding for that school district.

More so, online courses can pose challenges for students with learning or physical disabilities. It may be difficult for some students with learning or physical disabilities to access Internet use independently without any help from teachers or parents. It is evident that certain students with learning or physical disabilities may not be able use technology and communication tools involved in blended and online learning at the K-12 level (e.g., online discussions, blogging, chats, and simply the use of emails or telephone). Lack of qualified instructional technology staff is a major challenge to managing successful blended learning program. A typical example is that of shortage or lack of IT staff in states like Louisiana, Georgia, and Florida (Project Tomorrow, 2010). Few instructional staff members are offered trainings on technology or how to teach online. Further, in 2010 only 12% of new teachers reported receiving college or university training on online education (Dawley, Rice, & Hinck, 2010).

Additionally, the rising growth in online education has outpaced education policy in several states (Watson, 2010). For example, in many states such as Florida, Alabama, Georgia, Ohio, and California online programs are guided and overseen by rules and regulations created for traditional schools. According to Watson (2010), in 2001 the National Association of State Boards of Education stated, "In the absence of firm policy guidance, the nation is rushing pell-mell toward an ad hoc system of education that exacerbates existing disparities and cannot assure a high standard of education across new models of instruction" (p.12). Finally, even advocates of online education say that online learning is not for everyone. It requires a certain degree of self-motivation, and the active participation of a parent or some other adult to help with classwork and ensure that a student is on track. Despite the rapid growth during the past decade, only a small fraction of students in the country take even one class online. In fact, observers do not expect digital classrooms to replace the neighborhood school anytime soon.

RECOMMENDATION FOR FUTURE STUDIES

A forecast growth of online learning in K-12 schools continues to increase across states in the present realm of technology. It is estimated that there are 1,816,400 enrollments in distance-education courses in K-12 school districts in 2009-2010 with a high percentage being online courses. In 2013, it was estimated that approximately more than two million, K-12 students took an online learning course (iNACOL, 2013). Thus, a critical look at the trend of online learning will concluded that it has transform America's education system as a means to provide additional support and means of personalized learning approaches for all students (Watson, 2010).

Due to this evidence, the author proposes an investigation using quantitative research methods to test the various learning theories at all instructional levels, determining which one will best suit students in K-12 schools. Another investigation could be conducted via participatory action research to determine the effectiveness of a particular learning theory on student learning and also to determine which aspect of the instructional model discussed above could be adopted without any challenges in the classroom setting. Furthermore, there could be a qualitative study interviewing K-12 school students, teachers, and administrators about the benefits and challenges of using a particular learning theory in an online learning paradigm. This could help to assess the effectiveness and use of an instructional model and its implications on students in online learning.

A longitudinal study could also investigate the trend of learning theories in online learning environments at K-12 level on students and teachers.

CONCLUSION

Online learning has come to revolutionize instructional delivery to K-12 school students. As indicated above, online learning takes place in different dimensions to augment effective teaching and learning process. Several instructional or teaching models have been combined to implement successful online environments for K-12 students. The most commonly used is constructivism in which students get the opportunity to construct knowledge via social interaction online with their peers. Online learning can benefit K-12 students by providing a wider range of courses that many traditional schools cannot offer students. This can allow the opportunity for some students to graduate early or recover credits from classes they have failed or need to take; the ability to extend learning in a digital format to help students learn, and the availability of coursework 24 hours a day, seven days a week. It is therefore imperative on the part of teachers, students, and administrators at the K-12 school system to embrace the use of online learning and promote its effective implementation, because of its increased use across all levels of education in the United States.

REFERENCES

Anderson, N., & Lin, C. (2009). Exploring technologies for building collaborative learning communities among diverse student populations. In *Proceedings of the 14th annual ACM SIGCSE conference on Innovation and technology in computer science education* (p. 243). Paris, France: ACM. doi:10.1145/1562877.1562953

Anderson, T. (2004). *Teaching in an Online Learning Context*. Retrieved August 5, 2013, from http://epe.lacbac.gc.ca/100/200/300/athabasca_univ/theory_and_practice/ch11.html

Cavanaugh, C., Gillian, K. J., Kromrey, J., Hess, M., & Blomeyer, R. (2004). *The effects of distance education on K-12 student outcomes: A meta-analysis*. Naperville, IL: Learning Point Associates.

Christensen, C., & Horn, M. (2008). How do we transform our schools? *Education Next*, *8*(3), 13–19.

Dawley, L., Rice, K., & Hinck, G. (2010). *Going virtual 2010: The status of professional development and unique needs of K-12 online teachers.* White paper prepared for the North American Council for Online Learning. Retrieved December 26, 2013, from http://edtech.boisestate.edu/goingvirtual/goingvirtual3.pdf

Gulati, S. (2008). Compulsory participation in online discussions: is this constructivism or normalisation of learning?. *Innovations in Education and Teaching International*, *45*(2), 183-192.

Helland, B. (2004, March 1). *The constructivist learning environment scorecard: A tool to characterize online learning*. (ERIC Document Reproduction Service No. ED492301) Retrieved March 30, 2013, from ERIC database.

Hoic-Bozic, N. (2009). A blended learning approach to course design and implementation. *IEEE Transactions on Education*, *52* (1), 19-30.

International Association for K-12 Online Learning (iNACOL). (2010). *National standards for quality online teaching*. Vienna, VA: iNACOL. Retrieved January 12, 2013, from www.Inacol.org/research/nationalstandards/NACOL%20Standards%20Quality%20OnlineTeaching.pdf

International Association for K-12 Online Learning (iNACOL). (2011). *Annual report on K-12 online education.* Retrieved January 30, 2013, from www.inaco.org

International Association for K-12 Online Learning (iNACOL). (2012). *Annual report on K-12 online education.* Retrieved December 30, 2012, from www.inaco.org

International Association for K-12 Online Learning (iNACOL). (2013). *Annual report on K-12 online education.* Retrieved December 30, 2012, from www.inaco.org

Jonassen, D. H. (2008). *Meaningful learning with technology*. Pearson/Merrill Prentice Hall.

Neo, M. (2007). Learning with multimedia: Engaging students in constructivist learning. *International Journal of Instructional Media*, *34*(2), 149–158.

North Central Regional Educational Laboratory. (2002). *NCREL Online Learning for k- 12 Students: What Do We Know Now?* Retrieved June 5, 2013 from http://www.ncrel.org/tech/elearn/synthesis.pdf

O'Dwyer, L., Carey, R., & Kleiman, G. (2007). A study of the effectiveness of the Louisiana Algebra I online course. *Journal of Research on Technology in Education*, *39*(3), 289–306. doi:10.1080/15391523.2007.10782484

Patrick, S. (2011). *New Models Using Online and Blended Learning*. Academic Press.

Payne, C. (2008). What do they learn? In *Online and distance learning: Concepts, methodologies, tools and applications,* (pp. 153-161). Academic Press.

Piaget, J. (1980). The psychogenesis of knowledge and its epistemological significance. In M. Piattelli-Palmarini (Ed.), *Language and Learning*. Cambridge, MA: Harvard University Press.

Picciano, A., & Seaman, J. (2007). *K-12 online learning: A survey of U.S. school district administrators*. Retrieved from Sloan Consortium website: http://sloanconsortium.org

Project Tomorrow. (2010). *Learning in the 21st century: 2010 trends update.* Washington, DC: Blackboard K-12/Irvine, Calif: Project Tomorrow. Retrieved December 10, 2013, from www.blackboard.com/CMSPages/GetFile.aspx?guid=8106

Riel, M., & Polin, L. (2004). Online communities: Common ground and critical differences in designing technical environments. In S. A. Barab, R. Kling, & J. H. Gray (Eds.), *Designing for virtual communities in the service of learning* (pp. 16–50). Cambridge, MA: Cambridge University Press. doi:10.1017/CBO9780511805080.006

Rockman., et al. (2007). *ED PACE final report. Submitted to the West Virginia Department of Education.* Retrieved October 30, 2013 from http://www.rockman.com/projects/146.ies.edpace/finalreport

Schwen, T. M., & Hara, N. (2004). Community of practice: A metaphor for online design. In S. A. Barab, R. Kling, & J. H. Gray (Eds.), *Designing for virtual communities in the service of learning*. doi:10.1017/CBO9780511805080.010

Staker, H. (2011). *The rise of K-12 blended learning: Profiles of emerging models*. Mountain View, CA: Innosight Institute. Retrieved December 18, 2013, from www.innosightinstitute.org/blended_learning_models/

Sturgis, C., Rath, B., Weisstein, E., & Patrick, S. (2010, December). *Clearing the path: Creating innovation space for serving over-age, under-credited students in competency-based pathways*. Retrieved December 24, 2013 from http://www.inacol.org/cms/wp-content/uploads/2012/09/ClearingthePathReportJan2011.pdf

Sun, K., Lin, Y., & Yu, C. (2008). A study on learning effect among different learning styles in a Web-based lab of science for elementary school students. *Computers & Education*, *50*(4), 1411–1422. doi:10.1016/j.compedu.2007.01.003

U.S. Department of Education, National Center for Education Statistics. (2010). *Teachers' Use of Educational Technology in U.S. Public Schools: 2009.* Retrieved October 29, 2013, from http://nces.ed.gov/pubsearch/pubsinfo.asp?pubid=2010040

Wang, K. H., Wang, T. H., Wang, W. L., & Huang, S. C. (2006). Learning styles and formative assessment strategy: Enhancing student achievement in Web-based learning. *Journal of Computer Assisted Learning*, *22*(3), 207–217. doi:10.1111/j.1365-2729.2006.00166.x

Watson, J. (2012). *Keeping pace with K-12 online and blended learning: An annual review of policy and practice*. Evergreen Education Group. Retrieved March, 2014 from www.kpk12.com/wpcontent/uploads/KeepingPaceK12_2013.pdf

Watson, J., et al. (2010). *Keeping pace with K-12 online learning*. Boulder, CO: Evergreen Education Group. Retrieved November 30, 2013 from www.kpk12.com/wpcontent/uploads/Keeping-PaceK12_2010.pdf

Watson, J., Murin, A., Vashaw, L., Gemin, B., & Rapp, C. (2010). *Keeping pace with K-12 online learning: An annual review of policy and practice*. Retrieved December 29, 2013 from http://kpk12.com/

Zandberg, I., & Lewis, L. (2008). *Technology-based distance education courses for public elementary and secondary school students: 2002-03 and 2004-05. (NCES 2008-08)*. Washington, DC: National Center for Education Statistics, Institute of Education Sciences, U.S. Department of Education.

ADDITIONAL READING

Alvarez, S. (2005). Blended learning solutions. In B. Hoffman (Ed.), *Encyclopedia of Educational Technology.* Retrieved December 24, 2012, from http://coe.sdsu.edu/eet/articles/blendedlearning/start.htm

Archambault, L., Diamond, D., Coffey, M., Foures-Aalbu, D., Richardson, J., Zygouris-Coe, V., et al. (2010). Research Committee issues brief: An exploration of at-risk learners and online education. Vienna, VA: International Association for K–12 Online Learning (iNACOL).

Ash, K. (2010). E-learning update: Middlebury language courses. *Education Week Digital Education*. Retrieved November 20, 2012, from http://blogs.edweek.org/edweek/DigitalEducation/2012/11/elearning_update_middlebury_la.html

Belanger, Y. (2005). *Laptop computers in the K-12 classroom.* Retrieved from November 4, 2013, from http://www.ericdigests.org/2001-1/laptop.html

Black, E. W., Ferdig, R. E., & DiPietro, M. (2008). An overview of evaluative instrumentation for virtual high schools. *American Journal of Distance Education*, *22*(1), 24–45. doi:10.1080/08923640701713422

Bosseler, A., & Massaro, D. W. (2003). Development and evaluation of a computer- animated tutor for vocabulary and language learning in children with autism. *Journal of Autism and Developmental Disorders*, *33*(6), 653–672. doi:10.1023/B:JADD.0000006002.82367.4f PMID:14714934

Bremer, C. (1998). *Design of a group oriented, virtual learning environment*. Retrieved October 18, 2013, from http://www.bremer.cx/paper1

Bull, G., & Kajder, S. (2003). Scaffolding for struggling students: Reading and writing with logs. *Learning and Leading with Technology*, *31*(2), 32–34.

Dede, C. (2009, May 01). Comments on Greenhow, Robelia, and Hughes: Technologies That Facilitate Generating Knowledge and Possibly Wisdom. *Educational Researcher*, *38*(4), 260–263. doi:10.3102/0013189X09336672

Dillion, E., & Tucker, W. (2011). *Lessons for online learning. Education Sector*. Retrieved December 14, 2013, from www.educationsector.org/print/publications/lessons-online-learning

Englert, C. S., Zhao, Y., Dunsmore, K., Collings, N. Y., & Wolbers, K. (2007). Scaffolding the writing of students with disabilities through procedural facilitation: Using an Internet-based technology to improve performance. *Learning Disability Quarterly*, *30*(1), 9–34. doi:10.2307/30035513

Flavin, S. (2001). *E-learning advantages in a tough economy*. Retrieved June 8, 2013, from http://www.babsoninsight.com/contentmgr/showdetails.php/id/217

New Jersey Institute of Technology. (2005). *Hybrid learning*. Retrieved May 23, 2013, from http://media.njit.edu/hybrid/

Oakes, K., & Casewit, C. (2003). *E-learning: The answer is blended learning, Now what was the question again.* Retrieved May 2, 2013, from http://www.astd.org/astd/Publications/TD_Magazine/2003_pdf/76031017.htm

Osguthorpe, R. T., & Graham, C. R. (2003). Blended learning environments: Definitions and directions. *The Quarterly Review of Distance Education*, *4*(3), 227–234. Retrieved March 16, 2013

Patrick, S., & Powell, A. (2009). *A summary of research on the effectiveness of K-12 online learning*. Vienna, VA: International Association for K-12 online learning. Retrieved June 18, 2013, from www.inacol.org/research/docs/NACOL_ResearchEffectiveness-1r.pdf

Rice, K. L. (2006). A comprehensive look at distance education in the K–12 context. *Journal of Research on Technology in Education*, *38*(4), 425–448. doi:10.1080/15391523.2006.10782468

Roblyer, M., & Davis, L. (2008). Predicting success for virtual school students: Putting research-based models into practice. *Online Journal of Distance Learning Administration, 11*(4). Retrieved May 20, 2013, from http://www.westga.edu/~distance/ojdla/winter114/roblyer114.html

Setzer, J. C., & Lewis, L. (2005). *Distance education courses for public elementary and secondary school students: 2002–2003*. Washington, DC: U.S. Department of Education, National Center for Education Statistics.

Stahl, G. (2006). Supporting group cognition in an online math community: A cognitive tool for small-group referencing in text chat. *Journal of Educational Computing Research*, *35*(2), 103–122. doi:10.2190/Q435-7611-2561-720P

Stockley, D. (2005). *Blended learning or training-definition and explanation*. Retrieved June 12, 2013 from http://derekstockley.com.au/blended-learning.html

Swan, K. (2002). Building learning communities in online courses: The importance of interaction. *Education Communication and Information*, *2*(1), 23–49. doi:10.1080/1463631022000005016

Twigg, C. A. (2003). *Improving learning and reducing costs: Lessons learned from round I of the PEW grant program in course redesign*. Troy, NY: Centre for Academic Transformation, Rensselaer Polytechnic Institute.

U.S. Department of Education, Office of Planning, Evaluation and Policy Development. (2010). *Evaluation of evidence-based practices in online learning: A meta-analysis and review of online learning studies.* Washington, DC: U.S. Department of Education. Retrieved May 28, 2013, from www.ed.gov/rschstat/eval/tech/evidence-based-practices/finalreport.pdf

Voos, R. (2003, February). Blended learning—what it is and where might it take us? *Sloan-C View, 2*(1). Retrieved May 14, 2013 from http://aln.org/publications/view/v2n1/blended1.htm

KEY TERMS AND DEFINITIONS

Blended Learning: A form of distance learning that combines different forms of instructional technology (e.g., videotape, CD-ROM, Web-based learning, e-mail, telephone, & chats, blogging) with traditional face-to-face instructor-led instruction depending on availability, access, and resources in the context of location, time and space.

Constructivism: Constructivist learning is based on students' active participation in problem-solving and critical thinking regarding a learning activity which they find relevant and engaging. They are "constructing" their own knowledge by testing ideas and approaches based on their prior knowledge and experience, applying these to a new situation, and integrating the new knowledge gained with pre-existing intellectual constructs.

Face-to-Face Instruction: Is a form of instruction that requires teachers and students to single location (classroom) with a fixed amount of time for interaction between instructor and students at a specified time in a particular place and time (classroom).

Instructional Models: Are guidelines or sets of strategies on which the approaches to teaching by teachers are based. They are based on learning theories. Learning theories describe the ways that theorists believe people learn new ideas and concepts.

Instructional Technology: Instructional technology consists of the design, development, utilization, management, and delivery of instruction either through media, electronic, print and other technology (computers, audiovisuals and equipment) as well as the evaluation of instruction for learners.

Learning Theory: Learning theory is a model of psychology that explains human responses through the concept of learning. Learning theory includes behaviorism, cognitive theory, cognitive-behavioral theory and constructivism.

Online Learning: Is a type of learning where access to learning experiences occurs through the use of technology. Online learning can be "Fully or Wholly" online or can be described as learning in reference to technology medium or context with which it is used.

This work was previously published in Exploring the Effectiveness of Online Education in K-12 Environments edited by Tina L. Heafner, Richard Hartshorne, and Teresa Petty, pages 126-146, copyright year 2015 by Information Science Reference (an imprint of IGI Global).

Chapter 11
Factors Shaping Academics' Use of Technology in Teaching: A Proposed Model

Geraldine Torrisi-Steele
Griffith University, Australia

ABSTRACT

Whilst academics have generally adopted the use of new technologies in their teaching, literature indicates that only a minority is exploiting technology to provide pedagogically rich learning experiences. This is a significant issue for universities, many of which are making considerable strategic investment into technology-infused teaching, as one way of responding to the pressures of globalization and meeting the needs technology-savvy student cohorts. Providing appropriate support to assist academics to implement effective, technology-infused teaching strategies is thus critical. It is argued that development of appropriate academic support should be informed by an understanding of why academics use technology as they do in their teaching. Towards this end, a model of factors influencing how academics use technology in their teaching is proposed in the chapter. The model arises from a synthesis of relevant literature and the identification of pertinent conceptual frameworks.

INTRODUCTION

New and emerging technologies have rapidly become a major feature of higher education teaching contexts. However, although institutions are making considerable investment to promote and support the use of technology in teaching, literature indicates that effective technology infused teaching practices are being adopted only by a minority of academics (Graham & Robison, 2007). Hence, a major challenge for higher education is supporting university teaching staff so that, post-adoption of technology, their use of technology will extend beyond purposes of efficiency and access, to the provision of pedagogically rich learning experiences.

In effort to lay some foundation for much needed further research aimed at addressing the issue of how to support academics in their use of technology-infused teaching, the chapter develops a model of factors that potentially influence how academics use technology in their teaching.

DOI: 10.4018/978-1-4666-8246-7.ch011

The model is developed by, first exploring and synthesizing existing literature, and then identifying noteworthy factors arising from literature and pertinent conceptual frameworks(technology acceptance (Davis, 1986), evolution of teaching practice (Sandholtz, Ringstaff, & Dwyer, 1997), teaching style (Grasha, 1996) and constructivist philosophy (Jonassen, 1994), and technological, pedagogical and content knowledge (Mishra & Koehler, 2006), and self-efficacy (Bandura, 1986).

It is envisaged the chapter will be of interest to university administrators developing support mechanisms and strategies to promote institution-wide adoption of effective technology infused teaching practices, to those engaged in the provision of professional development for academic teaching; and to researchers in the field of technology and pedagogy in higher education. The chapter provides a launching point for much needed further research into identifying factors shaping the manner in which academics' use technology for teaching.

BACKGROUND

Today's universities are compelled to change as they face what is possibly the most significant challenge in their history. The source of the challenge, as Siemans and Matheos (2010) so neatly sum up, is that at the same time as universities grapple with emerging technologies and the challenges of delivering education in a form palatable to a technologically savvy student body, the forces of globalization, expansion, and economic uncertainty are bearing down on institutions.

The potential of technology infused teaching approaches to help universities cope with current pressures is widely acknowledged in the literature. Many universities are investing considerable effort and money, to support institution-wide use of efficient, flexible, and quality technology-infused teaching strategies (Bonk, Kim, & Zeng, 2006; Graham & Robison, 2007; Garrison & Kanuka, 2004; Graham, 2006; Vasileiou, 2009). Technology use in teaching contexts clearly offers the advantages of flexibility and efficiency, which help universities, cope with increased student numbers and varied student needs. Furthermore, the use of technology may be a 'draw-card' for today's technology savvy students. Many students coming to university are immersed in new technologies and live in a highly connected social network and there is an expectation that the technologies with which they interact on a daily basis will also be present in their learning environment. Courses meeting these expectations will be more attractive to students (Ross & Gage, 2006). Technology also offers flexibility of access (through remote collaboration) for the increasing numbers of students juggling study, work and family (Uğur, Akkoyunlu, & Kurbanoğlu, 2011).

Although efficiency and flexibility are important considerations, alone they will not enable a university to remain competitive in the global market. As Graham and Robison (2007) point out, the promise of technology rich learning to help universities change in response to pressures will only be realized by the widespread adoption of effective technology-infused teaching practices.

Proponents of using technology for teaching, argue that technology can be used not only to create effective learning experiences, but that it offers some pedagogical advantage over more traditional methods for a number of reasons - it can facilitate the building of communities of inquiry, it offers the opportunity to provide experience that might not otherwise be possible, it more strongly focuses attention to the teaching and learning and so promotes the design of user-centered learning experiences, and it can encourage engagement and develop self-directed learning skills in students (Garrison & Kanuka, 2004; Sancho et al. 2006; George-Walker & Keeffe, 2010).

It is important to highlight at this point, that at the crux of views of pedagogical potential of blended learning is the academic's ability to create effective, pedagogically rich, experience through the appropriate use of technology together with face-to-face strategies. It is not the technology, per se, that has the power to transform learning for the better. Rather, this power rests with the academic.

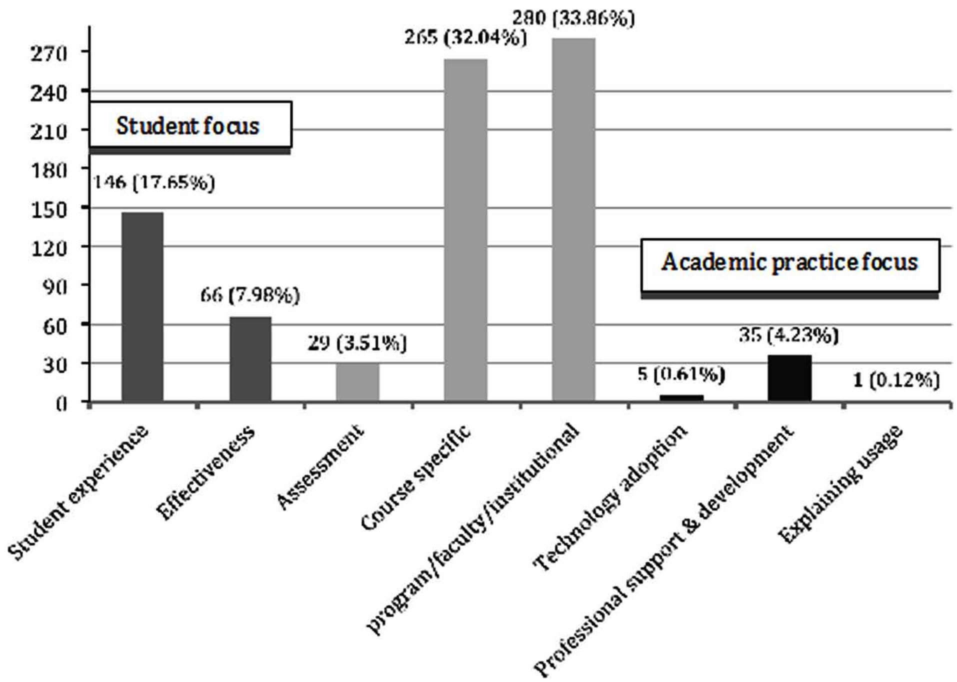
However, for many academic, harnessing the potential of technology with face-to-face teaching to transform learning for the better poses significant challenge. Firstly, academics need to build a body of knowledge of what technologies are available and to identify the capabilities of each technology - difficult tasks when new technologies are emerging at a rapid rate. Add to this that academics need to acquire knowledge about what technologies their university's infrastructure supports and how they can be technically implemented. Finally, academics then need to be able to map the attributes of both face-to-face teaching and the available technology to the requirements of the task and learning objectives so that they will be able to re-design courses with the appropriate learning activities. This usually involves significant redesign of courses.

Considering the demands facing academics intending to implement technology infused teaching approaches, it is not surprising that the achievement of widespread adoption of effective practices is proving difficult, with the vast majority of implementations having little or no impact on practice, at best, merely "stretching the mould" (Collis & Van Der Wende, 2002, p. 7), using technology for reasons of administrative efficiency and provision of supplementary access, but generally not providing, more effective pedagogically enriched learning experiences that are so essential for engaging and keeping today's technologically savvy student body. Herein, then, is a key issue for higher education: how can academics be supported to facilitate the widespread adoption of not only efficient, but also effective technology-infused practices?

It is now argued that an important pre-requisite for addressing the aforementioned issue is knowledge about factors influencing how academics are currently use technology in their teaching. As adult learners, academics will have developed a mental model about teaching with technology, that is, "assumptions derived from past beliefs and experience and expectations about future behavior and events crafted by these assumptions" (Thornton, 2008, p. 1040). When dealing with new tasks, the mental model is invoked and has an impact on how the new task is accomplished. Thus, to change technology infused teaching practices, academics need to redefine their mental models about teaching and learning and the role of technology (Brancato, 2003, p. 63). In order to redefine their mental models, academics first need to make the connection between new knowledge and their existing practice (Cranton & King, 2003). From this perspective, the role of professional support and development must be to effect connection to existing teaching practices, facilitate reflection and, subsequently nurture transformation in practice so that technology is used to develop effective technology infused teaching practices. Hence, knowledge of factors influencing academics' current practices is an important pre-requisite to formulating the support needed to help academics develop pedagogically rich technology-infused teaching practices.

However, the body of knowledge relating to factors influencing academics' use of technology for teaching is limited. A literature search conducted by the author supports this view by showing literature seeking to identify factors influencing how academics use technology in their teaching is very sparse. The search was conducted using Thomson Reuters' Web of Knowledge was conducted with the key words ((blended learning OR hybrid learning OR learning technology OR blended teaching) AND (university OR higher education OR academics OR faculty)). Thomson Reuters' Web of Knowledge provides access to a large volume of literature, from varied sources (over 12,000 of the highest impact journals worldwide, including Open Access journals and over 150,000 conference proceedings" (Thomson Reuters, n.d, para. 1)) and thus represents a substantial cross-section of literature.

Figure 1. The count of papers in each of the subcategories of research interest



The search identified 827 relevant to the use of technology in university teaching. When each of the 827 articles was then examined to identify the aim or dominant theme of the reported research, the results could be sorted into broadly into three topic areas identified in the initial literature search, each broad topic area could be further classified into subtopics (figure 1).

Of the 827 papers resulting from the search, only one (Woods, Baker, & Hopper (2004)) sought to explain current practice, that is sought to provide insight into the reasons why, after adoption, some academics use technology simply for course management and efficiency, while some use it to offer enriched, often innovative, learning experiences to their students. The search was then extended beyond of the Web of Knowledge to using Google and Griffith University Library searches. The extended search yielded additional studies relating to academics blended practices, both in relation to adoption of technology and focusing on explaining how academics used the technology after adoption. The studies are synthesized in Table 1. Notable among the results was the use of technology acceptance models (Davis, 1986) as a common thread.

Consideration of the literature in table1 (note the bolded factors in the table) gives rise to some frameworks useful for beginning to understand what factors may influence how academics use technology in their teaching - technology acceptance (Davis, 1986), evolution of teaching practice (Sandholtz, Ringstaff, & Dwyer, 1997), teaching style (Grasha, 1996) and constructivist philosophy (Jonassen, 1994), and technological, pedagogical and content knowledge (Mishra & Koehler, 2006), and self-efficacy (Bandura, 1986). The frameworks provide a basis for the construction of a proposed model of factors shaping academics' use of technology in teaching. Each of the frameworks, and the emerging model factors are now discussed.

Table 1. Literature investigating factors influencing academics' technology use. Factors of interested are highlighted in bold.

Author/s	Description	Findings
Woods, Baker and Hopper (2004) Published in *Internet and Higher education*	Woods, Baker, and Hopper (2004) examined responses from academics members across 38 institutions using the Blackboard learning management system. The authors explored the factors predicting the type of usage of Blackboard whether as a supplement or for various instructional purposes such as community building, collaboration, or interactivity.	Results indicated administrative rather than integrated instructional use was more prevalent. Factors impacting the ways in which technology was used included **age, gender, nature of subject matter, academics perceptions about how students would learn best, and their personal preferences.** Academics' **experience with Blackboard** was found to be the most significant factor of usage. Academics with greater Blackboard experience tended to have more positive attitudes towards both the pedagogical potential of Blackboard and its usefulness for course administration. **Instructional experience** impacted on the academics perceptions of the benefits of Blackboard. The study was limited by the investigation of a specific learning management system and did not take into account institutional factors.
Celik (2011) Published in Ankara University, *Journal of Academics of Educational Sciences,*	Used a modified version of the Level of Technology Implementation (LoTi) Technology Use survey (Moersch, 1994). The study sought to establish the levels of technology integration in teaching strategies and the factors that hinder academics' technology integration into teaching strategies.	The study revealed most academics were not using technology effectively for instructional purposes. There was no dependency between academic qualifications and level of technology use in their teaching. Participants' level of technology integration declined with more sophisticated technologies. Among the most influential **barriers to integration of technology were found to be time and lack of professional development.**
Georgina and Olson (2008) Published in *Internet and Education* (Journal)	The study explored the impact of technology literacy and technology training on blended pedagogy use by academics. Specifically, the study addressed the impact on pedagogy of academics' self-perception of technology literacy and of training in technology literacy.	The study suggested that there is **a strong link between technology literacy and pedagogy.** It was found that small group training was more effective than large training sessions. However, the study is rather narrow in its scope. Frameworks such as the Technological, Pedagogical and Content knowledge model (Mishra & Koehler, 2006) suggest a much more complex relationship between technology and the quality of pedagogical practice when using technology than is suggested by this study.
Mehra and Mithel (2007) published in International *Journal of Education and Development using Information and Communication Technology*	Seeking to address the question of why some academics members find the idea of using technology for teaching appealing while others do not, the study investigated the perceptions of the management academics about the benefits of using technology and also considered how factors such as age, experience, time, and academic background affected the extent of use of technology for teaching.	The results of the survey of 150 respondents allowed them to be categorised into one of three groups according to technology use and perceptions. The least technology use was made by the group who **perceived technology as too complex to use and who felt intimidated by its use** in the classroom (Cynics). The second group included those who, **with the assistance of support and training, were willing to incorporate technology** (Moderates). The third group continually innovated and incorporated technology fully into their teaching (Adaptors). The study found there was no **significant relationship between: pedagogy used and the perceived usefulness of technology** (the reasons why this might be were not explored), **age and extent of technology use, academic background and extent of technology use.**

continued on following page

Table 1. Continued

Author/s	Description	Findings
Renzi (2008) Unpublished PhD thesis.	Used Azjen's theory of planned behaviour to explain why some academics use a learning management system in a supplemental role whilst others integrate its capabilities into their teaching model. Variables under consideration included attitude towards the learning management system, subjective norms, perceived behavioural controls, and actual behavioural control.	Results indicated that while academics have a positive attitude to the learning management system, the more significant factors in determining whether the system was used as an integrated component of teaching strategy or in a supplemental role, were **pedagogical skill along with the confidence to use technology.** The outcome of this study is indicative of the value of the Technological, Pedagogical and Content knowledge model (Mishra & Koehler, 2006)
Sturgeon (2011) Unpublished PhD thesis	The study attempted to establish factors contributing to the integration of technology with face-to-face teaching. A cross-institutional study was undertaken with 36 universities in the Appalachian Region.	**Personal use and knowledge of technology were found to be important factors in determining integration of technology.** Age was found not to be a factor although **gender appeared statistically significant,** with females reporting the use of technology for teaching more frequently than males. The study suggested that the most **important factor determining use of technology was "the knowledge that doing so would enhance student learning**"(p.v)
Thornton (2008) Published in *Proceedings of ASCILITE conference* 2008	Used the idea of 'cognitive frames' and 'sense making' to explore 'how [university] teachers deal with their encounters with courseware' (Thornton, 2008, p. 1040). The study highlighted how teachers' pre-existing ideas about teaching and technology came into play when they produced their learning designs.	**Technological expertise was much less important than "a strong sense of epistemic purpose**" (Thornton, 2008, p. 1040) in producing effective learning designs. Effective teaching resulted when the task of combining face-to-face teaching with technology was framed as a pedagogical problem, rather than as a media problem. Findings of Thornton's study are consistent with findings of literature related to professional development such as Salter (2006), and Keengwe, Georgina and Wachira (2010) who found linking the learning of technical skills with pedagogy was important to facilitate academics' use of technology for pedagogical purposes.

FRAMEWORKS AND EMERGENT FACTORS

Technology Acceptance

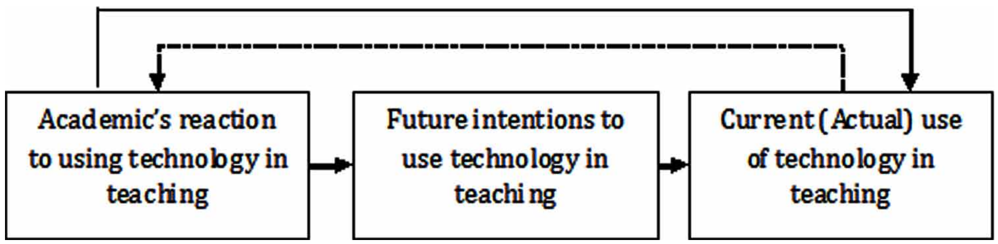
The core concept underlying technology acceptance models (Davis, 1986; Venkatesh & Bala, 2008; Venkatesh & Davis, 2000; Venkatesh, Morris, Davis, & Davis, 2003) is that individuals' reaction to using information technology and their actual use of technology influence each other. Furthermore, individuals' reactions to using technology influence future intentions, which in turn influence the actual use of technology. Venkatesh et al. (2003, p. 427). The core concept of technology acceptance models can be adapted, as shown in figure 2, to underpin a model of factors influencing how academics, after adoption, use technology.

In addition to the foundation in figure 2, other constructs from technology acceptance potentially contribute towards a model of factors that influence how academics' use technology in their teaching. These constructs are: Normative influences, perceived ease of use, perceived usefulness, perceived feasibility. Each of these is discussed below from the context of academics' use of technology in teaching.

Normative Influences

Normative influences refer to an individual's belief about whether or not people important to them think the behavior should or should not be enacted (Fishbein & Ajzen, 1975). It would be reasonable to assume that the opinions of supervisors and peers are important influences

Figure 2. The core constructs of technology acceptance models as they apply to academics' use of technology in teaching adapted from (Venkatesh, Morris, Davis, & Davis, 2003, p. 427)



on academics' practices. Examining some of the literature related to professional support shows this to be a reasonable expectation. For example, in a paper reporting on the implementation of online assessment as an institutional strategy at the University of Glamorgan (Chew, Jones, & Blackey, 2010), it was found that having senior university staff members using blended strategies had a generally positive influence on the uptake of technology-infused strategies by more junior academics members. According to Chew, Jones, and Blackey (2010), the influential role of peers became obvious when certain academics members who were using blended practices were publicly cast in the role of 'champions' within each academic area, and lead to positive influence on the uptake of technology-infused strategies by academics members.

The influence of peers and supervisors aside, it is possible that students' opinions also have the potential to influence academics' use of technology. Compelling evidence for this argument is found in the volume of literature concerned with the student opinions of using technology in teaching (Mitchell & Forer, 2010; Salmonson & Lantz, 2005; Richardson & Turner, 2000). Against this background, it is proposed that normative influences are an important factor to consider when seeking understanding of why academics' use technology as they do in their teaching.

Perceived Ease of Use

In the present study, 'perceived ease of use' refers to the amount of effort an academic believes he or she needs to expend to implement teaching strategies that require the use of both technology and face-to-face teaching. Research on academics' acceptance of technology has often found perceived ease of use to be a determinant of technology acceptance (e.g. Ahmad, Madarsha, Zainuddin, Imsail, & Nordin, 2010; Halawi & McCarthy, 2000; Kripanont & Tatnall,2009). Conceivably, perceived ease of use is a factor with the potential to impact on how academics use technology in teaching, as demonstrated by Mehra and Mithel (2007).

Perceived Usefulness

In the context of the present chapter, perceived usefulness is the degree to which academics believe that using technology together with face-to-face teaching strategies will enhance teaching effectiveness. In existing research about technology acceptance among academics, perceived usefulness is consistently found to be a significant determinant of whether or not an academic will use technology in teaching (Halawi & McCarthy, 2010; Chang et al., 2011, Tarcan, Varol, & Toker, 2010). Some studies (Sturgeon, 2011; Thornton, 2008; Woods, Baker, & Hopper, 2004) (Table1) have also shown that perceived usefulness also plays a significant role in *how* the technology is used after adoption.

Perceived Feasibility

Given that implementing technology-infused teaching approaches generally requires a significant investment of time and resources, it is likely that academics' perceptions of feasibility conditions such as time, funding, support, and infrastructure play a role in shaping the extent to which technology is used by academics in their teaching. Indeed Celik (2011) found time and lack of professional development to be major barriers for academics seeking to integrate technology with teaching. Furthermore, feasibility conditions such as time, infrastructure, professional support, technical support, and funding have been identified as factors determining technology acceptance in existing studies such as those by Bagher, Marek, and Sibbald (2007), Davis and Fill (2007), Kistow (2009), Ocak (2010), Stewart, Bachman, and Johnson (2010), and Wang (2009).

Evolution of Teaching Practice

The technology acceptance framework aside, a consideration of literature, especially Woods, Baker, and Hopper (2004), and Mehra and Mithel (2007), points to evolution of practice and the factor of experience as also useful to understanding academics' use of technology. Evidence of stages of evolution in the use of technology for teaching (as a result of experience) has been observed by a number of authors including Goddard (2002), Sandholtz, Ringstaff, and Dwyer (1997), and Toledo (2005). The number and name of stages identified varies with different authors. Sandholtz, Ringstaff, and Dwyer's (1997) five stages best capture the essence of the idea of evolution of stages. The first stage, termed 'entry point' by Sandholtz, Ringstaff, and Dwyer (1997) begins with awareness of the existence of technology for teaching though it is not used in teaching. In the second stage, the adoption stage, technology is used in the teaching context but primarily for increasing efficiency. In the third stage, there is some limited use of technology in learning strategies, usually for supplemental reasons and has minimal impact of practice. In the fourth and fifth stages, appropriation and invention, technology is progressively embedded in learning strategies to a greater extent and leads to transformation of practice.

The idea of evolution of practice is not dissociate from ideas presented in technology acceptance models. Evolution of practice relates to experience and the effect of those experiences. The technology acceptance models (Venkatesh & Bala, 2008; Venkatesh & Davis, 2000; Venkatesh, Morris, Davis, & Davis, 2003) include experience as influencing constructs such as perceived ease of use, perceived usefulness and behavioural intent.

Teaching Approach and Constructivist Philosophy

It is worth noting that Woods, Baker and Hopper (2004) found academic perceptions about how students learn best influenced how academics used technology in their teaching. It is now argued that teaching approach should feature in a model of factors influencing how academics use technology in their teaching.

Aligned with Grasha's (1996) conception of teaching approach is used here refer to the characteristic manner in which individual teachers design the instructional process. It follows that when technology is used as part of the instructional process, teaching style will have bearing on how the technology will be used (Zisow, 2000; Weitkamp, 2006).

Individual beliefs about how students learn best are embedded in the idea of teaching approach. Some prior research has shown that constructivist teaching approaches seem to be conducive to using technology as an intrinsic part of learning activities (Judson, 2006; Grasha, 1996; Weitkamp, 2006).

Some literature suggests that those with teaching approaches more aligned with constructivist ideals are more likely to exploit new technologies to design active, student-centered, learning that encourages active knowledge building (Jonassen, 1994; Kramer & Schmidt, 2001; Strommen, 1999) and thus achieve learning related objectives (Judson, 2006), rather than use technology for administrative or supplemental purposes only. For example, Preston, Phillips, Gosper, McNeill, Woo and Green (2010) used Trigwell and Prosser's (2004) *Approaches to Teaching Inventory* to profile teachers and found that those teachers who viewed the main goal of teaching as simply delivery of content were likely to consider Web based technologies not useful for learning and therefore did not use technologies for learning activities. However, Palak and Walls (2006, p. 436) point out that "teachers' beliefs and practices are context bound" and thus belief in constructive ideals alone does not necessarily result in student-centered use of technology. Supporting this argument, Florini (1989) maintains that the personal models teachers' use for determining appropriate technology use is the result of interplay between awareness of personal teaching style, understanding of the characteristics of the media, and the context of use.

Technology, Pedagogy, and Content Knowledge Framework

Congruent with the idea that teachers' use of technology is not the result of a single or simple characteristic such as teaching style, Mishra and Koehler (2006) assert that how teachers use technology for teaching is determined by a "complex interplay" (p.1025) among three bodies of knowledge: pedagogy, technology, and content. Mishra and Koehler (2006) maintain that teachers must possess technical knowledge and pedagogical knowledge as well as content knowledge as a pre-condition for the design and use of effective strategies for using technology to achieve learning objectives. For example, teachers with good content knowledge and good pedagogical knowledge do not necessarily have the skills required to effectively use technology to create learning activities that support curriculum objectives (Thornton, 2008).

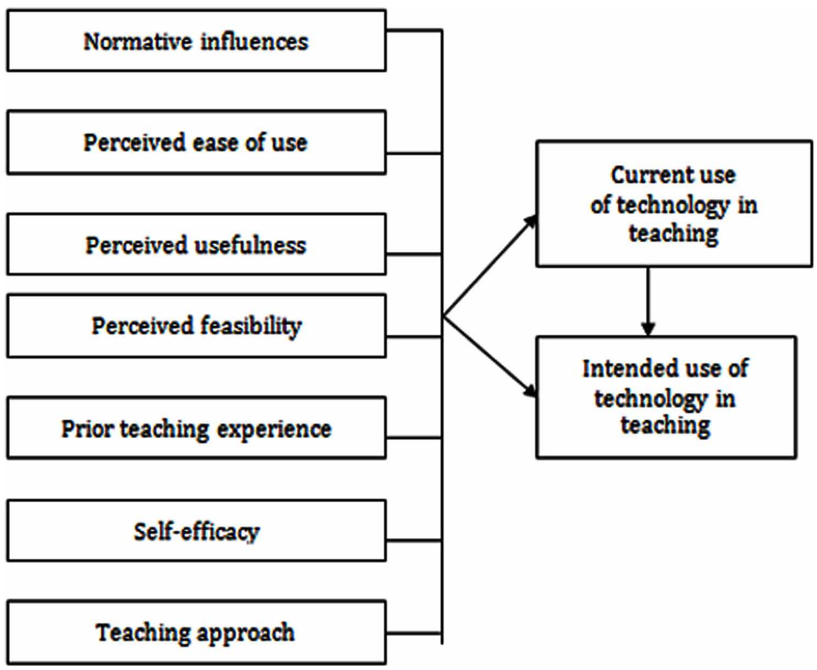
Self-Efficacy

Self-efficacy is the final construct proposed for a model of factors influencing how academics use technology. Mehra and Mithel (2007), and Renzi (2008) both identify confidence to use technology as an important factor determining how academics used the technology. The concept of confidence is encapsulated in the idea of self-efficacy (Bandura, 1986) and is defined as the belief in one's capacity to achieve an undertaking. An interesting extension is the framing of self-efficacy using the technology, pedagogy, and content knowledge framework (Mishra & Koehler, 2006) as done by Nathan (2009) and Albion, Jamieson-Proctor and Finger (2010) to explore primary teachers' use of technologies in the classroom.

When self-efficacy is framed by Mishra and Koehler's framework, it refers to academics' (as teachers) beliefs about their ability to (or confidence to):

- Use technology (technical knowledge);
- Design effective teaching strategies (pedagogical knowledge);
- Understand course content (content knowledge);
- Make good decisions about teaching approaches appropriate to teaching the content (pedagogical-content knowledge);
- Identify which technologies can be used in the content area (technological-content knowledge);
- Understand the attributes of the technology and how they can be used to form new teaching strategies (pedagogical-technological knowledge);
- Identify the attributes of technology as well as design new strategies using those attributes to best teach the required content knowledge (technological-pedagogical-content knowledge).

Figure 3. A proposed model of factors influencing how academics' use technology in teaching



A PROPOSED THEORETICAL MODEL OF THE ACADEMICS' USE OF TECHNOLOGY IN TEACHING

Bringing together the underlying frameworks and the constructs discussed above leads to the proposed theoretical model of academics' use of technology in teaching (figure 3)

The core constructs of the technology acceptance models underpin the model (Figure 2) shown in Figure 3. The proposed model suggests that normative influences, perceived ease of use, perceived usefulness, perceived feasibility, prior teaching experience, self-efficacy and teaching approach are likely to be factors important to how academics' are currently using technology in their teaching and to how they intend to use it in the future. The experiences of current use of technology will also feed into future intentions of use.

FUTURE TRENDS

The pressures on higher education due to globalization and the changing nature of student needs are not likely to relent in the near future; and it is envisaged technology will continue to be a crucial element of higher education teaching contexts. Add to the mix the rapidly changing nature of technology and it is evident that there is an urgent need to support academics such that their use of technology provides not only efficient, but also highly effective learning experiences for students. Research into understanding what shapes how academics use technology in their teaching must inform the design of professional support strategies. Well-informed support strategies are more likely to succeed in changing academic practice.

Although the proposed theoretical model may be seen as oversimplifying what is undoubtedly a complex interaction of many factors, the model provides a firm basis for the much-needed research seeking to understand the factors that shape how academics will use technology in their teaching.

CONCLUSION

This chapter has identified the effective use of technology in higher education to be an important issue for institutions given the competitive climate of globalization, and the demands of technology savvy cohorts of students. It has been argued that, after adoption of technology in their teaching, academics oftentimes do not exploit it for increasing pedagogical effectiveness – and the widespread adoption of effective teaching practices is, alongside effectiveness and efficiency, critical if universities are to maintain competitive advantage in the current climate. It was also argued that understanding the factors that shape how academics use technology in their teaching provides a valuable insight into how to best support academics such that they are able to use technology to achieve more effective teaching practices. This chapter sought to identify potential key factors influencing academics current and future practices in using technology in teaching. A model was proposed that offers some direction for further investigation into influences shaping academics' technology-infused teaching practices.

REFERENCES

Ahmad, T. B., Madarsha, K. B., Zainuddin, A. M., Ismail, N. A., & Nordin, M. S. (2010). Academics's acceptance of computer based technology: Cross-validation of an extended model. *AJET, 26* (2).

Albion, P., Jamieson-Proctor, R., & Finger, G. (2010). *Auditing the TPACK competence and confidence of Australian teachers: The teaching With ICT audit Survey (TWictAS).* Paper presented at the Society for Information Technology and Teacher Education Conference (SITE). San Diego, CA.

Bagher, M., Marek, S. A., & Sibbald, A. (2007). Implementing web-assisted learning and engaging academic staff in the change process. *Journal of Organisational Transformation and Social Change*, *3*(3), 269–284. doi:10.1386/jots.3.3.269_1

Bandura, A. (1986). *Social foundations of thought and action: A social cognitive theory*. Englewood Cliffs, NJ: Prentice Hall.

Bonk, C. J., Kim, K., & Zeng, T. (2006). Future directions of blended learning in higher education and workplace learning settings. In C. J. Bonk & C. R. Graham (Eds.), *Handbook of blended learning: Global perspectives, local designs* (pp. 550–567). San Francisco, CA: Pfeiffer.

Brancato, V. C. (2003). Professional development in higher education. *New Directions for Adult and Continuing Education*, (98): 49–52.

Celik, S. (2011). Technology integration levels of teacher education academics. *Ankara University Journal of Academics of Educational Sciences*, *44*(2), 141–163.

Chang, J.-L., Lieu, P.-T., Liang, J.-H., Liu, H.-T., & Wong, S.-L. (2011). Factors influencing technology acceptance decision. *African Journal of Business Management*, *5*(7), 2901–2909.

Chew, E., Jones, N., & Blackey, H. (2010). Implementing institutional inline assessment – Addressing the challenges. In P. Tsang, S. K. S. Cheung, V. S. K., Lee, & R. Huang (Eds.), *Hybrid Learning*, (LNCS), (vol. 6248, pp. 453-464). Berlin: Springer-Verlag. Retrieved from http://www.springerlink.com/content/0802v72064121055/

Collis, B., & Moonen, J. (2001). *Flexible learning in a digital world: Experiences and Expectations*. London: Kogan Page.

Cranton, P., & King, K. P. (2003). Transformative learning as a professional development goal. *New Directions for Adult and Continuing Education*, *98*, 31–37. doi:10.1002/ace.97

Davis, F. (1986). *A technology acceptance model for empirically testing new end-user information systems: Theory and results.* (Doctoral Dissertation). Sloan School of Management, Massachusetts Institute of Technology, Cambridge, MA. Retrieved January 3, 2010 from http://hdl.handle.net/1721.1/15192

Davis, F. D. (1989). Perceived usefulness, perceived ease of use, and user acceptance of information technology. *Management Information Systems Quarterly*, 319–340. doi:10.2307/249008

Davis, H. C., & Fill, K. (2007). Embedding blended learning in a university's teaching culture: Experiences and reflections. *British Journal of Educational Technology*, *38*(5), 817–828. doi:10.1111/j.1467-8535.2007.00756.x

Fishbein, M., & Ajzen, I. (1975). *Belief, Attitude, Intention and Belavior: An Introduictionto Theory and R esearch*. Reading, MA: Addison-Wesley.

Florini, B. (1989). Teaching styles and technology. *New Directions for Adult and Continuing Education*, *43*, 41–53. doi:10.1002/ace.36719894306

Garrison, D. R., & Kanuka, H. (2004). Blended learning: Uncovering its transformative potential in higher education. *The Internet and Higher Education*, *7*(2), 95–105. doi:10.1016/j.iheduc.2004.02.001

George-Walker, L. D., & Keeffe, M. (2010). Self-determined blended learning: A case study of blended learning design. *Higher Education Research & Development*, *29*(1), 1–13. doi:10.1080/07294360903277380

Georgina, D. A., & Olson, M. R. (2008). Integration of technology in higher education:Integration of technology in higher education: A review of academics self-perceptions. *The Internet and Higher Education*, *8*, 1–8. doi:10.1016/j.iheduc.2007.11.002

Goddard, M. (2002). What do we do with these computers? Reflections on technology in the classroom. *Journal of Research on Technology in Education*, *35*(1), 19–26. doi:10.1080/15391523.2002.10782367

Graham, C. R. (2006). Blended learning systems: Definition, current trends and future directions. In C. J. Bonk & C. R. Graham (Eds.), *Handbook of blended learning: Global perspectives, local designs* (pp. 3–21). San Francisco, CA: Pfeiffer.

Graham, C. R., & Robison, R. (2007). Realizing the transformative potential of blended learning: Comparing cases of transforming blends and enhancing blends in higher education. In A. G. Picciano & C. D. Dziuban (Eds.), *Blended learning research perspecives* (pp. 83–110). Needham, MA: The Sloan Consortium.

Grasha, A. F. (1996). *Teaching with style*. Pittsburgh, PA: Alliance Publishers.

Halawi, L., & McCarthy, R. (2000). Measuring academics perceptions of Blackboard using TAM. *Issues in Information Systems*, *8*(2), 160–165.

Jonassen, D. H. (1994). Thinking technology: Toward a constructivist design model. *Educational Technology Research and Development*, *34*(4), 34–37.

Judson, E. (2006). How teachers integrate technology and their beliefs about learning: Is there a connection? *Journal of Technology and Teacher Education*, *14*(3), 581–597.

Keengwe, J., Georgina, D., & Wachira, P. (2010). Academics training strategies to enhance pedagogy-technology interaction. *International Journal of Information and Communication Technology Education*, *6*, 1–10. doi:10.4018/jicte.2010070101

Kistow, B. (2009). E-learning at the Arthur Lok Jack Graduate School of Business: A survey of academics members. *International Journal of Education and Development using ICT, 5* (4).

Kramer, B. J., & Schmidt, H. (2001). Components and tools for on-line education. *European Journal of EducationEuropean Journal of Education*, *36*(2), 195–222. doi:10.1111/1467-3435.00060

Kripanont, N., & Tatnall, A. (2009). The role of a modified technology acceptance model in explaining internet usage in higher education in Thailand. *International Journal of Actor-Network Theory and Technological Innovation*, *1*(2), 31–49. doi:10.4018/jantti.2009040103

Macharia, J., & Nyakwende, E. (2010). Vice Chancellor's influence on academic staff intentions to use learning management systems (LMS) for teaching and learning. *Journal of Languages. Technology & Entrepreneurship*, *2*(1), 221–231.

Mehra, P., & Mital, M. (2007). Integrating Technology into the Teaching Learning Transaction-Pedagogical and technological perceptions of management academics. *International Journal of Education and Development using Information and Communication Technology, 3* (1).

Mishra, P., & Koehler, M. J. (2006). Technological pedagogical content knowledge: A framework for teacher knowledge. *Teachers College Record*, *108*(6), 1017–1054. doi:10.1111/j.1467-9620.2006.00684.x

Mitchell, P., & Forerf, P. (2010). Blended learning: The perceptions of first-year geography students. *Journal of Geography in Higher Education*, *34*(1), 77–89. doi:10.1080/03098260902982484

Nathan, E. J. (2009). *An examination of the relationship between preservice teachers' level of technology integration.* Unpublished doctoral thesis.

Ocak, M. (2010). Why are academics members not teaching blended courses? Insights from academics members. *Computers & Education*, *56*(3), 689–699. doi:10.1016/j.compedu.2010.10.011

Preston, G., Phillips, R., Gosper, M., McNeill, M., Woo, K., & Green, D. (2010). Web-based lecture technologies: Highlighting the changing nature of teaching and learning. *Australasian Journal of Educational Technology*, *26*(6), 717–728.

Renzi, S. (2008). *Differences in university teaching after learning management system adoption: An explanatory study based on Azjen's theory of planned behaivour.* Unpublished PhD thesis.

Richardson, J. A., & Turner, A. (2000). A large-scale `local' evaluation of students' learning experiences using virtual learning environments. *Journal of Educational Technology & Society*, *3*(4), 108–125.

Ross, B., & Gage, K. (2006). Global perspectives on blended learning: Insight from WebCT and our customers in higher education. In C. J. Bonk & C. R. Graham (Eds.), *The handbook of blended learning: Global perspectives, local designs* (pp. 155–168). San Francisco, CA: Pfeiffer.

Salamonson, Y., & Lantz, J. (2005). Factors influencing nursing students' preference for a hybrid format delivery in a pathophysiology course. *Nurse Education Today*, *25*(1), 9–16. doi:10.1016/j.nedt.2004.09.006 PMID:15607242

Salter, D. (2006). E-Scholars: Staff development through designing for learning. In P. Goodyear, P. Reimann, & L. Markauskaite (Eds.), *Proceedings of the 23rd Annual Conference of the Australasian Society for Computers in Learning in Tertiary Education* (pp. 717-726). Sydney: University of Sydney.

Sancho, P., Corral, R., Rivas, T., Gonzalez, M. J., & Chordi, A. (2006). Instructional design and assessment: A blended learning experience for teaching microbiology. *American Journal of Pharmaceutical Education*, *7*(5), 1–9.

Sandholtz, J., Ringstaff, C., & Dwyer, D. (1997). *Teaching with technology*. New York: Teachers College Press.

Siemens, G., & Matheos, K. (2010). Systemic changes in higher education. *Education*, *16*(1).

Stewart, C., Bachman, C., & Johnson, R. (2010). Predictors of academics acceptance of online education. *MERLOT Journal of Online Learning and Teaching*, *6*(3), 597–616.

Strommen, D. (1999). *Construcitivism, technology and the future of classroom learning*. Retrieved September 27, 1999 from http://www.ilt.columbia.edu/ilt/papers/construct.html

Sturgeon, C. (2011). *Academics perceptions of the factors enabling and facilitating their integration of instructional technology in teaching*. (Unpublished doctoral thesis). University of Tennessee.

Tarcan, E., Varol, E. S., & Toker, B. (2010). A study on the acceptance of information technologies from the perspective of academicians in Turkey. *Ege Academic Review*, *10*(3), 791–812.

Thornton, J. (2008). Framing pedagogy, diminishing technology: Teachers experience of online learning software. In *Proceedings ASCILITE '08* (pp. 1040-1046). Melbourne, Australia: ASCILITE.

Toledo, C. (2005). A five-stage model of computer technology integration into teacher education curriculum. *Contemporary Issues in Technology & Teacher Education*, *5*(2), 177–191.

Trigwell, K., & Prosser, M. (2004). Development and use of the Approaches to Teaching Inventory. *Educational Psychology Review*, *16*(4), 409–424. doi:10.1007/s10648-004-0007-9

Uğur, B., Akkoyunlu, B., & Kurbanoğlu, S. (2011). Students' opinions on blended learning and its implementation in terms of their learning styles. *Education and Information Technologies*, (16): 5–23. doi:10.1007/s10639-009-9109-9

Vasileiou. (2009). The transformation of Higher Education curriculum. *The Journal for Open and Distance Education and Educational Technology, 5* (1).

Venkatesh, V., & Bala, H. (2008). Technology Acceptance Model 3 and a Research Agenda on Interventions. *Decision Sciences*, *39*(2), 273–315. doi:10.1111/j.1540-5915.2008.00192.x

Venkatesh, V., & Davis, F. D. (2000). A theoretical extension of the technology acceptance model: Four longitudinal field studies. *Management Science*, *46*(2), 186–204. doi:10.1287/mnsc.46.2.186.11926

Venkatesh, V., Morris, M. G., Davis, G. B., & Davis, F. D. (2003). User acceptance of information technology: Toward a unified view. *Management Information Systems Quarterly*, *27*(3), 425–478.

Wang, S.-C. (2009). University instructor perceptions of the benefits of technology use in e-learning. In K. Jusoff, S. S. Mahmoud, & R. Sivakumar (Ed.), *Proceedings of the Second International Conference on Computer and Electrical Engineering* (pp. 580-585). Dubai, UAE: IEEE Computer Society Washington.

Weitkamp, E. W. (2006). *Teaching style and technology: The role of educational values in the adoption of information technology innovations in the classroom*. Retrieved November 2, 2010 from http://gateway.proquest.com/openurl%3furl_ver=Z39.88-2004%26res_dat=xri:pqdiss%26rft_val_fmt=info:ofi/fmt:kev:mtx:dissertation%26rft_dat=xri:pqdiss:3183581

Woods, R., Baker, J. D., & Hopper, D. (2004). Hybrid structures: Academics use and perception of web-based courseware as a supplement to face-face instruction. *The Internet and Higher Education*, 281–297. doi:10.1016/j.iheduc.2004.09.002

Zisow, M. (2000). Teaching style and technology. *TechTrends*, *44*(4), 36–38. doi:10.1007/BF02818190

KEY TERMS AND DEFINITIONS

Constructivist Philosophy: A set of beliefs about teaching and learning in which the learner is viewed as an active participant in their own knowledge building process, and the teacher as a facilitator of that active knowledge building process.

Normative Influences: The views expressed by people viewed as important by an individual can affect the actions of the individual.

Perceived Ease of Use: The amount of effort an individual believes he or she needs to expend to implement something.

Perceived Feasibility: The extent to which an individual believes that they have the required resources (or skills) to successfully undertake the task.

Perceived Usefulness: The extent to which an individual believes that undertaking a particular task will result in a positive gain.

Self-Efficacy: The extent to which an individual believes in their own ability to undertake a task and successfully complete it.

Teaching Approach: Refers to the manner in which different teachers design of instructional strategies in different ways as a result of their individual pedagogical beliefs, preferences and attitudes.

Technology-Infused Teaching: Using technology in teaching for pedagogical reasons (rather than only efficiency and flexibility). Technology infused teaching uses technology rich teaching strategies together with face-to-face teaching to achieve substantial learning objectives.

This work was previously published in a Handbook of Research on Education and Technology in a Changing Society edited by Victor C. X. Wang, pages 806-820, copyright year 2014 by Information Science Reference (an imprint of IGI Global).

Chapter 12
A Mobile Learning Overview by Timeline and Mind Map

David Parsons
Massey University, New Zealand

ABSTRACT

Mobile learning has been a research topic for some 20 years. Over that time it has encompassed a wide range of concepts, theories, designs, experiments and evaluations. With increasing interest in mobile learning from researchers and practitioners, an accessible overview of this area of research that encapsulates its many facets and features can provide a useful snapshot of the field to interested parties. This article provides a summary of the field of mobile learning, applying the main analysis categories of research, technology, content, learning and learner. The author presents these categories and subcategories in the form of a mind map, which outlines the details of the major themes in mobile learning. In addition, the author contextualises the key developments in mobile learning in a timeline. The intent of this article is that it may serve as an introduction to the research field of mobile learning, enabling researchers to quickly familiarise themselves with the type of work that has been done in the past, and the potential areas of investigation that might prove fruitful in the future.

INTRODUCTION

Mobile learning is an increasingly popular approach to learning with technology, particularly with the increase in BYOD (Bring Your Own Device) approaches to classroom learning, where students are using their own mobile devices to learn. With this increasing interest in the subject, it may be a useful aid to new researchers, or other interested readers, to provide an accessible overview of mobile learning that encompasses its many facets and features. Although there have been many reviews of the mobile learning literature, these have tended to focus mostly on the nature of the work from a research perspective. Further, they have focused on a specific subset of the overall literature. For example Wingkvist & Ericsson (2011) surveyed the papers published in the Mobile and Contextual Learning (mLearn) conference series, but classified them according to only two dimensions: research method and research purpose. Pollara & Broussard (2011) provided a review focused specifically on student learning outcomes and processes. Sattler et al

DOI: 10.4018/978-1-4666-8246-7.ch012

(2010) focused on the benefits (particularly to constructivist learning) and challenges (buy-in, interface issues, cost and infrastructure.) Orr (2010) focused on pedagogy and constraints. Some review articles have specifically confined themselves to a particular type of mobile learning, for example mobile language learning (Viberg & Grönlund, 2013.) It is, of course, in the nature of a comprehensive literature review that it will sacrifice breadth in favour of depth, within a chosen area of investigation. The intention of this article is to sacrifice depth in favour of breadth, in order to provide a full-landscape view of the field of mobile learning, which has so far been lacking from the literature.

THE CONCERNS OF MOBILE LEARNING RESEARCH

A number of authors have attempted to break down the field of mobile learning research into various specific concerns. The ways in which this has been done has, of course, varied depending on the focus of interest of these authors. From a general perspective, for example, Traxler (2009) defined a number of mobile learning categories: technology-driven, portable, connected classroom, informal, personalized, situated, performance support and in the development context. He also outlined some aspects of affordances; infrastructure, sparsity, policy agenda and blended learning modes. Laurillard (2007) provided a slightly different interpretation, pointing to aspects of mobile learning's uniqueness as a learning mode by referencing learner generated contexts, digital objects co-located with the learner, the three 'mobilities' in m-learning (learners, technology objects, and information) and motivation through ownership and agency. While these categories are all relevant and helpful, this article attempts to develop a new overview, based on a broad analysis of the literature up to and including 2013, and provide visualisations of the main themes, concepts and concerns of mobile learning.

ANALYSIS METHODOLOGY

The methodology used in this article was based on seeking comprehensive coverage of mobile learning research as represented primarily by journal articles and book chapters, and presenting visualisations of our findings (in the form of a timeline and a mind map.) Our main sources were journal articles on the topic of mobile learning revealed in a search of the Web of Science (400 articles), all articles published in the International Journal of Mobile and Blended Learning (94 articles), chapters in mobile learning books (~50), and additional articles found in a search of Google Scholar that covered concepts not previously identified, and included additional types of publication such as conference papers (~50). Each paper was analysed in terms of its own statements of its key features and contribution, based mainly on the abstracts and conclusions of the papers, and visualisations of the data were developed incrementally as new concepts were added, revised and rearranged. In seeking a saturated sample, these data were accumulated until the additional concepts being gleaned from the literature were either (a) already included in the data or (b) were only providing further examples that were indicative rather than exhaustive. For example, one of our themes related to the subject content of mobile learning systems. Since the number of subjects became increasingly large, the final visualisation only includes a small subset of the most popular subjects covered. The papers cited in the commentary provide indicative examples of each of the main concepts of the mind map, though in many cases there were many other papers that could equally have represented the chosen concepts, and it is not claimed that each of these examples is the 'best' paper that could have represented each individual concept. Further, due to limitations on space, it has not been possible to provide commentary and references for every single concept in the mind map, so the article focuses instead on what is hoped to be a representative sample.

Data Presentation

This article presents its landscape view of the field of mobile learning in the form of a timeline (mapping in time) and a mind map (mapping in space). Timelines are an important tool in the visualisation of temporal data, for example they have proved particularly useful in the visualisation of time-sensitive medical data (e.g. Bui, Aberle & Kangarloo, 2007). In this article, the value of temporal visualisation is to give greater clarity to what we have identified as key phases in the evolution of mobile learning research.

Whilst timelines are well established as having value in several research domains, the use of mind maps is perhaps more controversial. Although this approach to visualization is relatively subjective, it is a qualitative approach that allowed us to find creative associations between ideas, as opposed to some other approaches that simply present quantitative data (Davies, 2011). It enabled the researchers to work creatively and interactively to integrate large volumes of individually captured data. Although the current work does not address this aspect, it also potentially supports additional services such as certain types of information search (Beel & Gipp, 2010). Through an iterative process of refinement, we have applied the main analysis categories of research, content, technology, learning and learner, with a range of subcategories and representative exemplars. There is a large number of Mind Map creation software tools available, but the mind map presented here was created using XMind (http://www.xmind.net/).

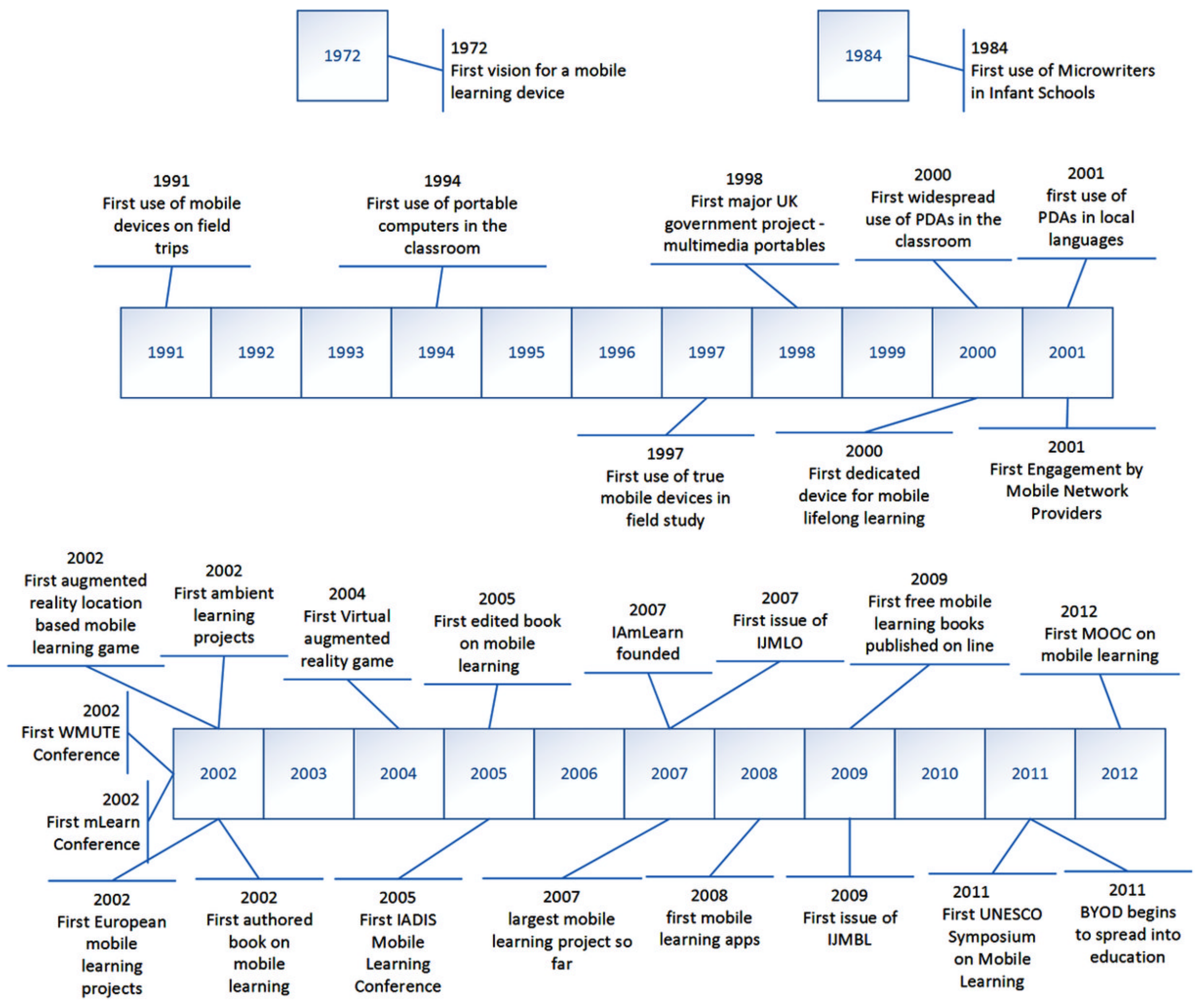
A MOBILE LEARNING TIMELINE

The mobile learning timeline (Figure 1) describes the evolution of mobile learning through a series of significant 'firsts'. The events on the timeline are of various kinds; notable research projects, the establishment of relevant journals and conference series, and some technology related innovations. In each case, an attempt has been made to identify the first occurrence of each type of mobile learning project, forum or application. This has two main purposes. First, it allows the reader to see the roots of mobile learning research, and to appreciate its history. Second, it reveals some important themes in the field that are explored in more detail in the mind map described later in this article. The timeline was partially crowdsourced by seeking contributions and debate among members of the International Association for Mobile Learning via their shared mailing list.

The first two items on the timeline are separated by several years from the main body of activity. The first of these is Alan Kay's visionary Dynabook, a vision for future mobile learning, which laid out many of the affordances for a mobile learning device that we now take for granted (Kay, 1972.) However, it was many years before anything like Kay's vision could be realised in a practical way. The first attempt to use a small device for learning seems to be the use of Microwriters in Infant Schools (High & Fox, 1984). Of course these simple word processing devices were very primitive compared to the concept of the Dynabook, and classifying them as mobile learning might be stretching a point. Nevertheless they were small semi-portable devices used to encourage autonomous and collaborative learning, so that within the technical limitations of the devices, this project was pioneering in some of the concepts that were to prove central to mobile learning.

The first attempt to take mobile learning out of the classroom, to make it truly mobile, appears to have been the Apple Classrooms of Tomorrow (ACOT) project in 1991, including the first use of mobile devices for field trips (Grant,1993), which has since become a core context for mobile learning. 1993 saw the Pupils' Learning and Access to Information Technology (PLAIT) project, which was probably the first project to use truly portable (though not really mobile) computers in the classroom (Gardner et al., 1994.) If nothing else, this project first raised the seemingly end-

Figure 1. A Timeline of mobile learning research



less debates about how mobile learning might or might not impact on learning performance and learner attitude. While early field-based projects used devices that might be better described as portable rather than mobile, the first project to use truly mobile devices for learning in the field was probably the Cornell Plantations projects in 1997, which utilised the (then new) Windows mobile devices (Rieger & Gay, 1997.) At around the same time, the indoor equivalent of the field trip, the museum or gallery tour, was also a focus of innovative mobile projects, including Hyper-interaction within Physical spaces (Oppermann & Specht, 1998.)

While previous projects has been either small scale or driven by vendors, the first large scale government funded project was the 1998 Becta Project in the UK, Multimedia Portables for Teachers. Although this focused more on the portable than the mobile, it was significant in its emphasis on educators rather than learners, and on the use of multimedia and internet connectivity to support teaching and learning (Harrison et al, 1998.)

The first attempt to truly address Kay's vision of a mobile learning device was probably the HandLeR Project in 2000, which sought to design and build a mobile device that would directly support mobile learning (Sharples, 2000.) Around the same time, Palm were distributing the Palm Education Pioneer grants, to provide handheld computers for teachers and their students in K-12 classrooms. This may be seen as the first project designed to see large scale use of mobile devices by children for learning within the classroom. Perhaps less high profile, but also significant, the Enlace project provided the first use of Personal Digital Assistants for mobile learning in languages other than English (Rodríguez et al, 2001)

While manufacturers of mobile devices (Apple, Microsoft, Palm) had been active in promoting and supporting mobile learning initiatives, mobile network providers finally became formally involved in 2001, with the inaugural meeting of the European m-learning Forum (PJB Associates, 2001.) This signalled the increasing move away from standalone mobile learning tools deployed on disconnected PDAs to connected tools, utilising the content and collaboration opportunities of wireless mobile devices.

2002 was a very significant year in the development of mobile learning. As technology developed, more ambitious forms of mobile learning became possible with ambient, pervasive and ubiquitous technologies. Perhaps the pioneers of this type of mobile learning were the related Hunting of the Snark and Ambient Wood projects, explorations in contextual learning through ambient devices that pushed the boundaries of mobile learning in outdoor environments (Price et al., 2003, Harris et al, 2004). In a similar vein, the first augmented reality location based mobile learning game, Environmental detectives, was developed (Klopfer, Squire & Jenkins, 2002.)

The first authored book on mobile learning appeared in 2002, and interestingly was based not on classroom learning but on work-based learning, reflecting a quick uptake in the United States of mobile technology by employers who saw the potential for mobile learning in a work-based training context (Gayeski, 2002). 2002 also saw the beginning of the first major mobile learning projects to be supported by European funding. The M-Learning Project was funded by the European Fifth Framework programme to help disaffected learners aged 16 to 24, while the more ambitious Mobilearn Project was a worldwide European-led project exploring context-sensitive approaches to informal, problem-based and workplace learning. Further major events in 2002 were the first meetings of two conference series that have continued to act as significant forums for the research community. The First IEEE International Workshop on Wireless and Mobile Technologies in Education (WMTE) took place at Växjö University in Sweden, while the first World Conference on Mobile and Contextual Learning (mLearn) was held at the University of Birmingham, UK, though it was initially called the European Workshop on Mobile and Contextual Learning. mLearn is the longest continuously running international conference series on mobile learning. A further conference 'first' took place in 2005, with the IADIS Mobile Learning conference series being inaugurated in Malta. This conference series differed from its predecessors in that it remains focused on European venues.

2005 also saw the publication of the first edited book on mobile learning (Kukulska-Hulme & Traxler, 2005.) The Advanced Mobile and Ubiquitous Learning Environments for Teachers and Students (AMULETS) project in 2006 might also be seen as innovative in its blending of mobile device use in the field with integral classroom activities, bringing together the two contexts of mobile learning (in the classroom or in the field) that had been previously explored separately. Another evolutionary step from 2006 was Futurelab's Savannah project, which was the first mobile learning application that overlaid imaginary (rather an informational) virtual content onto real world contexts (Facer et al. 2004).

2007 saw the beginning of the large scale MoLeNET (Mobile Learning Network) Project in the UK, which claimed to be the world's largest and most diverse implementation of mobile learning to date, including 50,000 learners and 4,000 staff. The increasing maturity of mobile learning as a research field began to lead to more formal outlets for publication and collaboration. The first issue of the International Journal of Mobile Learning and Organisation, the first journal to include mobile learning in its title, was published in 2007. This was followed in 2009 by the first issue of the International Journal of Mobile and Blended Learning. The International Association for Mobile Learning (IAMLearn) was established in 2007, while in 2009 the first free mobile learning books were published on line (Ally, 2009; Herrington et al., 2009.) Meanwhile, technology development continued apace. In 2008 the first mobile learning apps began to appear in the App stores for both Apple and Android devices, enabling mobile learning apps to be distributed for both platforms.

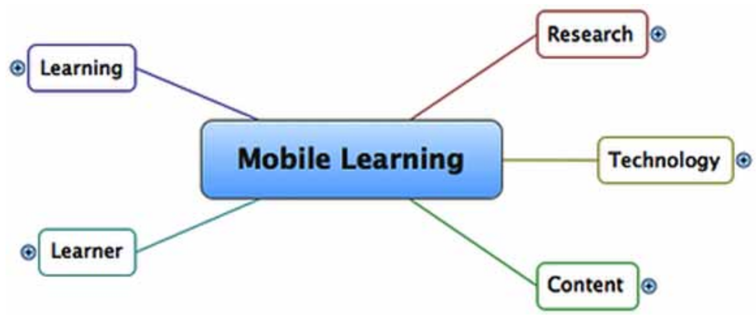
Another significant first took place in 2011, with the first UNESCO Symposium on Mobile Learning, acknowledging that mobile learning was by now of global interest, and a potentially important tool for educational delivery in developing nations. The following year, with increasing interest in the potential of massive open online courses (MOOCs), the first MOOC on mobile learning (MobiMOOC) was delivered. Around the same time, a sea-change began to occur in the way that mobile learning was deployed in schools and higher education institutions, with the increasing uptake of bring your own device (BYOD) policies (Norris & Soloway, 2011.) This change suddenly brought mobile learning into the mainstream, challenging mobile learning researchers to adapt to the new world of research challenges and opportunities brought by mass adoption of mobile learning.

It is notable that the timeline reveals three distinct phases in mobile learning evolution. Initially, innovation is driven by individual researchers or small groups, perhaps supported by technology vendors such as Palm and Apple, exploring new concepts in teaching and learning by being early adopters of new technology. Later, we see a series of large scale projects, sponsored not by commercial enterprises but by quasi-governmental organisations such as the European Union. More recently, we see new channels of dissemination and collaboration; journals, conferences, MOOCs etc. Underlying these developments we see the evolution of mobile technology from early portable devices, through PDAs, to contemporary touch screen smart devices, owned by learners. Given this context, it may be useful to the researcher to consider what the next phase of mobile learning research might be, and how the research community might contribute to future developments.

A MIND MAP OF MOBILE LEARNING

In creating our mind map, the main areas we have identified are: Research, Technology, Content, Learning and Learner (Figure 2). These concepts 'bubbled up' through the process of interactively developing the mind map, so were not starting points in our analysis, rather they were the final result of generalising concepts from the specific to the generic. In the remainder of this article we have attempted to summarise the key concerns of each area, presenting the relevant subtree of the mind map, with some indicative examples where appropriate. For example under 'Content', one of our subconcepts is 'subject specific (content)'. Within this branch of the mind map we include a number of popular subjects that have been addressed by mobile learning, but this is by no means an exhaustive list. Similarly under the 'Learning' concept, in the 'Specific Context' subconcept, we include some popular contexts for mobile learning. Again, these are only intended to be indicative. A similar philosophy applies to most of the branches of the mind map.

Figure 2. A mind map of mobile learning categories



RESEARCH

Figure 3 shows the subtree from the mind map that explores the overarching theme of 'Research'. Mobile learning research has fallen into a number of categories. Some papers have focused on theory, with activity theory being one of the most popular theories applied to mobile learning (Uden, 2007). However there are many other theories that have been found relevant, including psychological theory (Brown & Campione, 1996), in particular behavioural psychology, flow experience (Csíkszentmihályi, 1996; Park, Parsons & Ryu, 2010) social constructivism (Cochrane & Bateman, 2010) and constructionism (Patten et al., 2006). Learning theories that stress context, a particularly important feature of mobile learning, include situated cognition (Brown, Collins & Duguid, 1989) and distributed cognition (Hutchins, 1995). Siemens (2004) also stresses the importance of context in applying connectivism to mobile learning. There have also been efforts directed at creating an overarching theory for mobile learning research (Sharples, Taylor & Vavoula, 2007). Theories that apply specifically to practical aspects of education are clearly important in mobile learning, for example experiential learning (e.g. Facer et al., 2004)

A large number of methods have been used in mobile learning research. A popular strand of research is the review paper, several of which have been mentioned in the introduction. However most research addresses new areas of investigation, many of which involve human subjects, since the main purpose of mobile learning research is to measure its effects on how people learn.

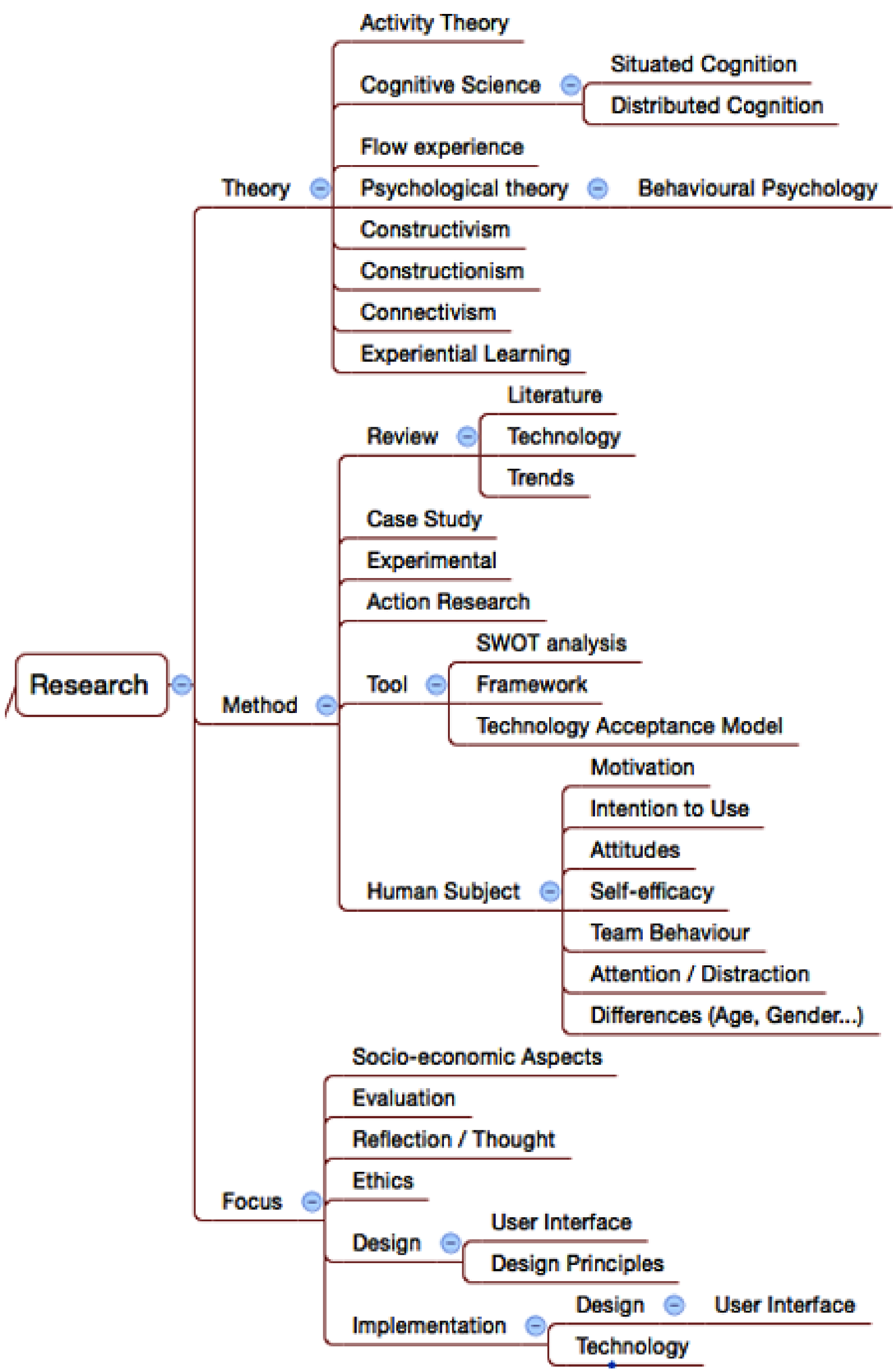
The focus of research may range from general thought pieces on the philosophy of mobile learning to specific implementations of hardware or software tools. All research needs some form of evaluation, and a number of authors have tried to address how mobile learning interventions should be evaluated, including Traxler & Kukulska-Hulme (2005), Motiwalla (2007) and Vavoula & Sharples (2009).

Research into design has been approached both from the general perspective of design guidelines and frameworks (Parsons, Ryu & Cranshaw, 2007), in specific areas of design concern such as the user interface (Carmen et al., 2012) and also looking at the design (and implementation) of individual mobile learning applications (Sharples, Corlett & Westmancott, 2002.) While not all research into design formally uses design based research as a methodology, there are a number of examples that do (e.g. Ahmed, & Parsons, 2013).

TECHNOLOGY

Figure 4 shows the subtree from the Mind Map that explores the overarching theme of 'Technology'. This theme is divided into technology platform concerns (devices and communications) as well

Figure 3. The 'Research' branch of the Mind Map



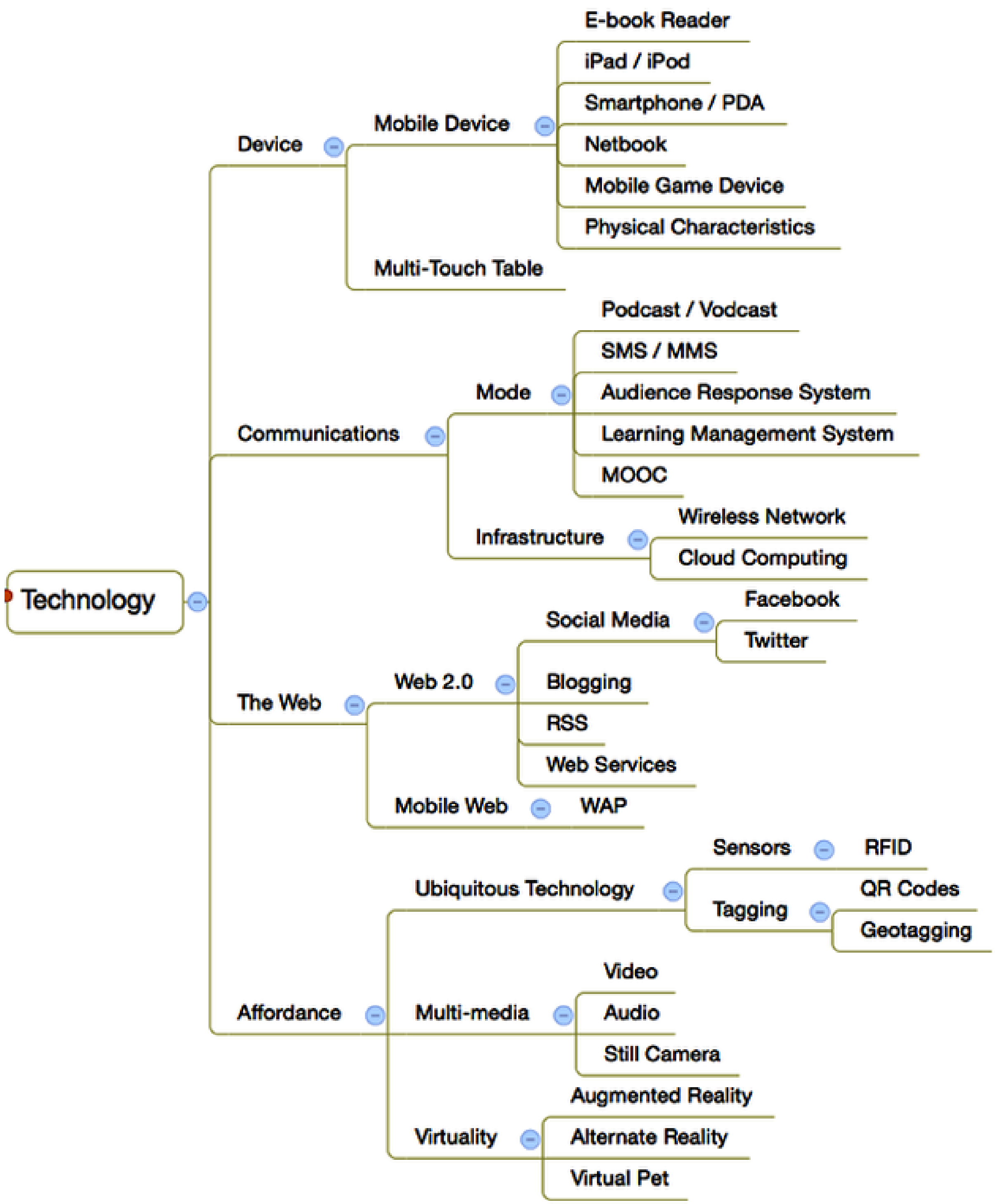
as potential ways of using these technologies (web-based applications and system affordances). One aspect of mobile learning that is difficult to ignore is the device, since the rate of change of these technologies is such that it constantly drives new research opportunities. While the device itself is not the subject of the research, specific devices inevitably get used in empirical research projects. Thus mobile learning has, over the years, used many different types of technology, for example iPods, MP3 Players, Personal Digital Assistants, USB Drives, E-Readers, Smart Phones, UMPCs, Laptops and Tablet PCs (Corbeil, 2007). In some cases, specific mobile technologies have been chosen because they are particularly useful in a given context. A good example of this is the E-Reader, which can provide large volumes of material when offline. For example Havelka (2011) described the use of E-Readers with nursing faculty and students, because these users require instant access to large amounts of reference material that would be inefficient to download on demand. E-Readers have also been used in a prison context to support mobile learning where internet access is forbidden (Murphy, Bedford, & Farley, 2014). While many studies focus on particular technology, others compare different technologies, for example Martin & Ertzberger (2013) compare iPods, iPads and traditional computer based instruction.

Along with the devices themselves, technologies for communications have also evolved considerably, changing the focus of research. Many early mobile learning systems relied on SMS text messaging (Bollen et al. 2004), and indeed this simple technology still has a role to play in mobile learning systems in parts of the world where mobile device ownership is predominantly focused on low-end devices rather than smart phones or tablets (e.g. Cavus & Ibrahim, 2008.) Similarly, with the rise of personal digital audio devices, podcasting became very popular (Read, 2005), followed by vodcasting, as more devices became capable of playing video (Edwards, Jones, & Murphy, 2007.) Not all of this work was confined to one way broadcasting. Some mobile learning using small video capable devices enables the learners to develop and share their own content (Wilson, Andrews, & Dale, 2009.) Thus when we refer to communication, we are concerned not only with the technologies that support it, but the modes of communication that leverage this infrastructure, such as audience response systems and learning management systems.

A consequence of increasing access to communications technology has been the increasing use of web based tools. Indeed, in the first decade of the 21st century, the concepts of content creation and sharing became increasingly prevalent as Web 2.0 tools became commonly used as a means of supporting mobile learning where both teachers and learners could create and share content, using various features of Web 2.0 technologies such as blogging (Pierroux, Krange & Sem, 2011) and social networking (Pimmer et al, 2012.) The affordances of these web 2.0 tools enabled educators to support constructivist learning in their courses (Cochrane & Bateman, 2010.) As the technology continues to evolve, mobile learning researchers embrace these changes, for example the rapid adoption of tablet computers (Melhuish & Falloon, 2010) and cloud computing (Verma, Dubey & Rizvi, 2012.)

Technological advances have increased the affordances of mobile learning. These range from the straightforward concepts of multimedia, to more complex types of affordances such as ubiquitous technologies and virtuality. There are a number of examples of work where some kind of virtuality is introduced into the mobile learning process. This includes augmented reality (Price & Rogers, 2004), mixed reality, where real and virtual worlds are combined in real time (Doswell & Harmeyer, 2007) and alternate reality. Alternate reality activities are a combination of searching for information and sharing information, but have no predefined narrative. Open ended alternate reality is uncommon in learning activities, as they tend to be more structured. However there are some

Figure 4. The 'Technology' branch of the Mind Map



interesting hybrids of mixed and alternate reality, where the investigation is loosely structured. Kocher, Rusnak & Eklund (2010) emphasise a ludic (playful) approach focused on storymaking, which embodies ambiguous properties giving implicit direction for participants to collaborate with each other and understand what they can or should do. A broader and longer running alternate reality game that included elements of mobile device creativity is described by Keegan (2011). Other more structured examples include 'Invisible Buildings' (Winter & Pemberton, 2011) and 'Savannah' (Facer et al., 2004.) Virtuality also extends to virtual pets (Hildmann, Uhlemann & Livingstone, 2008.)

CONTENT

Figure 5 shows the subtree from the Mind Map that explores the overarching theme of 'Content'. Content in mobile learning systems is usually targeted to a specific curriculum subject, and for the purposes of the Mind Map these have been grouped according to the Library of Congress classification (Library of Congress, 2014). Sciences are well addressed in mobile learning, for example mathematics has frequently been the target of mobile learning systems, as it can take advantage of various affordances of mobile devices such as calculators and sensors, and many mathematics learning systems are based on the ability to take the device outside the classroom and apply mathematical problem solving to real world contexts (Tangney et al., 2010.) Other major science classifications addressed by mobile learning include chemistry (Dekhane & Tsoi, 2012) and biology (Liu et al., 2009). Subjects from science subclasses have included nuclear power (Chang, Wu & Hsu, 2013) while subclasses from the social sciences have included awareness of traffic violations (Lan & Huang, 2012.) Further main classifications that are well represented in the mobile learning literature are world history (e.g. Wake & Baggetun, 2009) geography (Chang et al., 2012), and language and literacy, where mobile learning has proved particularly popular for learning languages, especially English. For example Cavus & Ibrahim (2009) used SMS for those learning English as a foreign language.

Mobile learning systems targeted at the professional learner will have content oriented towards skills, such as medical (Edwards et al. 2007; Havelka, 2011) or teaching skills (Seppälä & Alamäki, 2003). Not all content is specific to a curriculum subject or professional skill. For example Chiauzzi et al (2008) focus on the personal development topic of stress management. More generic types of content covered in mobile learning include learning schedules and cross cultural communication.

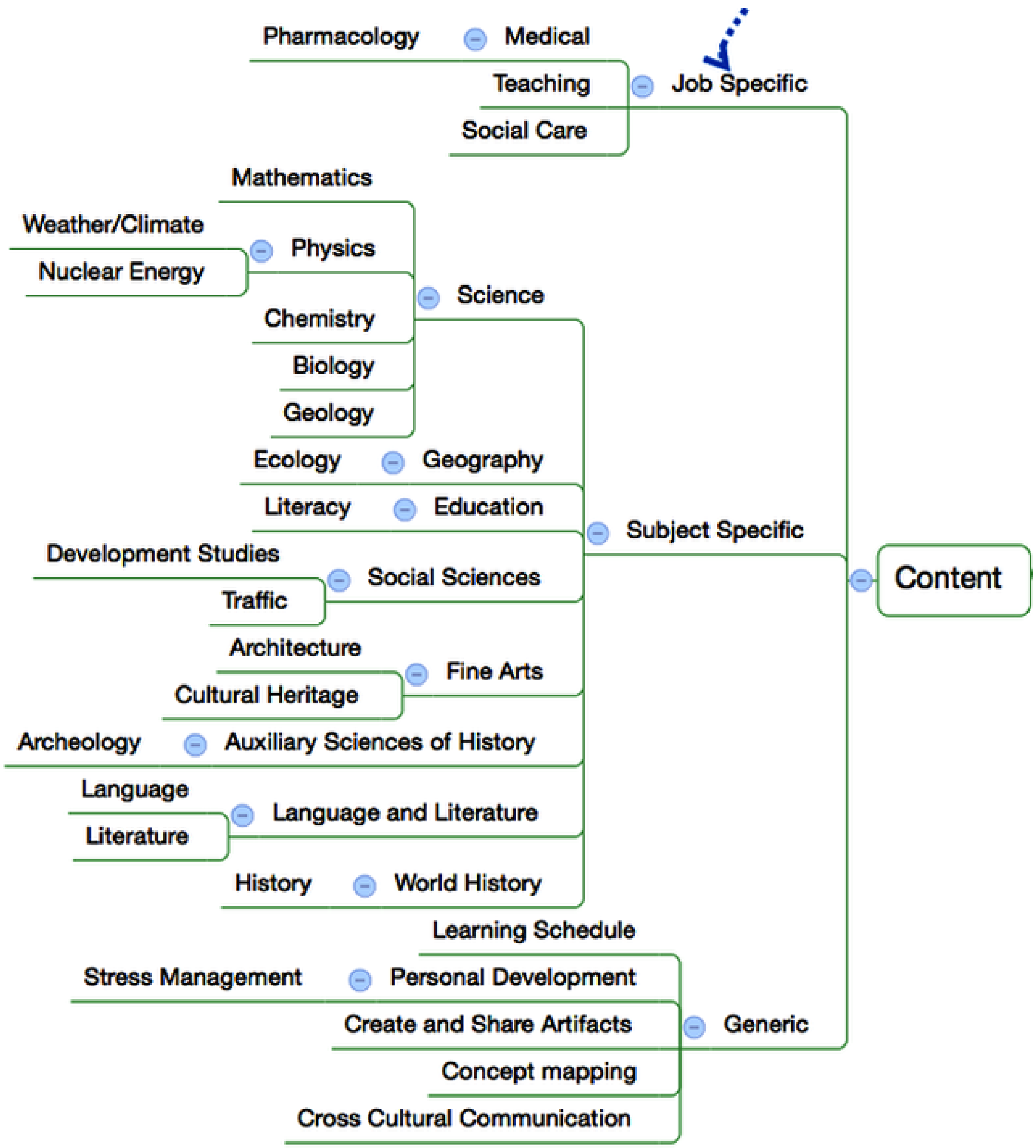
LEARNING

Figure 6 shows the subtree from the Mind Map that explores the overarching theme of 'Learning'. The learning category has been subdivided into style and context, with context further subdivided.

There are many learning styles, for example game-based learning which has been suggested holds the attention of young learners and motivates them (Kumar et al, 2010). The concept of scaffolding (from Bruner) is intended to support the initial stages of a learning process, and can be embedded in the design of mobile learning tools (Chen, 2003). Many authors distinguish between formal and informal modes of learning (e.g. Santos & Ali, 2012). Some learning styles are targeted at the individual, some at the group. Individual mobile learning addresses issues such as self-regulated learning (Sha et al., 2012), while other approaches emphasise collaboration and group work (Bowman, 1998), and the supporting of learner communities.

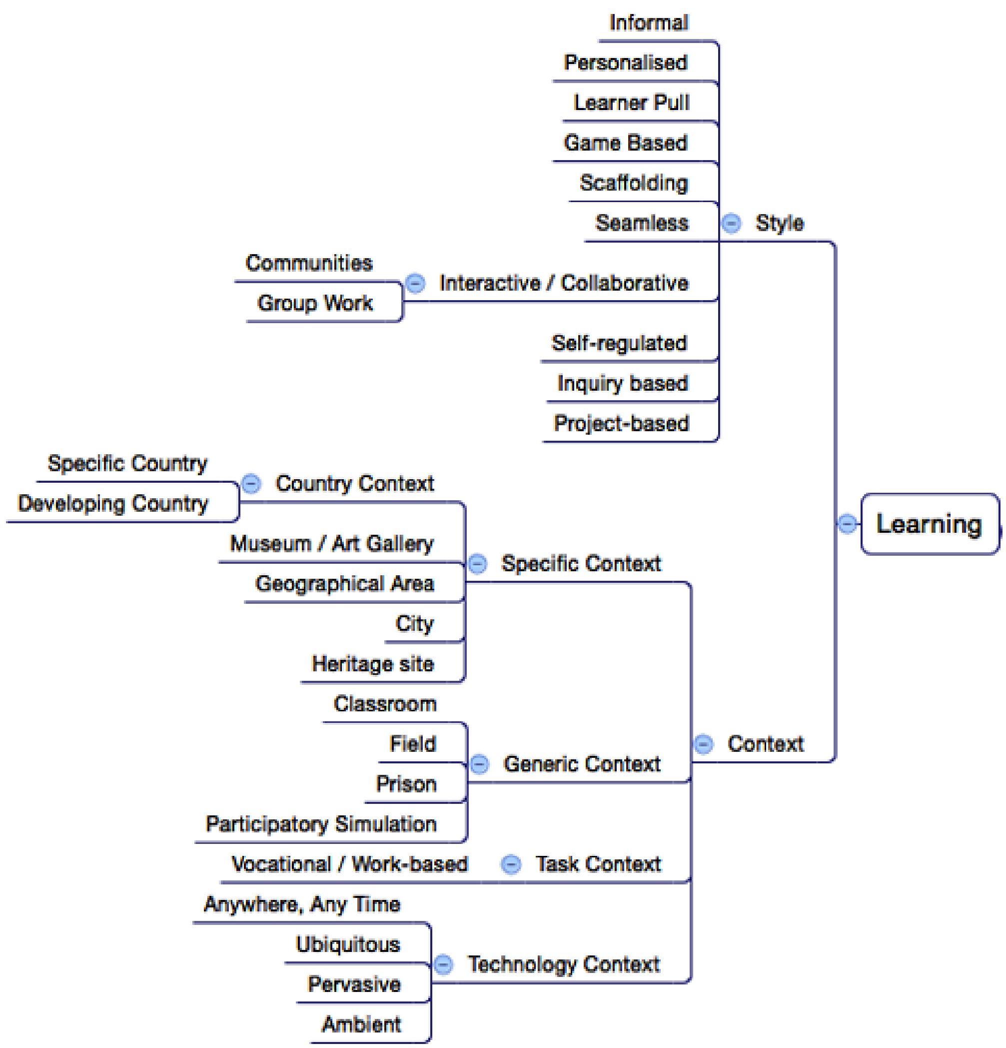
Within the context category, we make a distinction between general types of context and specific learning locations. For example, the classroom is one type of context, which relates

Figure 5. The 'Content' branch of the Mind Map



to the general concept of using mobile devices inside the classroom; the actual location of the classroom is not relevant. In contrast, the specific physical location (which may range from a local to a national context) is an important feature of many mobile learning experiences. A further task context is one in which a particular work-based task is to be performed. This is categorised as a separate context, since it may be relevant to both generic and specific situations.

Figure 6. The 'Learning' branch of the Mind Map



Though we have separated out styles and contexts they may of course overlap. For example Hung (2002) draws connections between situated cognition and problem-based learning (PBL) with educational technologies, and Uden (2007) discusses the relationship between collaborative learning using mobile technologies and the concepts of distributed cognition.

For learning in specific context, mobile devices naturally extend their learning support to outdoor learning environments. One of the most effective ways to teach subjects such as geography and heritage is through situated field study (Ahmad & Pinkward, 2012; Nordmark & Milrad, 2012). Where learning is situated in this way, location awareness is often a key component, whether indoor or outdoor (Brown et al, 2010.) Cook's (2010) concept of the augmented context for development in mobile learning applications integrates Vygotsky's zone of proximal development into location based learning activities.

Although our mind map includes a separate 'Technology' category, we also include a 'Technology Context' here, because specific types of technology environment can shape particular types of learning. A simple example is 'anywhere, anytime' learning, which depends on seamless technology infrastructure. A number of articles that explore more specialised technological contexts refer to terms such as ubiquitous, pervasive and ambient learning. These terms can be difficult to pin down, and in some cases may be used interchangeably. For the purposes of our analysis, we defined the terms as follows:

1. **Ubiquitous Learning:** learning that takes advantage of ubiquitous technologies, with technology integrated into the objects and activities of learning (Ogata et al, 2010).
2. **Pervasive Learning:** Where the technology penetrates or affects everything in the learning process. Thus it may be seen to be perhaps more specifically mobile than ubiquitous technology. For example it may involve bringing a mobile learning game into a particular environment (Laine, et al 2010). A consequence of this is that pervasive learning is also likely to be aware of its context (Syvänen et al, 2005).
3. **Ambient Learning:** Where the learning technologies are in the surrounding environment, For example the learning context might include sensors, tags, geotagging, interactive bar codes etc. (Price & Rogers, 2004).

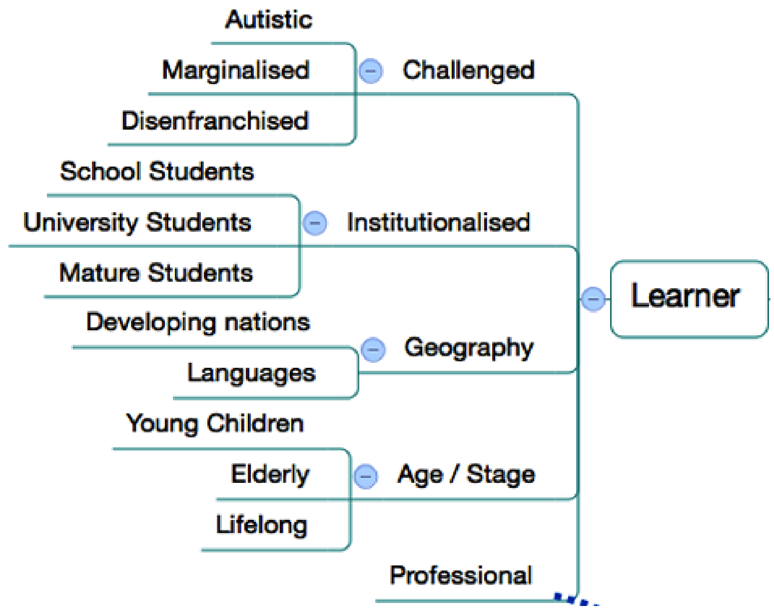
LEARNER

Figure 7 shows the subtree from the Mind Map that explores the overarching theme of the 'Learner'. Mobile learning solutions cannot be considered independently of the learner group for which they are intended. The learner category is mainly concerned with particular groups of individuals whose physical or social constraints lead to specific goals and needs. Groups of learners might be categorised in number of ways, for example by age, nationality, language or role, among many other possible categories. Age is an important learner category, because content and learning style need to be age appropriate. This does not just mean differentiating between the stages of institutionalised schooling, such as higher education (Alexander, 2004) or school, but may also involve other age groups outside of formal institutions, such as the elderly (Lam & Chung, 2009). Neither is the learner necessarily being targeted in the mainstream of education provision, since they may be challenged in some way, for example they may be marginalised (Unterfrauner & Marschalek, 2009). The nationality and/or language of the learner can also be a major factor, since some mobile learning applications are designed for a particular country or wider geographical context, often focusing on issues in developing countries, such as in Africa (Traxler & Leach, 2006; Lwoga, 2012), or India (Kumar et al., 2010), while others are specifically about teaching foreign languages (Viberg & Grönlund, 2013). Another important learner type is that of the professional learner, whose mobile learning needs may often be focused on learning support in context, or specific professional training. Common categories of professionals targeted by mobile learning systems include teachers (Seppälä & Alamäki, 2003), medical workers (Edwards, Jones & Murphy, 2007; Havelka, 2011; Pimmer et al. 2013) and those in the military (Metcalf & De Marco, 2006), or even a combination of military and medical (Han, Harkke, Collan & Tétard, 2006). Further categories of learner include prisoners (Murphy, Bedford & Farley, 2014) and the disabled (Rainger, 2005, Brown et al., 2011).

CONCLUSION

This article has approached the field of mobile learning research from a perspective of creative visualisation. A timeline has revealed notable stages in the evolution of research, from pioneering concepts and activities, through large scale national and international projects, to maturing forms of dissemination, with an underpinning

Figure 7. The 'Learner' branch of the Mind Map



process of technological change. The mind map has shown the breadth of research, its core themes, and some indicative work. This shows how mobile learning research is sometimes of the moment (many of the technologies used in past research are now obsolete) or very specialised (e.g. teaching a very specific topic) but may also address long term issues of teaching and learning theory and practice.

What conclusions might we draw from this analysis? From the timeline we can see that mobile learning as a research field has evolved through a series of stages, in which researchers have often provided the vision for the future that has later been met by the technology. Eventually, Alan Kay's vision for the Dynabook could be implemented in hardware and software. Pioneering researchers brought new devices into the classroom, and ultimately the learners began to bring their own devices. From these cycles we can see that the main role of the researcher is to create visions for the future. These visions may not be very practical in the short term, but give direction and impetus to others who can bring these ideas into mainstream learning. The message from the timeline for current researchers is to cast their eye beyond current technology and practice and imagine the potential opportunities for the mobile learning that are not yet even possible or practical.

From the mind map we can see that the field of mobile learning is very broad and researchers have already explored a multitude of theories, applications, topics and tools. Nevertheless there are great future opportunities. New technologies arrive all the time, enabling us to explore new ways to learn with these tools. There are many mobile learning applications that have addressed the core categories of the Library of Congress classifications, yet there are many sub-classifications that have yet to gain the benefit of innovative, specialised mobile learning applications. Many theories have been applied to mobile learning, yet there still seem to be ample opportunities for researchers to reinterpret existing theory in this research context, and to evolve new theory as the field matures and evolves. Perhaps the lesson that we might draw from the mind map is that, whilst some aspects of mobile learning have been exhaustively covered, there are always new branches that can be added to this tree of concepts.

There are of course a number of limitations to this work. While the literature coverage is broad it is by no means exhaustive. The categorisation is also largely subjective and is not quantitative. It would be interesting to see how this creative mind mapping technique might reveal very different interpretations of similar source material, if used by other researchers. More objective, qualitative analyses, perhaps measuring impact, would also be of value.

Despite its limitations, it is hoped that this article will be useful to new researchers seeking to understand the background to the research field, and find areas of research that are of interest to them. It may also act as a guide to aspects of mobile learning that have not yet been reported in detail in the literature. For existing mobile learning researchers, perhaps this contribution will help them to contextualise their own work within a broader vision of mobile learning, and thus give them inspiration for extending their future work into new areas.

REFERENCES

Ahmad, M. S., & Pinkward, N. (2012). Supporting Field and In-class Collaborative Learning: Towards a Generalized Framework. In *Proceedings of the 7th IEEE International Conference on Wireless, Mobile and Ubiquitous Technology in Education (WMUTE)*, 147 – 151. doi:10.1109/WMUTE.2012.34

Ahmed, H., & Parsons, D. (2013). Abductive science inquiry using mobile devices in the classroom. *Computers & Education*, *63*, 62–72. doi:10.1016/j.compedu.2012.11.017

Alexander, B. (2004). Going Nomadic: Mobile Learning in Higher Education. *EDUCAUSE Review*, *39*(5), 28–35.

Ally, M. (Ed., 2009). Mobile Learning: Transforming the Delivery of Education and Training. Edmonton: Athabasca University Press.

Associates, P. J. B. (2001). Developing the Mobile Learning Business http://www.pjb.co.uk/m-learning/m-learning-Forum-First-meeting/dmlb.htm

Beel, J., & Gipp, B. (2010). Enhancing Information Search by Utilizing Mind Maps. In *Proceedings of the 21st ACM Conference on Hyptertext and Hypermedia (HT'10)*, pages 303–304, ACM Press. doi:10.1145/1810617.1810686

Bollen, L. et al. (2004). SMS-based discussions - technology enhanced collaboration for a literature course. In *Proceedings of the 2nd IEEE International Workshop on Wireless and Mobile Technologies in Education*, 209-210 doi:10.1109/WMTE.2004.1281393

Bowman, R. (1998). Life on the electronic frontier: The application of technology to group work. *Journal for Specialists in Group Work*, *23*(4), 232–238. doi:10.1080/01933929808411411

Brown, A. L., & Campione, J. C. (1996). Psychological theory and the design of innovative learning environments: On procedures, principles, and systems. In L. Schauble & R. Glaser (Eds.), *Innovations in learning: New environments for education* (pp. 289–325). Mahwah, NJ: Erlbaum.

Brown, D. J., McHugh, D., Standen, P., Evett, L., Shopland, N., & Battersby, S. (2011). Designing location-based learning experiences for people with intellectual disabilities and additional sensory impairments. *Computers & Education*, *56*(1), 11–20. doi:10.1016/j.compedu.2010.04.014

Brown, E., Börner, D., Sharples, M., Glahn, C., de Jong, T., & Specht, M. (2010). Location-based and contextual mobile learning. A STELLAR Small-Scale Study, STELLAR European Network of Excellence in TEL(EU). http://oro.open.ac.uk/29886/1/Sss6.pdf

Brown, J. S., Collins, A., & Duguid, P. (1989). Situated cognition and the culture of learning. *Educational Researcher*, *18*(1), 32–42. doi:10.3102/0013189X018001032

Bui, A., Aberle, D., & Kangarloo, H. (2007). TimeLine: Visualizing Integrated Patient Records. *IEEE Transactions on Information Technology in Biomedicine*, *11*(4), 464–473. doi:10.1109/TITB.2006.884365 PMID:17674629

Carmen, et al. (2012). Towards better UIs for mobile learning: experiences in using mobile phones as multimedia tools at schools in rural Panama, In *Proceedings of 11th International Conference on Mobile and Ubiquitous Multimedia. (MUM '12)*

Cavus, N., & Ibrahim, D. (2009). m-Learning: An experiment in using SMS to support learning new English language words. *British Journal of Educational Technology*, *40*(1), 78–91. doi:10.1111/j.1467-8535.2007.00801.x

Chang, , Chatterjea, K., Goh, D. H.-L., Theng, Y. L., Lim, E.-P., & Sun, A. et al. (2012). Lessons from learner experiences in a field-based inquiry in geography using mobile devices. *International Research in Geographical and Environmental Education*, *21*(1), 41–58. doi:10.1080/10382046.2012.639155

Chang, H., Wu, H., & Hsu, Y. (2013). Integrating a mobile augmented reality activity to contextualize student learning of a socioscientific issue. *British Journal of Educational Technology*, *44*(3), E95–E99. doi:10.1111/j.1467-8535.2012.01379.x

Chen, Y. S., Kao, T. C., & Sheu, J. P. (2003). A mobile learning system for scaffolding bird watching learning. *Journal of Computer Assisted Learning*, *19*(3), 347–359. doi:10.1046/j.0266-4909.2003.00036.x

Chiauzzi, E., Brevard, J., Thurn, C., Decembrele, S., & Lord, S. (2008). MyStudentBody–Stress: An Online Stress Management Intervention for College Students. *Journal of Health Communication*, *13*(6), 555–572. doi:10.1080/10810730802281668 PMID:18726812

Cinque, M. & Pensieri, C. (2009). Campus We-Com. University students' attitude towards didactical innovation. *Journal of e-Learning and Knowledge Society 5*(1), 181-189.

Cochrane, T., & Bateman, R. (2010). Smartphone give you wings: Pedagogical affordances of mobile Web 2.0. *Australasian Journal of Educational Technology*, *26*(1), 1–14.

Cook, J. (2010). Mobile Phones as Mediating Tools within Augmented Contexts for Development. *International Journal of Mobile and Blended Learning*, *2*(3), 1–12. doi:10.4018/jmbl.2010070101

Corbeil, J. R., & Valdes-Corbeil, E. (2007). Are You Ready for Mobile Learning? *EDUCAUSE Quarterly*, *2*, 51–58.

Csíkszentmihályi, M. (1996). *Finding Flow: The Psychology of Engagement With Everyday Life*. Basic Books.

Davies, M. (2011). Concept mapping, mind mapping and argument mapping: What are the differences and do they matter? *Higher Education*, *62*(3), 279–301. doi:10.1007/s10734-010-9387-6

Dekhane, S., & Tsoi, M. (2012). Designing a Mobile Application for Conceptual Understanding: Integrating Learning Theory with Organic Chemistry Learning Needs. *International Journal of Mobile and Blended Learning*, *4*(3), 34–52. doi:10.4018/jmbl.2012070103

Doswell, J., & Harmeyer, K. (2007). Extending the 'Serious Game' Boundary: Virtual Instructors in Mobile Mixed Reality Learning Games. In *Proceedings of the Digital Games Research Association International Conference (DiGRA)*.

Edwards, M., Jones, S., & Murphy, F. (2007). Handheld video for clinical skills teaching. *Innovations in Education and Teaching International*, *44*(4), 401–408. doi:10.1080/14703290701602821

Elias, T. (2011). Universal instructional design principles for mobile learning. *International Review of Research in Open and Distance Learning*, *12*(2), 143–156.

Facer, K., Stanton, D., Kirk, D., Joiner, R., Reid, J., & Hull, R. (2004). Savannah: Mobile gaming and learning? *Journal of Computer Assisted Learning*, *20*(6), 399–409. doi:10.1111/j.1365-2729.2004.00105.x

Gardner, J., Morrison, H., Jarman, R., Reilly, C., & Mcnally, H. (1994). Learning with portable computers. *Computers & Education*, *22*(1–2), 161–171. doi:10.1016/0360-1315(94)90084-1

Gayeski, D. (2002). *Learning Unplugged: Using Mobile Technologies for Organizational Training and Performance Improvement*. New York: AMACOM.

Grant, W. (1993). Wireless Coyote: a computer-supported field trip. *Communications of the ACM - Special issue on technology in K–12 education. 36*(5), 57-59

Guy, R. (Ed., 2009). The Evolution of Mobile Teaching and Learning. Santa Rosa, California: Informing Science Press.

Han, S., Harkke, V., Collan, M., & Tétard, F. (2006). Usage of a Mobile Medical Information System: An Investigation of Physicians in the Military Service. In Proceedings *19th Bled eConference*, Bled, Slovenia, June 5 - 7, 2006.

Harris, E., Fitzpatrick, G., Rogers, Y., Price, S., Phelps, T., & Randell, C. (2004). From Snark to Park: Lessons learnt moving pervasive experiences from indoors to outdoors. In *Proceedings 5th Australasian User Interface Conference (AUIC 2004)*.

Harrison, C., Youngman, M., Bailey, M., Fisher, T., Phillips, R., & Restorick, J. (1998). *Multimedia Portables for Teachers Pilot Project Report Coventry: British Educational Communications and Technology Agency*. Becta.

Havelka, S. (2011). Mobile Resources for Nursing Students and Nursing Faculty. *Journal of Electronic Resources in Medical Libraries*, *8*(2), 194–199. doi:10.1080/15424065.2011.576623

Herrington, J., Herrington, A., Mantei, J., Olney, I., & Ferry, B. (Eds.). (2009). *New technologies, new pedagogies: Mobile learning in higher education*. University of Wollongong.

High, J., & Fox, C. (1984). Seven-year olds discover Microwriters. Implications for literacy of autonomous and collaborative learning in the infant classroom. *English Education*, *18*(2), 15–25. doi:10.1111/j.1754-8845.1984.tb00662.x

Hildmann, H., Uhlemann, A., & Livingstone, D. (2008). A Mobile Phone Based Virtual Pet to Teach Social Norms and Behaviour to Children. In *Proceedings 2nd IEEE International Conference on Digital Game and Intelligent Toy Enhanced Learning*, pp.15-17 doi:10.1109/DIGITEL.2008.41

Hung, D. (2002). Situated Cognition and Problem-Based Learning: Implications for Learning and Instruction with Technology. *Journal of Interactive Learning Research*, *13*(4), 393–414.

Hutchins, E. (1995). *Cognition in the Wild*. Bradford: MIT Press.

Kay, A. (1972). *A Personal Computer for Children of All Ages*. Xerox Palo Alto Research Center http://history-computer.com/Library/Kay72.pdf

Keegan, H. (2011). *Running a module as an ARG a.k.a. The Rufi Franzen Mystery* http://heloukee.wordpress.com/2011/12/11/running-a-module-as-an-arg-a-k-a-the-rufi-franzen-mystery/

Kim, et al. (2013). *Evolution to Smart Learning in Public Education: A Case Study of Korean Public Education*. Open and Social Technologies for Networked Learning IFIP Advances in Information and Communication Technology.

Klopfer, E., Squire, K., & Jenkins, H. (2002). Environmental Detectives: PDAs as a window into a virtual simulated world. In *Proceedings of IEEE International Workshop on Wireless and Mobile Technologies in Education*, 95-98 doi:10.1109/WMTE.2002.1039227

Kocher, M., Rusnak, P. J., & Eklund, K. (2010). Breaking boundaries: learning by ARG within an academic conference presentation. In *Proceedings of the International Academic Conference on the Future of Game Design and Technology*, 223-226. doi:10.1145/1920778.1920812

Kukulska-Hulme, A., & Traxler, J. (2005). *Mobile Learning: A Handbook for Educators and Trainers*. Psychology Press.

Kumar, et al. (2010). An exploratory study of unsupervised mobile learning in rural India. In *Proceedings of the SIGCHI Conference on Human Factors in Computing Systems* doi:10.1145/1753326.1753435

Laine, T. H., Vinni, M., Islas Sedano, C., & Joy, M. S. (2010). On Designing a Pervasive Mobile Learning Platform. *ALT-J: Research in Learning Technology*, *18*(1), 3–17. doi:10.1080/09687761003657606

Lam, S., & Chung, W. (2009). Understanding the need of mobile ICT learning as an elderly learning tool. *International Journal of Emerging Technologies in Learning*, *4*(4).

Lan, Y., & Huang, S. (2012). Using Mobile Learning to Improve the Reflection: A Case Study of Traffic Violation. *Journal of Educational Technology & Society*, *15*(2), 179–193.

Laurillard, D. (2007). Pedagogical forms for mobile learning: framing research questions. In N. Pachler (Ed.), *Mobile learning: towards a research agenda. London* (pp. 153–175). London: WLE Centre, Institute of Education.

Library of Congress. (2014). Library of Congress Classification Outline. http://www.loc.gov/catdir/cpso/lcco/

Liu, T., Peng, H., Wu, W., & Lin, M. (2009). The Effects of Mobile Natural-science Learning Based on the 5E Learning Cycle: A Case Study. *Journal of Educational Technology & Society*, *12*(4), 344–358.

Looi, C.-K., Wong, L.-H., So, H.-J., Seow, P., Toh, Y., & Chen, W. et al. (2009). Anatomy of a mobilized lesson: Learning my way. *Computers & Education*, *53*(4), 1120–1132. doi:10.1016/j.compedu.2009.05.021

Lwoga, (2012). Making learning and Web 2.0 technologies work for higher learning institutions in Africa, *Campus-Wide Information Systems. 29*(2), 90-107.

Martin, F., & Ertzberger, J. (2013). Here and now mobile learning: An experimental study on the use of mobile technology. *Computers & Education*, *68*, 76–85. doi:10.1016/j.compedu.2013.04.021

Melhuish, K., & Falloon, G. (2010). Looking to the future: M-learning with the iPad. *Computers in New Zealand Schools: Learning, Leading. Technology (Elmsford, N.Y.)*, *22*(3), 1–16.

Metcalf, D., & De Marco, M. J. (2006). Mlearning: Mobile Learning And Performance in the Palm of Your Hand. Amherst, Mass: HRD Press.

Motiwalla, L. F. (2007). Mobile learning: A framework and evaluation. *Computers & Education*, *49*(3), 581–596. doi:10.1016/j.compedu.2005.10.011

Murphy, A., Bedford, T., & Farley, H. (2014). Providing simulated online and mobile learning experiences in a prison education setting: Lessons learned from the PLEIADES pilot project. *International Journal of Mobile and Blended Learning*, *6*(1).

Nordmark, S., & Milrad, M. (2012). Using Mobile Digital Storytelling to Support Learning about Cultural Heritage, In *Proceedings of IEEE Seventh International Conference on Wireless, Mobile and Ubiquitous Technology in Education (WMUTE)*, 9 - 16. doi:10.1109/WMUTE.2012.10

Norris, C., & Soloway, E. (2011). Learning and Schooling in the Age of Mobilism. *Educational Technology*, (Nov/Dec): 3–10.

Ogata, H., Li, M., Hou, B., Uosaki, N., El-Bishouty, M. M., & Yano, Y. (2010). Ubiquitous Learning Log: What if we can log our ubiquitous learning? In *Proceedings of the 18th International Conference on Computers in Education*, 360-367.

Oppermann, R., & Specht, M. (1998). Adaptive Support for a Mobile Museum Guide. *Proceedings of Workshop on Interactive Applications of Mobile Computing (IMC'98)*.

Orr, G. (2010). A Review of Literature in Mobile Learning: Affordances and Constraints. In Proceedings *of 6th IEEE International Conference on Wireless, Mobile, and Ubiquitous Technologies in Education*, 107-111.

Park, J., Parsons, D., & Ryu, H. (2010). To Flow and Not to Freeze: Applying Flow Experience to Mobile Learning. *IEEE Transactions on Learning Technologies*, *3*(1), 56–67. doi:10.1109/TLT.2010.1

Parsons, D., Ryu, H., & Cranshaw, M. (2007). A Design Requirements Framework for Mobile Learning Environments. *Journal of Computers*, *2*(4), 1–8. doi:10.4304/jcp.2.4.1-8

Patten, B., Arnedillo Sánchez, I., & Tangney, B. (2006). Designing collaborative, constructionist and contextual applications for handheld devices. *Computers & Education*, *46*(3), 294–308. doi:10.1016/j.compedu.2005.11.011

Pierroux, P., Krange, I., & Sem, I. (2011). Bridging contexts and interpretations: Mobile blogging on art museum field trips. *Journal of Media and Communication Research*, *50*, 30–47.

Pimmer, C., Linxen, S., & Gröhbiel, U. (2012). Facebook as a learning tool? A case study on the appropriation of social network sites from the mobile phones in developing countries. *British Journal of Educational Technology*, *43*(5), 726–738. doi:10.1111/j.1467-8535.2012.01351.x

Pimmer, C., Linxen, S., Gröhbiel, U., Jha, A., & Burg, G. (2013). Mobile learning in resource-constrained environments: A case study of medical education. *Medical Teacher*, *35*(5), 1157–1165. doi:10.3109/0142159X.2012.733454 PMID:23137244

Pollara, M., & Broussard, K. (2011). Mobile Technology and Student Learning: What Does Current Research Reveal? *International Journal of Mobile and Blended Learning*, *3*(3), 34–42. doi:10.4018/jmbl.2011070103

Price, S., & Rogers, Y. (2004). Lets get physical: The learning benefits of interacting in digitally augmented physical spaces. *Computers & Education*, *43*(1-2), 137–151. doi:10.1016/j.compedu.2003.12.009

Price, S., Rogers, Y., Scaife, M., Stanton, D., & Neale, H. (2003). Using 'tangibles' to promote novel forms of playful learning. *Interacting with Computers*, *15*(2), 169–185. doi:10.1016/S0953-5438(03)00006-7

Rainger, P. (2005). Accessibility and Mobile Learning. In A. Kukulska-Hulme & J. Traxler (Eds.), *Mobile Learning: A Handbook for Educators and Trainers*. Abingdon, Oxon: Routledge.

Read, B. (2005). Abandoning Cassette Tapes, Purdue U. Will Podcast Lectures in Almost 50 Courses. *The Chronicle of Higher Education*, *52*(3), 32.

Rieger, R., & Gay, G. (1997). Using mobile computing to enhance field study. In *Proceedings of 2nd international conference on Computer support for collaborative learning (CSCL 97)*. doi:10.3115/1599773.1599800

Rodríguez, P., Nussbaum, M., Zurita, G., Rosas, R., & Lagos, F. (2001). Personal digital assistants in the classroom: an experience. In *Proceedings of World Conference on Educational Multimedia, Hypermedia and Telecommunications* 1567-1572.

Santos, L. M., & Ali, N. (2012). Exploring the uses of mobile phones to support informal learning. *Education and Information Technologies*, *17*(2), 187–203. doi:10.1007/s10639-011-9151-2

Sattler, B., Spyridakis, I., Dalal, N., & Ramey, J. (2010). The learning experience: A literature review of the role of mobile technology. In *Proceedings IEEE International Professional Communication Conference (IPCC)*, 38-45. doi:10.1109/IPCC.2010.5529811

Seppälä, P., & Alamäki, H. (2003). Mobile learning in teacher training. *Journal of Computer Assisted Learning*, *19*(3), 330–335. doi:10.1046/j.0266-4909.2003.00034.x

Sha, L., Looi, C.-K., Chen, W., & Zhang, B. H. (2012). Understanding mobile learning from the perspective of self-regulated learning. *Journal of Computer Assisted Learning*, *28*(4), 366–378. doi:10.1111/j.1365-2729.2011.00461.x

Sharples, M. (2000). The design of personal mobile technologies for lifelong learning. *Computers & Education*, *34*(3-4), 177–193. doi:10.1016/S0360-1315(99)00044-5

Sharples, M., Corlett, D., & Westmancott, O. (2002). The Design and Implementation of a Mobile Learning Resource. *Personal and Ubiquitous Computing*, *6*(3), 220–234. doi:10.1007/s007790200021

Sharples, M., Taylor, J., & Vavoula, G. (2007). A Theory of Learning for the Mobile Age. In R. Andrews & C. Haythornthwaite (Eds.), *The Sage Handbook of Elearning Research* (pp. 221–247). London: Sage.

Siemens, G. (2004). Connectivism: A Learning Theory for the Digital Age. http://devrijeruimte.org/content/artikelen/Connectivism.pdf

Syvänen, A., Beale, R., Sharples, M., Ahonen, M., & Lonsdale, P. (2005). Supporting Pervasive Learning Environments: Adaptability and Context Awareness in Mobile Learning. In Proceedings *IEEE International Workshop on Wireless and Mobile Technologies in Education*. 1, 251 - 253

Tangney, B., Weber, S., Knowles, D., Munnelly, J., Watson, R., Salkham, A., & Jennings, K. (2010). MobiMaths: An approach to utilising smartphones in teaching mathematics. In proceedings *9th International Conference on Mobile and Contextual Learning (MLearn 2010).*

Traxler, J. (2009). Current State of Mobile Learning. In M. Ally (Ed.) Mobile Learning: Transforming the Delivery of Education and Training. Athabasca University Press. 9-24.

Traxler, J., & Kukulska-Hulme, A. (2005). Evaluating Mobile Learning: Reflections on Current Practice. In Proceedings of mLearn 2005: Mobile technology: The future of learning in your hands, 25-28.

Traxler, J., & Leach, J. (2006). Innovative and Sustainable Mobile Learning in Africa. In *Proceedings of 4th IEEE International Workshop on Wireless, Mobile and Ubiquitous Technology in Education*. doi:10.1109/WMTE.2006.261354

Uden, L. (2007). Activity theory for designing mobile learning. *International Journal of Mobile Learning and Organisation*, *1*(1), 81–102. doi:10.1504/IJMLO.2007.011190

Unterfrauner, E., & Marschalek, I. (2009). ICT and Mobile Phones as Resources for Marginalised Youth. In *Proceedings 8th International Conference on Interaction Design and Children*.

Vavoula, G., Lefrere, P., O'Malley, C., Sharples, M., & Taylor, J. (2003). Producing guidelines for learning, teaching and tutoring in a mobile environment. In *Proceedings of the 2nd IEEE International Workshop on Wireless and Mobile Technologies in Education (WMTE'04)*, 173

Vavoula, G., & Sharples, M. (2009). Meeting the Challenges in Evaluating Mobile Learning: A 3-Level Evaluation Framework. *International Journal of Mobile and Blended Learning*, *1*(2), 54–75. doi:10.4018/jmbl.2009040104

Verma, K., Dubey, S., & Rizvi, M. (2012). Mobile Cloud A New Vehicle For Learning: m-Learning Its Issues And Challenges. *International Journal of Science and Applied Information Technology*, *1*(3), 93–97.

Viberg, O., & Grönlund, A. (2013). Systematising the Field of Mobile Assisted Language Learning. *International Journal of Mobile and Blended Learning*, *5*(4), 72–90. doi:10.4018/ijmbl.2013100105

Wake, J., & Baggetun, R. (2009). "Premierløytnant Bielke": A Mobile Game for Teaching and Learning History. *International Journal of Mobile and Blended Learning*, *1*(4), 12–28. doi:10.4018/jmbl.2009090802

Wilson, D., Andrews, B., & Dale, C. (2009). Choreo:pod: Dance and the iPod - Towards Blended Learning. *International Journal of Mobile and Blended Learning*, *1*(1), 49–60. doi:10.4018/jmbl.2009010104

Wingkvist, A., & Ericsson, M. (2011). A Survey of Research Methods and Purposes in Mobile Learning. *International Journal of Mobile and Blended Learning*, *3*(1), 1–17. doi:10.4018/jmbl.2011010101

Winter, M., & Pemberton, K. (2011). Unearthing Invisible Buildings: Device Focus and Device Sharing in a Collaborative Mobile Learning Activity. *International Journal of Mobile and Blended Learning*, *3*(4), 1–18. doi:10.4018/jmbl.2011100101

This work was previously published in the International Journal of Mobile and Blended Learning (IJMBL), 6(4); edited by David Parsons, pages 1-21, copyright year 2014 by IGI Publishing (an imprint of IGI Global).

Chapter 13
Factors Related to Students' Performance of Hybrid Learning in an English Language Course

Saovapa Wichadee
Bangkok University, Thailand

ABSTRACT

Redesigning a course along the lines of a hybrid format that blends face-to-face and online learning brings about changes in instructional practice. This paper introduces hybrid teaching that uses multiple web-based tools to supplement the students' face-to-face learning environment in a difficult situation in Thailand. In order to examine factors related to student learning achievement in the hybrid teaching course, data regarding learning achievement score, amount of participation, comfort with technology, and course satisfaction were collected from 182 students enrolled in an English course and analyzed by using correlation coefficients and multiple regression analysis. The findings indicated that students had a moderate level of satisfaction with the hybrid course and comfort with technology use, and previous experience of hybrid courses did not have an effect on their satisfaction. Student learning achievement was positively correlated with how much participation students had, but was negatively correlated with students' comfort with technology. There were no correlations between student learning achievement and how satisfied they felt with the hybrid course. In addition, an analysis of benefits and drawbacks of this hybrid course allowed teachers insights into what changes were needed when adjusting the hybrid course for language teaching.

INTRODUCTION

Nowadays, applying technology in the learning process is growing fast. There is an increasing integration of web-based resources into instructional practice (Rodriguez, Ooms, & Montanez, 2008). So, new learning environments and teaching methodologies based on the utilization of information and communication technologies such as e-learning, web-based learning, open and distance learning, and hybrid learning have been introduced in many courses. The face-to-face courses in conventional format have been modified to increase more on-line learning environments

DOI: 10.4018/978-1-4666-8246-7.ch013

called 'hybrid teaching.' Hybrid teaching is a combination of formal class meetings and virtual learning to promote active, self-directed learning opportunities with added flexibility (Garnham & Kaleta, 2002). In a hybrid course, conventional learning is enriched with the use of appropriate learning technologies. An instructor reduces in-person classroom meetings and replaces a significant amount of that instructional time with online learning activities (Allan, 2006; Orhan, 2008).

Since the goal of a hybrid approach is to join the best aspects of face-to-face and online instruction, there are many benefits for both teachers and students. First, a hybrid approach provides flexibility and convenience for students to work and communicate with others. Students have a wide range of socio-emotional messages to convey their personal greetings, feelings, and humor which resulted in more interpersonal relationships (Fjermestad, Hiltz, & Zhang, 2005). Second, a hybrid course enables teachers to organize their teaching in a meaningful way. That is, face-to-face oral communication can be designed to integrate well with online written communication so as to serve the context and intended educational purposes (Graham, 2005; Bonk, Kim, & Zeng, 2006). Classroom time can be used to engage students in content which suits a face-to-face environment. Meanwhile, the online portion of the course can provide students with content at anytime and anywhere, depending on the needs of the students and the preferences of the instructor.

Teaching a hybrid course is a challenging task since it requires both online and face-to-face teaching skills. On-line activities mostly provide links to resources and downloadable text materials, administer online quizzes and electronic submission of assignments (Dabbagh & Bannan-Ritland, 2005). So, teachers new to technology need to study how to facilitate online learning to assist students in keeping their work on track and should find technical support on campus for themselves and for their students (Lin, 2009). Incorporating technology in the course depends on the relative opportunities and constraints of its learning environment. For example, teachers may consider whether the course content and learning technologies are matched. Also, teachers should manage face-to-face classes to suit activities relating to verbal communication and body languages transmitted in a real-time.

Based on a literature review, it was found that hybrid teaching environments produced satisfactory results. Many studies revealed positive influences of hybrid learning on student performance (Ladyshewsky, 2004; Motteram, 2006) and student participation (DeGeorge-Walker & Keeffe, 2010; Lopez-Perez, Perez-Lopez & Rodriguez-Ariza, 2011; Ugur, Akkoyunlu & Kurbanoglu, 2011). Moreover, Wu and Hiltz (2004) found that hybrid courses that utilized asynchronous means of communication improved students' perception of learning. According to Bhatti, Tubaisahat, and El-Quawasmeh (2005), student satisfaction about learning increased while the students' dependency on the instructor for assistance decreased. They explained that online materials provided students with the resources to seek out answers independent of the instructor. Moreover, Rodriguez and Anicete (2010) examined students' views of hybrid learning in an undergraduate Ecology course, which incorporated Modular Object Oriented Dynamic Learning Environment (MOODLE) into the online portion of the coursework. Results revealed that a majority of students had positive views and experiences with hybrid learning, despite some challenges. Implications were discussed in terms of how to better utilize this instructional format in general education courses to foster active learning.

Rivera, McAlister, and Rice (2002) surveyed student satisfaction among the three modes of learning (face to face, fully online, and hybrid) and found that student satisfaction was the highest with the hybrid learning model and that test scores were the same for all three methods of delivery. Young (2002 cited in Buzzetto-More & Sweat-Guy, 2006) examined hybrid and fully online teaching at several universities and concluded that among the three modes of instruction (face to face, fully online, and hybrid), hybrid model offered the most significant benefits for teaching and learning. Hybrid teaching produced more active and deeper learning when compared with the traditional classes (Donnelly, 2010; Woltering, Herrler, Spitzer & Spreckelsen, 2009).

Aforesaid literature review with positive outcomes of hybrid teaching strengthened our beliefs and confidence in creating hybrid course experience for students at Bangkok University. Hybrid courses were designed to solve the problem of inadequate classrooms with a hope that it could help increase students' learning the same way as the traditional method had done in the past. In October 2011, Thailand faced the serious flooding situation which caused trouble for many people. Most offices and educational institutions had to close themselves for about 2-3 months. Bangkok University was no exception. The opening of the second semester was postponed many times due to the huge flood. The university administrators worked very hard to solve this problem; they tried to reorganize the schedule to keep instruction going. However, classrooms were not enough for the upcoming semester because most of them needed repair and refurbishment. The lack of classrooms still remained the big problem. The administrators had held several meetings to find out the best solution, and they came up with the concept of "hybrid instruction." With hybrid teaching, faculty members can use a variety of online and in-class teaching strategies, making it possible to achieve course goals and objectives effectively. It was hoped that the hybrid model or the blended learning approach to teaching would allow us to develop solutions to course problems and to incorporate new types of interactive and interesting learning activities. As such, the setback from the huge flood was turned into a good opportunity for Bangkok University students to make use of their technological skills to gain knowledge. With the hybrid model which offers the most substantive benefits for teaching and learning, students would become autonomous learners (Chapelle, 2001). Simultaneously, the advent of technologies in computer networking has enabled language teachers to shift their practice in using computers for their teaching.

Although hybrid instruction was the only one choice we had during that time, it was beneficial to find out whether the designed format is really satisfied by our students since design has a significant impact on how students approach learning (Graff, 2003). When designed carefully, a hybrid course combined the best features of in-class teaching with the best features of online learning to promote active student learning (Lin, 2008). According to McFarlin (2008), the hybrid course format can increase students' exposure to course content, thereby improving their academic performance. At the end of the course, students' perception was, therefore, examined. Does the hybrid course help to motivate student learning or make them succeed in learning? Since technology-based learning is a part of hybrid teaching, it is necessary to take students' feeling and technical skills into consideration. So, two factors including students' satisfaction with the hybrid course and comfort with technology cannot be ignored as they may have something to do with students' participation in learning and achievement. A previous study revealed a positive correlation between students' visible learning behaviors, such as participating in online activities, and their learning outcomes (Wang, 2004). In some pieces of research, it was found that comfort with technology was related to satisfaction with on-line learning (Stokes, 2003), and there were several factors to be considered while developing or implementing e-learning based courses such as technical competency, and university support (Selim, 2007). For students with on-line learning experience, comfort with technology was related to satisfaction with online courses (Rodriguez, Ooms, & Montanez, 2008). The finding in one study showed that motivation had a significant relationship with on-line participation (Xie, Durrington, & Yen, 2011).

The more motivation students had, the more they participated in the on-line course. Since on-line learning is a part of the hybrid format, the current study cannot exclude the factor of comfort with technology. The results of this study will reveal whether students perceive the hybrid approach as an effective or satisfactory way of teaching and what factors are related to their learning performance. The information derived from the study will be useful for the administrators in adjusting the hybrid course of Fundamental English to suit students' need. Also, the findings will be useful for instructors interested in implementing hybrid courses. The factors which were found to be related to students' performance should be taken into consideration. The four research questions guiding this study included:

1. What are students' learning achievement, satisfaction with the hybrid English teaching course, comfort with technology and participation?
2. Are there any differences in students' perceptions of hybrid English teaching course quality between two groups of students: one with experience with hybrid courses and the other with no experience with hybrid courses?
3. Are there any relationships between the students' learning achievement, satisfaction with the hybrid English teaching course, comfort with technology, and participation?
4. What are the drawbacks and benefits of hybrid teaching in an English course?

RESEARCH METHODOLOGY

The study design used a mixed-methods approach employing both quantitative and qualitative analysis of which the results could be compared and validated. Based on literature review, three independent variables—participation, satisfaction with the course, and comfort with technology were chosen to investigate the relationship with student learning achievement. In the quantitative analysis, the Technology Acceptance Model (TAM) was used to structure the data analysis. Davis (1986) who proposed the TAM model suggested that the ease of use and usefulness of a technology affect users' intention to use it. In this regard, comfort with technology and attitude towards hybrid course can have an impact on participation in online activities of the hybrid course. The more students participated in online activities, the more they had learning outcomes (Wang, 2004).

Satisfaction was chosen as a variable because when students are satisfied with the course, they often participate more. As a result, they are more likely to be successful (Allen et al., 2007; Puzziferro, 2008). It was defined as the student's perception that the course was a beneficial experience. Satisfaction informed how the course was accepted and valued, and it indicated the quality of the learning experience. Feedback from students should be obtained since it can throw light on the appropriate proportion of online and face-to-face components. In providing educational programs, people in charge use the information from course evaluation and participant feedback in making a decision of the delivery of the program (Wong & Yeung, 2003). One of the major criteria of such an evaluation process is to find out how satisfied the course participants are with the program, and this is often done through using a survey instruments (Pena & Yeung, 2011). Participation was another important variable which was counted by the number of attendance a student had, both in class and online. Comfort with technology was defined as the belief that using technology is comfortable or free of effort. The dependent variable was student learning achievement which can be measured by scores gained from assignments and a writing test. The qualitative analysis transferred from an open-ended perspective focusing on students' input on benefits and drawbacks of hybrid learning.

Participants

One hundred eighty-two students, from five sections of Fundamental English II participated in the research. All students who completed the course (i.e., did all assignments and took an in-class writing test) were included as participants. There were 123 females and 59 males. Eighty-three students came from School of Communication Arts, 40 students from School of Humanities, and 59 from School of Business Administration. All participants signed consent forms, and the instructor assured them that all data would be confidential and that the survey responses would not influence course grades.

Course Structure and Assessment

This study took place at a university in Thailand between January and April 2012 when the course of Fundamental English II was designed for hybrid teaching. It was a 3-unit credit course that met three hours weekly within a 14-week period. This course was usually taken by undergraduate students from different faculties during second semester. Student learning achievement was measured by an in-class writing test and the completion of homework assignments. The total score for grading was 100.

Research Instruments

The impact on students' learning was evidenced by three instruments. The first instrument was a report of learning achievement score and an amount of participation. The second instrument was a questionnaire covering four main parts. The first part asked the participants to give their background information comprising gender and experience in taking hybrid courses. The second part surveyed students' satisfaction with the hybrid course in order to learn how well the course was accepted by the students. It comprised 8 items with a choice of five rating scale responses for each (5 = strongly agree to 1 = strongly disagree). This part also required the participants to rate how much they agreed that the hybrid course meet the same quality standards as a classroom course with a five-point Likert scale ranging from strongly agree to strongly disagree. The third part asked the participants to rate their comfort with some commonly used technology applications on 10 items with a choice of five rating scale responses for each (5 = strongly agree to 1 = strongly disagree). This part was taken from the questionnaire in the research study conducted by Rodriguez, Ooms, & Montanez (2008). The last part provided two open-ended questions. The participants specified what they viewed as the three main benefits and the three main drawbacks of teaching with the hybrid format. The third instrument was an English proficiency test comprising reading and writing skills. The total score was 20 points. The contents for testing students were written to cover EN 112 contents in terms of vocabulary, grammatical points, summary writing, and paragraph writing. So, there were three main parts: 1) read a story and answer 5 questions 2) read a story and write a summary in 3-5 sentences 3) write a well-organized paragraph in about 100 words. Time allotted for the test was 100 minutes. The items of the tests were examined by three teachers of English from the Language Institute to assume language accuracy and content validity.

Internal-Consistency Reliability

The Likert scales items in part 2 and 3 of the questionnaire were processed for determining an internal consistency with 40 non-subject students by the coefficient alpha technique. Two parts in the questionnaire yielded acceptable coefficient-alpha estimates with the reliability value of .85 and warranted their use for the purposes of this research study (Cronbach, 1951).

To ensure the fairness in scoring the test, this study employed three examiners including two experienced teachers and the researcher to mark

Table 1. Scoring rubric for summary writing

	4	3	2	1
Main Idea	Effectively communicates the main idea of the reading selection	Communicates the main idea of the reading selection	Unclear presentation of the main idea of the reading selection	No main idea is presented
Supporting Details	Clearly identifies the most important details	Presents most of the important details	Presents details but leaves out some important details	No supporting details are presented
Use of Paraphrasing	Contains successful paraphrasing of main points, and avoids copying	Contains mostly successful paraphrasing of main points	Contains minimal paraphrasing with some copying of key phrases	Little or no paraphrasing and substantial copying of key phrases
Sentence Structure	Consistent use of complete, coherent sentences	General use of complete, coherent sentences	Inconsistent use of complete, coherent sentences	A lot of incomplete or incoherent sentences
Spelling	Excellent spelling	Generally good spelling	Inconsistent spelling	Errors in spelling that interfere with reader's understanding

the writing papers. The inter-rater approach of reliability estimates was applied to find the reliability of scores which were .887 (rater 1-2), .828 (rater 2-3), and .856 (rater 3-1).

This study employed three raters for grading writing assignments. In order to confirm the reliability of scores, the inter-rater approach of reliability estimates was applied. That is, the correlation coefficients between three different raters were calculated, and the results were .964 (rater 1-2), .875 (rater 2-3), and .928 (rater 3-1).

Rubrics for Grading Assignments

The rubric used for grading summary writing was mutually created by all of the teachers. The full rubric score was set at 20 points which would be divided by four to get five points for each piece of writing (Table 1).

In grading a descriptive paragraph, ten points were allocated to five categories. Then the obtained score was divided by two in order to get the full score of ten (Table 2).

The score allocation for the writing assignment "giving opinions on a movie" was ten points. Content and language use were two categories to be graded. The full rubric score was set at 20 points which would be divided by two to earn ten points (Table 3).

Teaching and Learning Procedure

In developing an appropriate hybrid format, the previous course syllabus had to be redesigned to cover online and in-class contents. Even though the use of Internet technologies blended with face-to-face class format can produce a wide variety of models, for the Language Institute, teachers in all courses followed the same pattern of two weeks of lecture, three weeks of WebEx Video Conference, two weeks of Learning Management System, and seven tutorial classes due to classroom limitation. In week 8, some of the classrooms were expected to be ready for tutorial classes where two subjects were taught in the same room. The proposed model was shown in the schedule presented in Table 4.

In our design, instructional process needs to begin with team teaching as we see a lot of benefits of this approach. First of all, team-teachers share responsibilities and thus lighten each other's workloads, especially in the large-size classes.

Table 2. Scoring rubric for descriptive paragraph writing

	4	3	2	1
Topic sentence	The topic sentence has a clear idea and it is easy to understand.	The paragraph contains the topic sentence, but it is simply a restatement of the topic.	The paragraph has the topic sentence, but it is unclear or contains fragments.	The paragraph does not contain a topic sentence.
Paragraph Body	The body of the paragraph supports the topic sentence with meaningful details.	The body of the paragraph supports the topic sentence, but it is short on specific details.	The body of the paragraph does not support the topic or is a list.	The paragraph does not contain a body.
Length	The paragraph consists of 10 or more complete sentences.	The paragraph consists of 7-9 complete sentences	The paragraph consists of 4-6 complete sentences	The paragraph consists of 3 or fewer sentences
Grammar & Spelling	Consistent use of correct grammar with excellent spelling	General use of correct grammar with generally good spelling	Inconsistent use of correct grammar with inconsistent spelling	Incorrect use of grammar and errors in spelling that interfere with reader's understanding
Closure	The paragraph has clear closure that is distinct from the topic sentence.	The closure is a variation of topic.	The closure is a restatement of the topic.	The closure is not related to the topic or there is no closure.

Adapted from http://www.rcampus.com/rubricshowc.cfm?sp=true&code=G85X56&

Second, team-teachers can improve the overall quality of the language lesson as the teaching job is assigned to each teacher based on their strong points. As such, team teaching can provide opportunities to make the best use of each teacher's ideas and experiences. Lastly, team-teachers can show students how teachers cooperate with each other. For EN 112, team-teaching in a large class was very useful when there were not enough classrooms. About 200 students were gathered in a big room and taught by team-teachers for the first two weeks.

The second component which is new for all teachers is WebEx: video conference system. WebEx is designed to be a virtual classroom where the teacher and students can meet and talk. With a camera and microphone, an interaction between both sides can occur based on a pre-set schedule. Video conference system helps students save time traveling to campus. It also solves the problem of limited classrooms. Students are required to participate in on-line classes for three times as scheduled. To earn 10 points, they were to speak, share ideas, ask or answer the questions.

Table 3. Scoring rubric for opinion paragraph writing

Criteria for Evaluation	Rating
Part I: Content	
The first paragraph presents brief information of the movie: movie's name, director, and stars (2 points)	2-1
The second paragraph reviews the story of the movie: the plot and theme (5 points)	5-4-3-2-1
The third paragraph gives opinions on the movie (3 points). The opinion must be biased: whether students like the movie or not. Give reasons to support the opinions.	3-2-1
Part II: Language Use	
Complete sentences are written instead of run-ons or fragments.	5-4-3-2-1
Grammar, punctuation and spelling are used appropriately.	5-4-3-2-1

Table 4. The proposed hybrid learning model

Week	Types of Teaching
1 & 2	Big class made up from many sections (team teaching)
3,5 & 7	WebEx: video conference system
4 & 6	Self-study online materials in Learning Management System
8-14	Tutorials: student-teacher small group meetings (10 students/40 minutes)

The next component in this hybrid teaching course includes Learning Management System (LMS). It refers to a server-based software that controls access and delivery of online learning resources through a standard web browser. In this study, students are required to study online materials, do quizzes, and summarize three stories, each of which was worth 5 points. The assignments are to be submitted in Learning Management System. LMS can show scoring and tracking of students' progress. Two means of communication available for teachers and learners include the announcement and discussion boards. Announcement is used to give all students any new information about the course, including the latest news and upcoming events while the discussion board is a forum of communication where both teachers and learners can post their messages and read the comments from others. In this study, after self-studying the materials provided, students did some exercises for their understanding.

Seven weeks (Week 8-14) were provided for tutorial classes. Instruction in tutorial classes is arranged in a small group format, providing an opportunity for students to brainstorm ideas and receive feedback on written drafts. This makes the actual writing process less burdensome. Teachers can identify the strengths and weaknesses of individual students, help them develop understanding and improve their attitudes of learning English. Tutorial classes are scheduled in the last step of hybrid format with a hope that classroom repair will be done during that time. Students in a group of 10 came in the class on a certain period of time based on the pre-set schedule distributed to them. They had a good chance to practice writing and get feedbacks from their teacher right after they finished writing. Individually, they wrote a 10 sentence paragraph describing a place for tourists to stay while on vacation in Thailand. Students were required to submit their first draft on week 8 in class and then the final draft on week 10. Next, they had to study an online material "Giving Opinions on a Movie." Then they individually watched a movie of their own interest and wrote a review of that movie. The review included THREE paragraphs: presenting brief information of the movie: movie's name, director, and stars, reviewing the story of the movie: the plot and theme, and giving opinions on the movie. Finally, students had an in-class test on writing.

Data Analysis

Data were collected from the questionnaire and the assessments of the students' assignments in form of score report. For the quantitative analysis, a one sample t-test, means and standard deviations were used to analyze students' learning achievement, satisfaction with the hybrid course, and comfort with technology. Frequency and percentages were used to investigate students' participation and opinion on the quality standards of the hybrid English course when compared with the conventional course. In addition, an independent samples t-test was employed to find out whether any difference existed in the two groups: one with experience with hybrid courses and the other without experience of hybrid courses. Pearson Correlation Coefficients were used to study the relationships among students' learning achievement, participation, satisfaction on hybrid course, and comfort with technology. Then linear regression was used to find out factors which might be predictors for student learning achievement. Open-ended questions included within each section of the questionnaire were read, coded, re-read, and categorized into bins by question (Miles & Huberman, 1994).

Table 5. The result of learning achievement scores

n	Mean	S.D.	Maximum	Minimum	Criteria	t	p
182	72.52	14.09	93	14	70	2.425	.008

RESEARCH RESULTS

Part I: Students' Learning Achievement, Participation, and Perceptions

Research Question 1: What are students' learning achievement, satisfaction with the hybrid teaching course, comfort with technology and participation?

Students' learning achievement was assessed from their scores obtained from all assignments and in-class test. The mean score was 72.52 from 100 with standard deviation of 14.09. The highest score was 93 while the lowest score was 14. After comparing the mean score with the criteria which was set at 70 by the Language Institute, the result from one sample t-test analysis showed that the mean score of 72.52 was higher than the criteria at the significance level of .05, indicating that students' learning achievement was satisfactory (Table 5).

Table 6 showed that there were two students (1.1 per cent) who only participated twice throughout the course. There were 33 students (18.1 per cent) who participated every time.

Table 7 showed the overall mean score of satisfaction with the hybrid course which was at moderate level (Mean = 3.16). The first highest mean score fell on item no. 6 (Learning Management System), followed by item no. 3 (team-teaching), and item no. 4 (Tutorial classes). The lowest mean scores were on items no. 2 and 8 (the format of hybrid and materials on-line). All of the items were at a moderate level.

Table 8 demonstrated the overall mean score of students' comfort with technology which was at a moderate level (Mean = 3.42). When considering each item, it was found that the three activities students got involved in the most were chatting on-line, receiving documents electronically, and accessing the Web. These three items were at a high level:

Research Question 2: Are there any differences in students' perceptions of hybrid teaching course quality between two groups of students: one with experience with hybrid courses and the other with no experience with hybrid courses?

From the survey, students were divided into two groups: the ones with hybrid learning experience and the others with no hybrid learning experience. They were asked to rate the quality of hybrid English course when compared with conventional courses. The result revealed that the percentage of students expressing their agreement was similar in both groups. That is, 28.8% of students without hybrid learning experience and 26.9% of students with hybrid learning experience agreed that the hybrid English course had the same quality standards as traditional courses. However, the number of students without previous experience who showed their disagreement with the quality standards was higher than that with previous hybrid learning experience (Table 9).

An independent t-test analysis was employed to examine a significant difference between two groups of students in their perceptions. The results revealed that there was no statistically significant difference found in students' perceptions between two groups at the level of .05. This means that students with and without experience in hybrid courses were not different in their perceptions on quality standards of this hybrid English course compared with conventional English courses as demonstrated in Table 10.

Table 6. Number and frequency of students' participation

Frequency of Participation	Number of Participants	Percentage
2	2	1.1
5	1	.5
6	3	1.6
7	1	.5
8	7	3.8
9	12	6.6
10	27	14.8
11	16	8.8
12	44	24.2
13	36	19.8
14	33	18.1

Table 7. Mean and standard deviation of students' satisfaction with the hybrid course

Statement	Mean	S.D.	Level	Order
1. Satisfaction that hybrid teaching suits the situation when there are limited classrooms	3.03	.80	moderate	4
2. Satisfaction with the format of hybrid	2.97	.73	moderate	7
3. Satisfaction with team-teaching	3.36	.87	moderate	2
4. Satisfaction with tutorial classes	3.16	.91	moderate	3
5. Satisfaction with WebEx video conference	3.02	.87	moderate	5
6. Satisfaction with learning management system	3.79	.83	moderate	1
7. Satisfaction with means of communication such as Facebook, e-mail, and forum	2.99	81	moderate	6
8. Satisfaction with materials provided on-line	2.97	.88	moderate	7
Total	3.16	.60	moderate	

Table 8. Mean and standard deviation of students' comfort with technology

Statement	Mean	S.D.	Level	Order
1. Using e-mail	3.27	.68	moderate	6
2. Typing and keyboarding	3.44	.81	moderate	3
3. Accessing the Web	3.62	.80	high	2
4. Sending documents electronically	3.28	.69	moderate	5
5. Receiving documents electronically	3.87	.96	high	1
6. Downloading documents	3.34	.83	moderate	4
7. Downloading multimedia materials (audio, video)	3.13	.91	moderate	7
8. Listening to audio on computer	3.05	.85	moderate	8
9. Viewing video on the computer	3.34	.83	moderate	4
10. Chatting on-line (verbally or typing)	3.87	.96	high	1
Total	3.42	.60	moderate	

Table 9. Percentage of students' expressing opinions on the hybrid English course regarding its quality standards classified by experience with hybrid courses

	With Hybrid Learning Experience (n=78)	With No Hybrid Learning Experience (n=104)
Strongly agree	5.1%	3.8%
Agree	21.8%	25.0%
Neither agree nor disagree	41.0%	32.7%
Disagree	25.6%	31.7%
Strongly disagree	6.4%	6.7%

Table 10. A comparison of mean scores of students' perceptions on quality standards of the hybrid course classified by prior experience

Variable	n	Mean	S.D.	df	t	p
With hybrid learning experience	78	2.94	.97	180	.413	.680
With no hybrid learning experience	104	2.88	.99			

Part II: The Relationship between Some Factors and Student Learning Achievement

Research Question 3: Are there any relationships between the students' learning achievement, satisfaction with the hybrid teaching course, comfort with technology, and participation?

The primary purpose of this study was to examine the relationship between some factors and student learning. Participation was calculated based on the number of times they attended classes including on-line and face-to-face classroom. Student learning was measured by the total points earned out of 100 (Mean = 72.52, S.D. = 14.09). Several analyses were, therefore, conducted to assess some factors which related student learning in the hybrid teaching course. Findings revealed that student learning achievement was positively correlated with how much participation students had, $r = .625$, $p < .001$. That is, the more students participated in the hybrid class, the higher their learning achievement.

It was interesting to see that the factors of comfort with technology and satisfaction did not have an influence on hybrid learning achievement. From data analysis, there were no correlations between student learning achievement and how satisfied they felt with the hybrid course, $r = -.017$, $p = .819$. Negative correlations were found between comfort with technology and their learning achievement, $r = -.220$, $p < .01$.

The results also indicated that course satisfaction was not correlated with how much participation students had, $r = .059$, $p = .429$ and comfort with technology, $r = .030$, $p = .687$. However, it was found that there was a negative correlation between comfort with technology and participation, $r = -.179$, $p < .05$. See Table 11.

After that, the relationship was analyzed by using linear regression. In order to find out which factors could be predictors of learning achievement, satisfaction with the hybrid course and comfort with technology were entered into the regression equation as independent variables along with participation. Then it was found the linear combination of these variables was significantly related to learning performance, $F = 43.75$, $p <$

Table 11. Intercorrelations among variables

	Participation	Satisfaction	Comfort with Technology
score	.625***	-.017	-.220**
Participation		.059	-.179*
Satisfaction			.030

*Correlation is significant at the 0.05 level (2-tailed)
** Correlation is significant at the 0.01 level (2-tailed)
*** Correlation is significant at the 0.001 level (2-tailed)

Table 12. The influence of predictor variables, including satisfaction with the hybrid course, participation, and comfort with technology

Predictor Variables	Unstandardized B	Standardized Beta	t	p
Constant	37.710			
participation	4.20	.627	10.82	.000
satisfactory	-1.51	-.062	-1.08	.280
Comfort with technology	-2.42	-.099	-1.72	.088

.001, R2 = .424. The adjusted R square was .415. This means that the three significant predictor variables accounted for 41.5% of the variance. Participation was the only one statistically significant predictor to student learning, $\beta = .627$, $t = 10.82$, $p = <.001$. Table 12 illustrates the relative contributions of each predictor variables to the significant predictive model.

Part III: Open-Ended Responses

Research Question 4: What are the drawbacks and benefits of hybrid teaching?

The final section of the questionnaire asked the participants to respond to two open-ended questions. First, they were asked to specify, in order, what they perceived as the three main benefits to learning with a hybrid format. Participants replied that the most significant benefit was the flexibility the hybrid format had, permitting them to have more freedom. They did not need to come to the campus when they studied on-line. The second most important benefit was gaining more responsibility and self-discipline when they were assigned to do out-of-class assignments or to prepare themselves before attending WebEx video conference sessions. Lastly, students indicated that they gained a lot of benefits from tutorial classes where they could get more explanation in a small group. The kind of face-to-face tutorial class was better arranged than the traditional face-to-face class, resulting in more motivation to learning.

Second, the participants were asked to list, in order, what they believed to be the three main drawbacks of studying with a hybrid format. Regarding the most significant drawback, students specified technical problems occurring when they studied through WebEx. Mostly, students who used equipment at the Language Lab on campus could not communicate well because of equipment defects such as microphones, speakers, and cameras. Participants stated that the second most significant drawback was the amount of time spent working with others on two projects and studying materials in the Learning Management System. In order to complete the course requirements, students complained that they had to do so many activities. Lastly, the participants mentioned having no face-to-face interaction during on-line learning. This made them have stress and anxiety, especially, when they did not know what to do with the assignment. The discussion board was not convenient in case they required a lot of explanation. However, the situation turned better when students started tutorial classes.

DISCUSSION

Although the findings show that students' learning achievement is satisfactory (Mean = 72.52), many issues should be taken into discussion when developing hybrid teaching courses of English. The first discussion concerns frequency of participation in this hybrid course. The results of regression analysis clearly showed that success in the class was positively related to the amount of participation. It might be because hybrid teaching allowed the flexibility and efficiency of the online environment, so students have access to content and assignments on their own time. On-line learning gave a chance for students to revise their lessons all the time and in all places, and when they had some enquiries concerning contents and exercises, they could ask instructors through WebEx and the discussion board in Learning Management System. In addition, they gained more understanding about projects and writing in tutorial classes because they could ask the teacher for clarification and discuss with peers in a small group. The response to open-ended questions showed that students liked tutorial classes although they had never experienced them before. In this way, the blending of face-to-face and technology-supported out-of class activities becomes a "mechanism through which students engage in existing effective educational practices" (Laird & Kuh, 2005).

The second discussion is about their satisfaction with the hybrid course of Fundamental English. It is essential to state that while the use of hybrid teaching can reinforce student learning, it does not bring about a high level of satisfaction. From the findings, students showed their satisfaction with the hybrid course of EN 112 at a moderate level. One of the causes may have been from the use of WebEx as they specified the most significant drawback. The video conference system should be used only when all the equipment is fully effective. From the interview, it was found that most students did not feel impressed with communicating online through video conference. In addition, they seemed to have less connected during on-line learning with Learning Management System. Apart from that, there are many other elements of the learning context students may consider such as subject contents, communication, process, and learning tasks.

One interesting issue is about student perceptions of quality of hybrid course when compared with a traditional course. In this study, students with hybrid learning experience were found to have the same agreement as others with no hybrid learning experience. When taking a closer look at their perceptions, students with and without experience in hybrid courses did not differ in their perceptions on quality standards of this hybrid English course compared with conventional English courses at the significance level of .05. A possible explanation for this result comes from Peterson and Bond (2004) revealing that students without hybrid learning experience may perceive that they learned more through face-to-face classes. They might remember traditional teacher-directed pedagogical learning environments where autonomous learning was not utilized. This is an interesting finding, suggesting that they might not be accustomed to learning independently. Meanwhile, students with hybrid learning experience who had been more familiar with online learning did not have different perception as well. Students in this group probably found the present course less interesting than the previous one they had ever taken, so they expressed their satisfaction at a moderate level. This result is supported by Graff

(2003) who states that design has a significant impact on how students approached learning. A hybrid course which is designed carefully can promote active learning (Lin, 2008). It can be concluded that students' prior learning experience did not affect their satisfaction and acceptance of the hybrid course.

That student learning achievement was not correlated with how satisfied they felt with the hybrid teaching course can be explained by two reasons. First, students were informed of the necessity of reorganizing the instructional process and limitation of classroom settings due to flooding. They understood that the difficult situation was the main cause of these changes. Second, learning English with hybrid format was rather new for many students who might not accept increased responsibility for their learning. The factor of learning styles can affect their satisfaction with the course. Some students prefer convenience and flexibility while the others don't. Moreover, having no chance to select communication tools may have an effect on student satisfaction too (Garrison & Vaughan, 2008). In spite of these limitations, the acceptance of the difficult situation made students pay much attention to the new course format and put more effort to their study in order to earn good scores.

The last issue for discussion is on students' comfort with technology. Although university students were expected to be proficient with online technology tools, the results of students' comfort with technology demonstrated only a moderate level. In addition, there were also negative correlations between comfort with technology and their learning achievement. The more students were comfortable with technology, the fewer scores they gained. This might be due to the fact that the hybrid course comprised not only on-line learning, but also face-to-face classes, so technological skills might not have much effect on student success. The result was in accordance with the open-ended responses showing that students felt worried about the anxiety they had when they wanted more detail about assignment and technical problems occurring when they studied through WebEx video conference. They did not specify any problems concerning their technological skills.

CONCLUSION

Due to the huge flood in our country, hybrid instruction became an alternative for all courses at the university. Therefore, the study was conducted to investigate the factors related to students' learning achievement after face-to-face meetings and online technology usage were blended in a fundamental English course. The findings reveal that participation is an important variable to be considered, so there should be a strategy to motivate students to participate more in both on-line learning and face-to-face classes. For example, the more they contribute to the activities, the more they will get the extra points. Some drawbacks expressed by students pointed out that technical problems such as insufficient computers and low-quality equipment were obstacles to communication which should have been solved before on-line learning started. The results from this study will be useful for instructors who may carry out a hybrid course in the near future.

LIMITATIONS OF THE RESEARCH

There are some limitations to be addressed in the study. First of all, the situation of huge flood occurring in Thailand was sudden; it did not provide us the possibility of having traditional face-to-face classes, so there was no control group to compare in terms of student learning achievement. Secondly, it has to be noted that the results should be considered in a cautious way as the study is applied in specific settings. One limitation is that while many variables were chosen to study, some variables such as university support in computer use on campus, economic situation, campus environment, and computer skills were not taken into account. These variables might have some influence on student learning outcomes and participation. In this study, inadequate computers resulted from adding on-line learning in many courses at the same time. Apart from that, many students had a financial problem because their parents faced difficulties. Another problem was that the environment on campus was not ready for a study; most buildings were under repaired. Also, hybrid teaching is not only a new instructional experience for students, but also for teachers. Some of them were not much skilled in technology. They had to learn how to communicate through video conference, create exercises and post on the discussion board in Learning Management System three weeks before the class started. For further study, the motivation factor is highly recommended to examine whether it has an effect on academic performance or not since the current research did not study students' motivation at all.

REFERENCES

Allan, B. (2006). *Blended learning: Tools for teaching and training*. London, UK: Facet Publishing.

Allen, M., Burrell, N., Bourhis, J., Mabry, E., & Timmerman, C. (2007). Literature of satisfaction. In M. G. Moore (Ed.), *Handbook of distance education* (2nd ed., pp. 149–156). Mahwah, NJ: Lawrence Erlbaum.

Bhatti, A., Tubaisahat, A., & El-Qawasmeh, E. (2005). Using technology-mediated learning environment to overcome social and cultural limitations in higher education. *Issues in Informing Science and Information Technology*, *2*, 67–76.

Bonk, C., Kim, K. J., & Zeng, T. (2006). Future directions of blended learning in higher education and workplace learning settings. In C. Bonk & C. Graham (Eds.), *The handbook of blended learning: Global perspectives, local designs* (pp. 550–567). San Franscisco, CA: Pfeiffer.

Buzzetto-More, N., & Sweat-Guy, R. (2006). Hybrid learning defined. *Journal of Information Technology Education*, *5*, 153–156.

Chapelle, C. (2001). *Computer applications in second language acquisition: Foundations for teaching, testing, and research*. Cambridge, UK: Cambridge University Press. doi:10.1017/CBO9781139524681

Cronbach, L. (1951). Coefficient alpha and the internal structure of tests. *Psychometrika*, *16*, 297–334. doi:10.1007/BF02310555

Dabbagh, N., & Bannan-Ritland, B. (2005). *Online learning: Concepts, strategies, and application*. Upper Saddle River, NJ: Pearson Education, Inc.

Davis, F. (1986). *Technology acceptance model for empirically testing new end-user information systems: Theory and results*. Massachusetts Institute of Technology.

De George-Walker, L., & Keeffe, M. (2010). Self-determined blended learning: A case study of blended learning design. *Higher Education Research & Development*, *29*(1), 1–13. doi:10.1080/07294360903277380

Donnelly, R. (2010). Harmonizing technology with interaction in blended problem-based learning. *Computers & Education*, *54*(2), 350–359. doi:10.1016/j.compedu.2009.08.012

Fjermestad, J., Hiltz, S. R., & Zhang, Y. (2005). Effectiveness for students: Comparisons of "in-seat" and ALN courses. In S. R. Hiltz & R. Goldman (Eds.), *Learning together online: Research on asynchronous learning networks* (pp. 39–80). Mahwah, NJ: Erlbaum.

Garnham, C., & Kaleta, R. (2002, March). Introduction to hybrid courses. *Teaching with Technology Today, 8*(6), 1-2. Retrieved January 22, 2011, from http://www.uwsa.edu/ttt/articles/garnham.htm

Garrison, D., & Vaughan, N. (2008). *Blended learning in higher education: Frameworks, principles, and guidelines*. San Francisco, CA: John Wiley & Sons.

Graff, M. (2003). Learning from Web-based instructional systems and cognitive style. *British Journal of Educational Technology*, *34*(4), 407–418. doi:10.1111/1467-8535.00338

Graham, C. (2005). Blended learning systems: Definition, current trends, and future directions. In C. J. Bonk & C. R. Graham (Eds.), *Handbook of blended learning: Global perspectives, local designs* (pp. 3–21). San Francisco, CA: Pfeiffer Publishing.

Ladyshewsky, R. (2004). E-learning compared with the face to face: Differences in the academic achievement of postgraduate business students. *Australasian Journal of Educational Technology*, *20*(3), 316–336.

Laird, T., & Kuh, G. (2005). Student experiences with information technology and their relationship to other aspects of student engagement. *Research in Higher Education*, *46*(2), 211–233. doi:10.1007/s11162-004-1600-y

Lin, Q. (2008). Student satisfactions in four mixed courses in elementary teacher education program. *The Internet and Higher Education*, *11*(1), 53–59. doi:10.1016/j.iheduc.2007.12.005

Lin, Q. (2009). Student views of hybrid learning: A one-year exploratory study. *Journal of Computing in Teaching Education*, *25*(2), 57–66.

Lopez-Perez, M., Perez-Lopez, M., & Rodriguez-Ariza, L. (2011). Bended learning in higher education: Students' perceptions and their relation to outcomes. *Computers & Education*, *56*(3), 818–826. doi:10.1016/j.compedu.2010.10.023

McFarlin, B. (2008). Hybrid lecture-online format increases student grades in an undergraduate exercise physiology course at a larger urban university. *Advances in Physiology Education*, *32*, 86–91. doi:10.1152/advan.00066.2007 PMID:18334574

Miles, M., & Huberman, A. (1994). *Qualitative data analysis: An expanded sourcebook* (2nd ed.). Thousand Oaks, CA: Sage Publications.

Motteram, G. (2006). Blended education and the transformation of teachers: A long-term case study in postgraduate UK higher education. *British Journal of Educational Technology*, *37*(1), 17–30. doi:10.1111/j.1467-8535.2005.00511.x

Orhan, F. (2008). Redesigning a course for blended learning environment. *Turkish Online Journal of Distance Education*, *9*(1), 54–66.

Pena, M., & Yeung, A. (2011). University students' satisfaction with online and face-to-face Spanish learning. *The International Journal of Learning*, *16*(9), 637–647.

Peterson, C., & Bond, N. (2004). Online compared to FTF teacher preparation for learning standards-based planning skills. *Journal of Research on Technology in Education*, *36*(4), 345–361. doi:10.1080/15391523.2004.10782419

Puzziferro, M. (2008). Online technologies self-efficacy and self-regulated learning as predictors of final grade and satisfaction in college-level online courses. *American Journal of Distance Education*, *22*(2), 72–89. doi:10.1080/08923640802039024

Rivera, J., McAlister, K., & Rice, M. (2002). A comparison of student outcomes & satisfaction between traditional & web based course offerings. *Online Journal of Distance Learning Administration*, *5*(3), 151–179.

Rodriguez, M., & Anicete, R. (2010). Students' views of a mixed hybrid ecology course. *MERLOT Journal of Online Learning and Teaching*, *6*(4), 791–798.

Rodriguez, M., Ooms, A., & Montanez, M. (2008). Students' perceptions of online-learning quality given comfort, motivation, satisfaction, and experience. *Journal of Interactive Online Learning*, *7*(2), 105–125.

Selim, H. (2007). Critical success factors for e-learning acceptance: Confirmatory factor models. *Computers & Education*, *49*, 396–413. doi:10.1016/j.compedu.2005.09.004

Stokes, S. (2003). Temperament, learning styles, and demographic predictors of college student satisfaction in a digital learning environment. In *Proceedings of the Annual Meeting of the Mid-South Educational Research Association*, Biloxi, MS.

Ugur, B., Akkoyunlu, B., & Kurbanoglu, S. (2011). Students' opinions on blended learning and its implementation in terms of their learning styles. *Education and Information Technologies*, *16*(1), 5–23. doi:10.1007/s10639-009-9109-9

Wang, M. (2004). Correlational analysis of student visibility and learning outcomes in an online setting. *Journal of Asynchronous Learning Networks*, *8*(4), 71–82.

Woltering, V., Herrler, A., Spitzer, K., & Spreckelsen, C. (2009). Blended learning positively affects students' satisfaction and the role of the tutor in the problem-based learning process: Results of a mixed-method evaluation. *Advances in Health Science Education*, *14*(5), 725–738. doi:10.1007/s10459-009-9154-6 PMID:19184497

Wong, E., & Yeung, A. (2003). Evaluation of teacher development programs: Participant satisfaction and recommendation. *Studies in Educational Evaluation*, *29*, 57–66. doi:10.1016/S0191-491X(03)90005-8

Wu, D., & Hiltz, R. (2004). Predicting learning from asynchronous online discussions. *Journal of Asynchronous Learning Networks*, *8*(2), 139–152.

Xie, K., Durrington, V., & Yen, L. (2011). Relationship between students' motivation and their participation in asynchronous online discussions. *MERLOT Journal of Online Learning and Teaching*, *7*(1), 17–29.

This work was previously published in the International Journal of Distance Education Technologies (IJDET), 12(1); edited by Maiga Chang, pages 74-90, copyright year 2014 by IGI Publishing (an imprint of IGI Global).

Chapter 14
Technology-Enhanced Learning:
Towards Providing Supports for PhD Students and Researchers in Higher Education

Eileen O'Donnell
Dublin Institute of Technology, Ireland

Liam O'Donnell
Dublin Institute of Technology, Ireland

ABSTRACT

There are many elements to an individual's life. Each individual engages in a variety of different activities which all require different types or forms of supports. Through family, friends, and colleagues, supports are available for many of the activities in which we engage. But, for students conducting research, specific types of support are necessary that can only be provided by supervisors and peers. This chapter reviews the supports necessary to learn how to effectively undertake research and how these supports could satisfactorily be provided through an e-learning portal or an e-learning platform. An e-learning module could be used to facilitate collaboration amongst student learners and researchers who share similar research interests. Students should be encouraged to develop a community of practice with fellow researchers as this relationship could provide beneficial peer support for as long as their research interests evolve and endure.

INTRODUCTION

This chapter investigates some of the issues which researchers encounter when performing their research and suggests that an e-learning module would assist researchers in overcoming these issues, "with the worldwide spread of journals in educational research, such technology-enhanced research has received much attention since the turn of the century" (Hwang & Tsai, 2011, p. 65). A Technology Enhanced Learning (TEL) or an e-learning module on research methods and statistical analysis is envisaged not as a replacement for existing structures to assist researchers, but as an enhancing technological solution to augment existing approaches through blended learning.

DOI: 10.4018/978-1-4666-8246-7.ch014

Technology has enhanced research through the ease of access to electronic journals and other citable electronic media. The use of word processing applications and referencing packages has made the writing up of research findings more efficient. The use of statistical analysis applications, spreadsheets, and database packages, has streamlined the process of analysing data, and the production of graphs and charts to illustrate the findings. The use of graphs and charts has greatly improved the readability and understanding of research outcomes. Communications between co-authors, editors and publishers through e-mail has greatly improved the flow and process of publishing academic research. Online submission of electronic papers has further enhanced the publishing process.

Technology enhanced learning (TEL) refers to the support of teaching and learning through the use of technology and can be used synonymously with e-learning, technology enhanced research has the possibility of supporting researchers and perhaps improving the quality of research. An e-learning module is stored in a predefined location on an e-learning platform and is dedicated to a particular subject area. Students are provided with user names and passwords to access and contribute to this module. Because the e-learning module is online students can access this module at any time from any place providing they have the appropriate computer equipment and broadband access.

While collaborating on papers and writing chapters of books, realisation dawned that a greater knowledge and use of research methods and statistical analysis was necessary to improve the quality of research and meet the requirements of peer reviewers. "Improving the quality of the student learning experience is a key issue in the higher education sector" (Dermo, 2009, p. 203). Power, Miles, Peruzzi, and Voerman (2011), and Parkinson (2009), suggest students can benefit from peer-to-peer mentoring in higher education. Hence, this book chapter proposes that an e-learning module on research methods and statistical analysis which encourages peer-to-peer mentoring could effectively support students and researchers and encourage peer-to-peer mentoring.

"Due to a lack of formal research training and experience, students can find completing research projects a daunting task. This, coupled with a fear of statistics, can culminate in quite an overwhelming experience for many students" (Chen, 2012, p. 1). When one commences study for a PhD (Doctor of Philosophy), generally a BSc (Bachelor of Science) and MSc (Master of Science) have already been acquired to a high level of academic achievement, conferred with a First or 2.1 Honours. Research methods and statistical analysis may not necessarily have been included in the subjects covered in the discipline undertaken or possibly some time has passed and a refresher course is required to update skills. Therefore there is perhaps a need for researchers to familiarise themselves with the correct application of research methods and statistical analysis techniques to their specific research area. Some researchers will have a good understanding of research methods and instinctively know which method or combination of methods to apply to specific research, while other researchers may need guidance and support in the correct application of research methods and statistical analysis for specific research undertakings.

Not all researchers will need an extensive knowledge of statistical analysis to present their research, but an awareness of the different methodologies available for analysing research will enable researchers to select the most appropriate methodology to do justice to their work. The objective of such an e-learning module is to enable researchers to keep up to date with changes in approach in the field of statistical analysis and satisfy personal changing needs as each individual researchers work evolves with time. The term e-learning refers to various forms of teaching and learning which are facilitated through the use of technology.

In addition, should a community of practice evolve this may encourage researchers to communicate with other researchers to discuss the most appropriate statistical analysis methods to employ in specific circumstances. "A community thrives not only on its resources, but also on the relationships among its members" (Cheak, Angehrn, & Sloep, 2006, p. 123). Such a community of practice would facilitate students by providing a potential environment to support each other's research efforts. A community of practice is formed when a group of people are drawn together through shared interests or goals. Generally, the members of the community of practice benefit from the sharing of knowledge and experience, and peer support (Dawson, 2010; Sitthiworachart & Joy, 2008). The use of discussion boards are a good medium for facilitating asynchronous online communication between members of the community of practice. E-mail is another example of an asynchronous communication affordance (Smyth, 2011). Web conferencing (Scott, Castañeda, Quick, & Linney, 2009; Smyth, 2011) can be used to facilitate synchronous online communication between members. Hierarchical and peer relationships when used together can promote a rich learning environment (Christiansen & Bell, 2010). An e-learning module would enable researchers to link up with others with similar research interests and perhaps collaborate for writing: journal articles, conference presentations, chapters of books, books or reports.

The benefits to be achieved by providing researchers with an e-leaning module would include: storage of notes, learning activities, and web links, in the one location, the opportunity to form a community of practice, the chance to collaborate with other researchers, and more than likely benefit from the support and guidance of peers.

The background section is broken down into a number of sub-sections: data types; quantitative and qualitative data types; and statistical analysis. This is followed by a section on e-learning module and blended learning which includes sub-sections as follows: community of practice and online collaboration; improving the quality of research; and personalised e-learning. Issues, controversies and problems encountered by researchers are discussed and some solutions and recommendations are made as to how these can be resolved by using an e-learning module. Future research directions are reviewed and the chapter is concluded.

BACKGROUND

The term 'researcher' will be used as a generic term in this chapter to represent any or all of the following who are involved in research: degree, post graduate, masters and PhD students, research fellows, academic researchers, and business researchers.

Researchers' interests tend to evolve as a result of unforeseen contributory factors, for example: funding opportunities, enterprise opportunities, attendance at seminars, research findings, or through the recognition of a specific hypothesis which merits further inquiry. Such influences can force researchers to select alternative research methods and statistical analysis techniques to the ones which they initially envisioned to be most appropriate to their own specific research interests. An e-learning module would enable students to explore different analytical approaches, as the need arises, to satisfy their research requirements as they change with time.

An e-learning module can be used for the: dissemination of course notes; administration of the course; dissemination of assignments; submission of assignments; use of asynchronous and/or synchronous discussions; enabling of students to peer review the submission of other students.

Asynchronous discussions refer to discussions which do not take place in real time. Each subscriber has the opportunity to research and present their opinion to a discussion board for peers to review at some later time. Asynchronous discussions enable subscribers to plan, research, structure, and reflect on their submission before they submit it to the forum for peers to review. Synchronous discussions refer to discussions which take place in real time. Subscribers respond to other subscribers' suggestions and comments without the opportunity to plan, research, structure, and reflect upon their submission to the forum. There are educational merits to both forms of communication.

An e-learning module for researchers would contain educational resources on research methods and statistical analysis to suit a broad range of requirements. Some researchers may already have some knowledge of research methods and statistical analysis while others may be totally new to conducting research. A range of learning activities should be provided in the e-learning module grouped into different levels of difficulty. Therefore enabling researchers to select the activities which best suit their existing level of knowledge and specific requirements at any point in time and work through the resources at their own pace. Skinner (1981) recommends that participants be presented with an alternative sequence of simpler tasks to perform if an initial task is too complex to grasp. By providing tasks aimed at different levels of competence, researchers at all levels should be able to identify and benefit from the use of appropriate e-learning activities.

Competent use of research methods and statistical analysis is paramount to the skill set of researchers. Peer reviewers will soon spot if the methods applied are unsuitable or ill used. Salmon (2009) mentions that statistical analysis is one way of observing trends but statistical analysis methods available for virtual worlds are neither well co-ordinated nor reliable. This statement supports the argument that researchers require a more comprehensive knowledge of statistical analysis methods and techniques and appropriate application to research in order to correctly compile and present findings to ensure their reliability when discussing virtual environments and other research areas.

DATA TYPES

There are two main types of data: quantitative and qualitative. Researchers need to be familiar with both types to ensure that they approach their study with an informed mind to enable them to apply the most appropriate type to test their hypothesis. The combined use of quantitative and qualitative data types facilitates triangulation of data sources enabling researchers to substantiate findings by correlating the hard facts of the numerical quantitative data with the soft more human side of qualitative analysis.

Quantitative and Qualitative Data Types

Quantitative methods of data collection include the collection of numerical data and participants' responses to closed ended questions. Closed ended questions can lead participants to concentrate on specific areas. Qualitative methods of data collection include the use of open ended questions which enable participants to give their views and opinions on issues without any influence from the researcher. Qualitative methods enable researchers to gather personal human experiences relevant to the hypotheses. This gathered data should contain unbiased views on research questions. The findings from both methods can then be correlated to see if they substantiate each other.

Quantitative analysis uses techniques including ratios to analyse numerical data that represent measurable characteristics in order to make sense of available information. Quantitative research tends to be framed in numbers or closed-ended questions, which do not encourage or facilitate the respondent to add any extra information which they feel is relevant. Hence, the opportunity to collect some very worthwhile feedback can be lost. More importantly, the findings of such research could be biased by the researchers own views. Because the researcher may unintentionally set specific boundaries on the information harvested, by leaving respondents no opportunity to divulge other thoughts on the subject. Such data collection methods could influence the conclusions derived from the data and effectively make the research useless.

Quantitative analysis alone produces insufficient in depth knowledge to do justice to the majority of research questions involving complex human experiences. Qualitative analysis is conducted by using techniques such as interviewing and observing participants and the collection of both oral and written communication from participants which can provide improved understanding of complex human experiences. A key consideration is how to improve the quality of researchers use of qualitative research in higher education (Davidson & Jacobs, 2008). Due to the diverse spectrum of influences that affect human lives, researchers require a variety of methodologies and techniques in order to achieve a deeper understanding of human experiences in order to generate useful knowledge as suggested by Fossey, Harvey, McDermott and Davidson (2002). Chesebro and Borisoff (2007) suggests that grounded theory emerges from data from the ground up, qualitative research deduces meaning from words and quantitative research commence with a theory to examine. Creswell (2009) suggests that qualitative analysis is framed using words and open-ended questions, whereas a mixed method approach incorporates elements of both quantitative and qualitative analysis.

Brannen (2005) recommends from empirical evidence that there is strong support for combining both qualitative and quantitative data types in research. Researchers could perhaps benefit from seeing a variety of research methods and the collection of different data types applied to different case studies. An e-learning module which also encompasses standard e-learning functionality such as discussion boards and chat facilities would enable students to discuss with peers their thoughts on the various approaches. Discussion and reflection are very important aspects of the learning experience of students and the investigative work conducted by researchers. The suggested module would enable students and researchers to engage with the e-learning resources and take time to reflect on the information which they have gathered. Subsequently, researchers could discuss their thoughts with peers using the discussion boards, or face to face discussions, to turn this information into knowledge. Such activity would assist researchers in using quantitative and qualitative methods in the most effective way. Hoyles, Küchemann, Healy and Yang (2005) recommend that corroborating evidence gathered through quantitative and qualitative data types used in research methods aids interpretation and contextualization.

Statistical Analysis

The range of statistical methods and techniques is vast and researchers could benefit from an e-learning module that would assist them in identifying the most suitable techniques to apply to their studies. An e-learning module would accommodate researchers' requirements as Murphy (2008) suggests researchers approaches change and statistical analytical requirements evolve throughout the course of their studies. Some statistical analysis techniques in regular use by researchers include: Analysis of variance (ANOVA); Chi-squared test, Correlations, Regression analysis, and Student's t-test.

E-LEARNING MODULE AND BLENDED LEARNING

An electronic learning (e-learning) module facilitates ubiquitous access to learning resources providing the student has broadband connectivity and the necessary computer equipment. Blended learning is where electronic learning resources are used to augment/enhance traditional teaching methods. Akyol and Garrison (2011) suggest high levels of cognition and learning outcomes can be achieved using blended learning. The proposed e-learning module could be used by educators to augment structures already in place to support researchers. Technology enhanced learning (TEL) refers to the support of teaching and learning through the use of technology and can be used synonymously with e-learning, technology enhanced research has the possibility of supporting researchers and perhaps improving the quality of research.

Despite the fact that the merits of technology enhanced learning have yet to be proven teachers are still encouraged to undergo training in the pedagogic use of technology (Jung & Latchem, 2011). Lecturers and teachers are continuously being encouraged to participate in e-learning summer schools, teaching qualifications which involve the use of Information Communication Technology (ICT), and research which also involves a reasonable knowledge of technology. Increasingly interactive whiteboards are being introduced to the classrooms at various different levels of the educational environment. Technology in learning is not going away any time soon, so educators may engage with the use of technology in educating their students, leave technology out of their pedagogic approach if it is deemed unhelpful or continue using technology to enhance the learning experience if they deem it beneficial. The minds of educators need to be informed of the pedagogic benefits which can be realised by using technology in their teaching methodologies, if educators are still not satisfied that technology can have a positive impact on the learning experience then they possibly have the choice of removing the use of technology from the classroom. Some departments and schools embrace the use of technology and encourage educators to create an online presence, others leave it up to the individual educators to decide which teaching methods they wish to employ.

Community of Practice and Online Collaboration

An e-learning module would enable researchers to collaborate with other researchers in order to identify the most appropriate analytical methods to use to evaluate and portray specific data in the most appropriate format. Students online collaboration facilitates a social environment "that promotes better learning" (Doering, Pereira, & Kuechler, 2012, p. 5). Collaboration refers to people working together as a team on a particular project or working together online to achieve a shared goal. "Good interdisciplinary research requires genuine team work and appreciation of the different skills contributed by the partners involved" (Bowman, 2007, p. 361). Unwin (2007) discusses the importance of good communication skills, continual interaction with peers, and "acting with mutual respect and understanding" (Unwin, 2007, p. 355). These interpersonal skills are paramount to the success of a community of practice. Figure 1 illustrates how a community of practice could evolve through the use of an e-learning module.

In addition, such an e-learning module would provide each researcher with access to a well informed community of practice to call upon for support as their research requirements demand. The ubiquitous nature of such a module would have the possibility of enhancing learning experience of researchers. This module could also facilitate researcher collaboration across various disciplines. Such a module could be created to augment and enhance the classroom experience of students as a form of blended learning. During the classroom sessions, students could be encouraged to engage with, and make effective use of the e-learning features. In addition, students should be urged to form a community of practice through the discussion boards and the chat facility. The use of discussion boards in the Masters in Information Systems for Managers (MISM) course (Oscail, 2007), encour-

Figure 1. Community of practice

aged the students to form a community of practice. The community of practice enhanced the learning experience of the students who participated and contributed to the asynchronous and synchronous discussions. Some of the most frequent contributors to the online discussions achieved the most satisfaction from the course. When the Masters in Information Systems for Managers (Oscail, 2007) course ended so did the discussions. Such an e-learning module could be used by students/ researchers to review methods and techniques, and to participate in the community of practice with other researchers to discuss further research projects and to disseminate findings.

Rovai (2002) discusses the importance of establishing a sense of community and hence reducing feelings of isolation. Due to the nature of research, each individual travels a unique path of discovery. This indeed can be a lonely, isolated process. Being afforded the opportunity to engage with other researchers as the need arises to discuss progress, or possibly more importantly: lack of progress, seek advice or generally just to get thoughts straightened out, could help alleviate the feelings of isolation. Moderato (2006) observed that a negative effect of isolation is the lack of exchange of ideas with other researchers. Such an e-learning module would facilitate the exchange of ideas with other researchers. In addition, the theoretical course content in the statistical analysis part of the module could be dipped in an out of as the researchers interests evolve and requirements change.

Vygotsky (2004) in a paper "Imagination and Creativity in Childhood" stated that "Nothing important in life is achieved without a great deal of emotion" (Vygotsky, 2004, p. 55). A PhD qualification is a prestigious achievement in life, a great deal of emotion can be felt by researchers while striving to achieve this goal. An e-learning module such as the one proposed in this chapter, would enable researchers the opportunity to support other researchers going through the research process, as part of a community of researchers the burden of emotional frustrations could be shared with others. Resnick (1987) recommends that researchers may also avail of the opportunity to augment their work by using cognitive tools devised by others. An e-learning module would afford researchers the opportunity to review and discuss the relevance of using tools devised by others to enhance their own research approach. Ribot (1901) recommends that researchers can also augment their work by reviewing anonymous inventions. Researchers need to review the work of others, even if the contributions are anonymous to create a state of the art literature review and position their work in the research area with respect to the achievements and discoveries of others. According to Cole et al. (1978) through Vygotsky's concept of Zone of Proximal Development, researchers would benefit through contact with more capable others or peers for guidance on the most appropriate methodology to use for specific research interests. Researchers using the module could be encouraged to leave contact details with appropriate statistical methods that they have applied in their research, so that other researchers contemplating the use these methods can get in contact. Thus, inexperienced researchers would have the opportunity to discuss their research methods and analytical approaches with others who have been through the PhD process and perhaps benefit from the shared experiences of more capable others.

Piaget (2008) suggested that reasoning develops as a result of trying to argue one's own views on a subject. Participation in such an online community of practice would allow researchers the opportunity to discuss/argue various viewpoints on theories, research methods and techniques used in the research process, in order to establish the approach most suited to the research which they are undertaking. All of the above supported arguments suggest that such an e-learning module would effectively improve the overall quality of PhD research and research in general.

IMPROVING THE QUALITY OF RESEARCH

An e-learning module on research methods and statistical analysis could perhaps improve the quality of the research and also enable researchers to communicate with each other by forming a community of practice to share knowledge and provide support to each other. The content for this module would contain all the theory, methodologies and techniques used in research methods and statistical analysis currently available for researchers to use when planning and analysing their research. Along with appropriate questions, solutions and applied examples to assist researchers in identifying the most appropriate research methods and statistical analysis techniques to apply to their specific research questions. This module would assist researchers in identifying learning content best suited to their needs. Therefore, the learning outcomes to be achieved through engagement with this module will be tailored to the specific needs of each individual researcher's requirements.

In essence, the objective of the proposed e-learning module is to: enhance the learning experience of researchers, improve their research outputs and ensure the peer supports are in place to assist them in completing the process.

Researchers could initially attend introductory courses on research methods and statistical analysis enhanced by proposed e-learning module. Involvement in the module should be encouraged. Researchers can be motivated to engage with each other to create an online community of practice within this module. At the completion of the introductory courses researchers could still have access to this e-learning module to use to refresh their skills as necessary or to delve into other methodologies and techniques as the need arises due to changing research needs. But, most importantly of all, to communicate with other researchers through the community of practice, to benefit from the peer review and help and advice which fellow researchers are willing to share.

Personalised E-Learning

Kalyuga and Sweller (2005) found that learner-adapted formats in e-learning environments proved to be more effective than non-adapted formats for changing levels of learner expertise in a domain. It would be interesting to test whether the provision of learner-adapted formats in a module for researchers would improve their expertise over a module which did not adapt to learners. This approach is based in the area of personalised e-learning. The creation of personalised e-learning formats is a complex process which is not easily achieved by non-technical educators. Dagger, Conlan and Wade (2003) recommend the use of a personalised e-learning module would effectively enable reusability, accessibility, interoperability and durability of peer reviewed learning resources. Access to such a personalised e-learning module would ensure that researchers have access to good quality learning content tailored to support their specific research requirements at all times.

Duncan-Howell (2010) in a paper "Teachers making connections: Online communities as a source of professional learning" suggests "Online communities may present a source of continuous professional development for teachers as they are able to deliver authentic and personalised opportunities for learning" (Duncan-Howell, 2010, p. 324). Online communities do afford learners the opportunity for personalised support from peers. The proposed e-learning module would provide researchers and PhD students with personalised support from their peers, in a timely fashion, which is relevant to their current research undertakings.

ISSUES, CONTROVERSIES, AND PROBLEMS ENCOUNTERED BY RESEARCHERS

Issues

A researcher may seek advice from the online community of practice and be accidentally led astray by a peer. Alternatively, a member of a collaborative team may misinterpret their role within the team and produce work which is outside the scope of the project (Donnelly & O'Rourke, 2007). An exemplary guide on the side would be necessary to ensure that questions posed by researchers to their peers were correctly answered, that each member understood the scope of collaborative projects, and that all contributions were from good quality peer reviewed resources i.e. journal papers, books, book chapters and lecture notes. Edwards, Perry and Janzen (2011) suggest there is a need for strong, positive educators to affirm learners personal worth online and in the classroom. Educators can have an enormous influence on the learning experience of students online and in the classroom; some educators form a better rapport with students than others

A researcher may be aware of the research approach which they believe to be the most appropriate to apply to a specific hypothesis but would like assurance that this is the most appropriate method to apply. A discussion with peers on the merits of the intended approach could help clarify the approach and improve the quality of the research output. This module would also assist researchers who are uncertain of which research method to apply and the type of statistical analysis to use for a specific research question to seek guidance from peers. The guide on the side would monitor the advice to ensure the researcher in need is receiving good advice, discuss online if necessary, so all the other researchers can benefit from the discussion.

The time of lead researchers and PhD supervisors is a valuable asset as they have many and varied responsibilities including for example: Chair of a Board, Member of a Committee, Head of Department, Leading various research projects or lecturing commitments. Therefore, the use of an e-learning module would facilitate the peer review of research contributions before the lead researcher or supervisor need be consulted for guidance.

Asynchronous online discussions can be facilitated through the use of a discussion board. Discussion boards are the ideal tool to use to submit definitions, reviews, figures, tables and citations relevant to various topics to share with fellow students. The use of discussion boards gives students the opportunity to reflect on the submissions of others, conduct research of their own and then post at their leisure when they felt that they had something relevant and worthwhile to contribute. Akyol and Garrison (2011) suggest asynchronous discussions have generated interest amongst educators with respect to deep and meaningful learning. From personal experience of using asynchronous discussions to explore various topics the author's opinion is that educators' interest in further exploring the use of asynchronous discussions in education is justified.

Synchronous discussions can take place through the use of a chat facility. From experience the chat facility for the purpose of conducting synchronous discussions was not a great success. Students participated by typing their contribution to an online conversation. This medium of communication suits some students but not others. Speed typists can contribute very quickly and keep up with the typed conversation. Student participants who were not speed typists find that it takes them so long to type a response that by the time they go to post their contribution to the conversation, the topic of the conversation has moved on leaving their contribution out of synch with the current flow of the online conversation. The synchronous discussion would be better conducted through web conferencing which would enable each student participating in the discussion equal opportunity to contribute to the discussion. Bower, Hedberg and Kuswara (2010) successfully used web-conferencing environments to enable students engage in collaborative design. Dolan, O'Connor, Mullally and Jennings (2004) conducted a study on synchronous e-learning and found "the outcomes were deemed to be very positive" (Dolan et al., 2004, p. 1).

When researchers in the Knowledge and Data Engineering Group (KDEG, 2013), in the School of Computer Science and Statistics, Trinity College Dublin were involved in the GRAPPLE FP7 STREP Funded Project (GRAPPLE, 2008), web conferencing was used to discuss evaluation guidelines (Steiner et al., 2010), training approach (Glahn, Steiner, De Bra, Docq, & O'Donnell, 2010), final evaluation (Glahn et al., 2011) and various other issues which needed to be discussed. The participants in the GRAPPLE project were based in various European universities (GRAPPLE, 2008). The use of web conferencing in this instance reduced: researchers time spent on attending conferences, budgetary expenses, inconvenience to lifestyle, and undue damage to the environment due to travel induced air pollution.

Controversies

Netiquette must be observed at all times. In the case of researchers disagreeing on the appropriate use of techniques, respect must be shown for peers and all arguments must be supported by relevant citations and links to the cited sources. Should researchers disagree on the most appropriate research method to apply to specific research questions, the relevant supervisor(s) or lead researcher's opinion should be sought. Resolution paths may be required to deal with some controversies, for example, round table discussions with an appointed chair to review research positions and directions which may be justifiably challenged.

Problems

From experience using an e-learning module to support students, some students made regular and relevant contributions to the discussion board while others did not personally contribute but regularly followed the comments and work submitted by others. Akyol and Garrison (2011) comment that students were of the opinion that in order for the process to work all parties should contribute equally. Some type of encouragement is required to get all students to contribute to the forum to make it a success. The approach to resolving this issue in both the Masters in Information Systems for Managers (Oscail, 2007) and the Post Graduate Diploma in Business Information Systems (DIT, 2007) was to allocate marks for student contributions to the discussion board as part of the continuous assessment mark. The marking scheme for the student contributions was based on: the relevance of the contributions made and that the contributions were supported by citations from peer reviewed sources.

The success of an e-learning module to support researchers would be dependent on a number of factors such as the: researchers' motivation, supervisors' motivation, and the impact of publications resulting from the researchers' engagement with the e-learning module and so forth. The chosen discipline of each researcher/supervisor will also influence the dissemination rate, citation rate, and the impact factor. Some research areas may only attract the attention of a very small specialised niche group, which will duly affect the citation level and hence the impact factor, though the researcher may be very highly motivated.

"A scientifically written article comprises a reference section at the end where all the references mentioned in the document are cited serially, and each reference is a citation. A citation count is the frequency of an article cited by other articles" (Nigam & Nigam, 2012, p. 511). PhD students and researchers require an awareness of citations counts and their values to enable them target appropriate publications with their research. "Citation counts are often interpreted as proxies for the scientific influence of papers, journals, scholars, and institutions. However, a rigorous and scientifically grounded methodology for a correct use of citation counts is still missing" (Radicchi & Castellano, 2012, p. 1).

Hassad (2010) on discussing "Doctoral education (PhD) in the USA" (Hassad, 2010, p. 1), concludes "it may be an opportune time to explore adopting a PhD education model that is emerging in the European system, and which requires students to produce published peer-reviewed articles instead of (or in addition to) the dissertation" (Hassad, 2010, p. 4). Researchers can realise invaluable feedback from the peer review process. The peer review of many researchers in the same discipline as a PhD student can broaden the student's outlook and improve their approach and academic writing style. Hassad (2010) suggests the model for PhD education which is emerging in the European system would add "another layer of accountability (and quality control) to the process, which can facilitate improved faculty support, and result in better prepared graduates" (Hassad, 2010, p. 4). For PhD students and researchers to know which journals, conferences, and publishing organisations to target with their research output, they would require knowledge of how the publishing process, citation counts, and how the Journal impact factor system works.

Lokker et al. (2012) cites both Garfield (Garfield, 2006) and Thompson Reuters Institute of Scientific Information (ISI, 2012), in the explanation of how Journal impact factors (JIFs) (Garfield, 2006) are calculated in all journals indexed by Thompson Reuters Institute of Scientific Information (ISI) (ISI, 2012), in the following quote on how to calculate JIFs. "Journal impact factors (JIFs) are calculated as the number of times articles in a journal published over a two-year period (e.g., 2005-2006) are cited in all journals indexed by Thompson Reuters Institute of Scientific Information (ISI) during the following year (e.g., 2007), divided by the total number of substantive articles and reviews published in that journal in the first two years (e.g., 2005-2006)" (Lokker et al., 2012, p. 28). Lokker et al. (2012) in the same paper suggests "Ultimately, it would be desirable to use a more robust and less controversial reference standard than JIF, which is based solely on citation counts of a somewhat arbitrary set of articles within journals over a fixed period" (Lokker et al., 2012, p. 32). Ideally, it would be nice to gauge papers by a less controversial reference standard, but this is one of the standards currently used to rate the impact factor of papers.

The h-index is another method in use "An h-index of 20 means that the scientist has published twenty papers that each had at least twenty citations" (Bador & Lafouge, 2011, p. 110). Another ranking method for papers is based on download counts "Journal of Vision (JOV) recently began publishing download counts for every published article. The journal also ranks the top 20 articles by download" (Nigam & Nigam, 2012, p. 512). A combination of the above methods for ranking the impact of papers could be used to determine the success of the e-learning module for researchers. In the meantime, Tous et al. (2011) suggests "Because citation analysis has become a critical component in scholarly impact factor calculation, and considering the relevance of this metric within the scholarly publishing value chain, we defend that the relevance of providing a reliable solution justifies the effort of introducing technological changes within the publishing lifecycle" (Tous et al., 2011, p. 33).

Granić and Ćukušić (2011) suggest that the poor design of e-learning systems are one of the contributory factors to the slow uptake of e-learning. Another is the fear of appearing unprofessional (O'Donnell, 2008) or incompetent should the technology fail. Lack of time to engage with e-learning training and to create e-learning modules (O'Donnell, 2008) is another reason why educators do not engage with e-learning. The creation of e-learning modules takes considerable expertise (Thompson, Jeffries, & Topping, 2010). Above are just some of the reasons why educators do not employ the use of e-learning modules.

SOLUTIONS AND RECOMMENDATIONS

An exemplary, strong and positive guide on the side familiar with research methods and statistical analysis should be available to oversee the use of the e-learning module for researchers to ensure the methods and techniques are correctly applied. The guide on the side would be responsible for ensuring that netiquette is observed at all times by researchers using the module.

Identifying suitable units of learning to present to students is a skill or problem solving process which educators continuously strive to improve. By providing researchers with a range of units of learning to facilitate self directed learning this would transfer the problem solving process to the researcher who then has the responsibility of identifying the most appropriate units of learning to study by themselves and apply to their research. This module would afford learners the opportunity to participate in different learning experiences based around a single concept in an attempt to broaden their knowledge of research methods and deepen their understanding of underlying concepts.

Examples of various different approaches to conducting research could be provided to enable students to obtain a better understanding of the complete research process from different perspectives. A comprehensive understanding of the research process and how and where to get published would assist students who are starting out on the path of discovery. The concepts depicted in the following figures are basic starting points; other concepts can be added to the various sections of the e-learning module at any stage. The concepts listed in the following figures are not exhaustive. Figure 2 portrays a simple example of how a researcher would approach testing a hypothesis through to dissemination of research findings.

Researchers would review various different approaches in order to identify the approach best suited to their particular research requirements. Researchers could use the e-learning module to discuss the different approaches with their peers through asynchronous or synchronous discussion to assist them in identifying the most appropriate approach to use for a particular type of research. The target media for dissemination of research will dictate: the rigour of analysis required, the referencing style to be used, and the preferred word processing formats.

Figure 3 outlines a selection of learning resources suitable for use by a researcher when commencing testing a hypothesis. Initially, the researcher would be led through a scenario outlining how to conduct a state of the art literary review.

Figure 2. Testing a hypothesis through to dissemination of findings

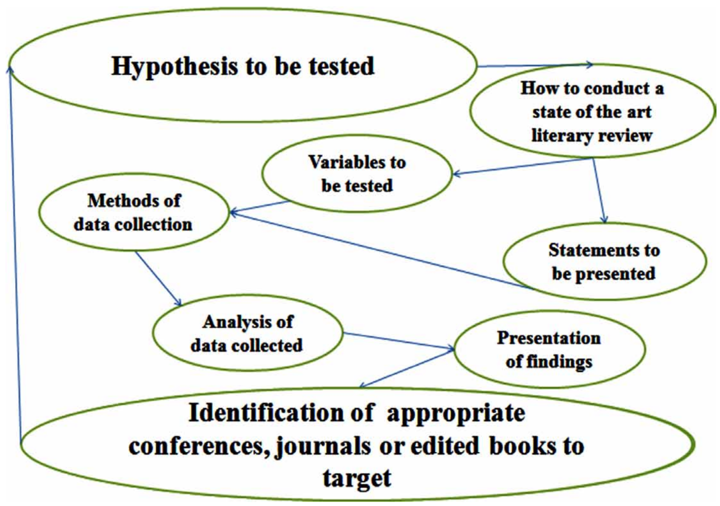
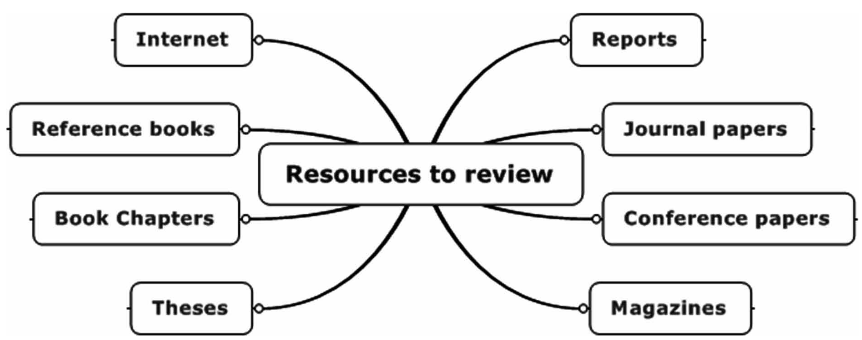


Figure 3. Resources to review



From the state of the art survey conducted the researcher would identify a set of variable to be tested to obtain quantitative data, and statements/ questions to be presented to participants to obtain qualitative data to analyse. Once the researcher has identified variables and statements to be tested, the most appropriate research methodology must be applied. The students should then consider the research methods options available for collecting data, as outlined in Figure 4.

Research ethical clearance must be sought and granted before commencement of data collection, regardless of the methods of data collection selected. Guidance on how to apply for research ethical clearance should be provided for students within the e-learning module. Templates to apply for research ethical clearance should be made available and updated as the need arises. Samples of applications for research ethical clearance which have previously been granted should be available; to assist researchers and PhD students in the process of obtaining research ethical clearance.

The researcher then has to decide on the format of the data to be collected. The researcher has to consider in advance how they are going to analyse the collected data. The data can be collected in numerous different formats as indicated in Figure 5.

Options to consider when performing the analysis of data collected would be provided as per Figure 6. These options would be expanded upon within the e-learning module, to enable the PhD students and researchers read up on the

Figure 4. Methods of data collection

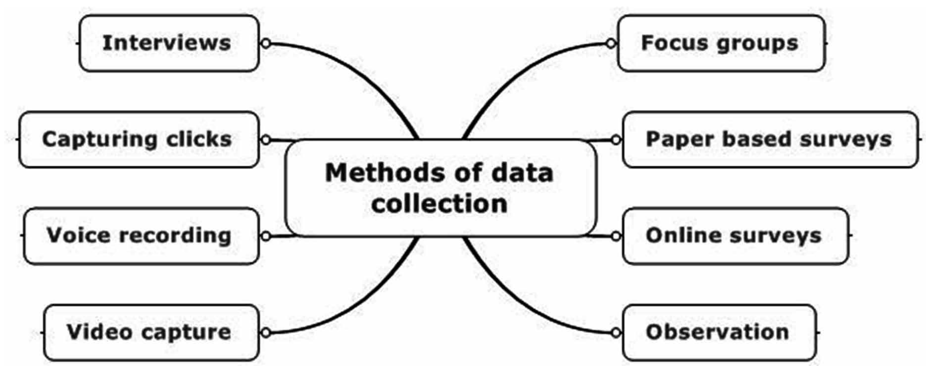
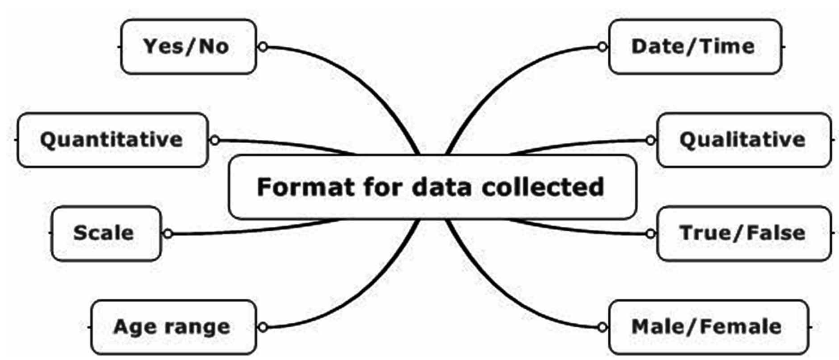


Figure 5. Format for data collection



various options available and select the option(s) most suited to the specific research they are currently pursuing.

In the analysis of data collected section, the e-learning module would enable researchers to select the most appropriate methods of data analysis relevant to the type and volume of data collected.

The presentation of findings may well depend on the discipline and where the research is to be published. Some publishers prefer black and white submission, for example, reference books, whereas, posters are generally in colour. The presentation of the findings will depend on the type of publication targeted. The e-learning module would supply information relevant to the type of publication targeted, for example:

- Summarised version for a poster
- 4,000 words for a journal article
- 8,000 – 10,000 words for a chapter of a book

Researchers should be advised to keep their formatting to a minimum in their initial draft of findings, then it is easier to insert into templates for book chapters, conference submissions and so forth, as the need arises. Figure 7 portrays the various different publishing opportunities for researchers.

Depending on work and personal commitments, different publishing venues will suit different researchers' lifestyles. Due to timetabling of contact hours lecturers may find it difficult to commit to attending conferences during term time.

Figure 6. Analysis of data collected

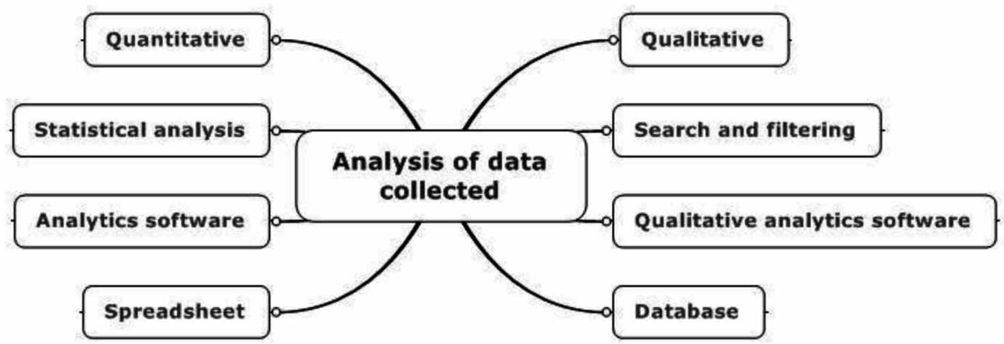
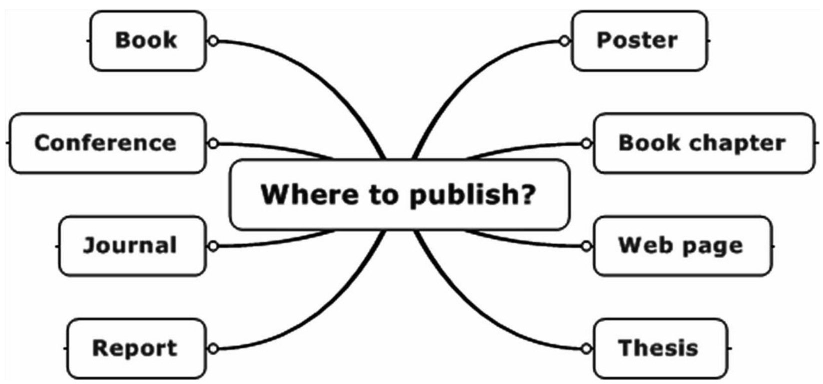


Figure 7. Where to publish



Presenting at conferences may gain the researcher some acknowledgement from the conference attendees, but an article in an electronic journal or an electronic book (e-book) may be more easily accessible to many. The e-learning module could outline the content relevant to publishing in each of these different venues and highlight the advantages and disadvantages of each.

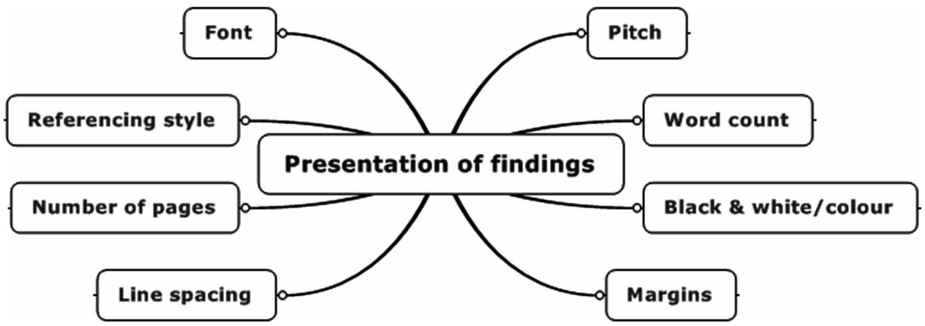
The presentation of findings or dissemination of research will be dependent on the publication type selected. Different publishers require different publishing formats and different referencing styles. As previously mentioned, it is advisable when collating results to keep the applied formatting to a minimum, then the text, tables and figures can easily be inserted into the formatting required by the publisher. Some publishers will not consider papers unless they are submitted in the correct format and citations follow the required referencing style. Figure 8 indicates some formatting issues; the requirements will differ depending on the publisher.

The combined e-learning module would conceptually appear as a combination of all the figures used in this chapter. The use of discussion boards, synchronously and asynchronously, would assist researchers understanding and use of these concepts.

FUTURE RESEARCH DIRECTIONS

To investigate if the proposed e-learning module would improve the quantity and quality of research publications, one method would be to compare the quantity and quality of the research

Figure 8. Presentation of findings



output of researchers who have engaged with the published research output of students who have not engaged with an e-learning module. An alternative method would be to create such an e-learning module, encourage student engagement, gather student feedback and analyse the feedback to see if the creation and implementation of such a module would be perceived as beneficial to researchers. Should either of the above solutions for the proposed module be pursued, the findings will provide a good indication as to whether such an e-learning module would improve the quality of research undertaken by PhD students and researchers. The process of evaluating such an e-learning module requires further research which promises to be an interesting study. Engagement with such an e-learning module has the potential to improve the quality of research and the quantity of research publications by facilitating online peer support. Furthermore, by adding some adaptive functionality to the e-learning module students could perhaps benefit from personalised e-learning whereby learning objects would be selected by the system to suit individual students learning needs.

CONCLUSION

This purpose of this chapter was to propose the use of an e-learning module to support researchers to improve the quality of research and increase research dissemination. An e-learning module on research methods and statistical analysis would perhaps improve the quality of research by providing students with the necessary skill set to identify the most appropriate research methods and statistical analysis to apply to their research. Thus, enabling students to effectively conduct research and subsequently analyse, interpret and contextualise the findings. In addition, the quality of research would perhaps improve as a result of the peer reviewed feedback received from the other researchers involved in the online community of practice. Opportunities for collaborative work would also be identified through discussions on research interests and approaches. Collaborative work on papers, book chapters and conference submission could increase the research output of the researchers and research groups who actively engage with an e-learning module to support researchers in higher education.

REFERENCES

Akyol, Z., & Garrison, D. R. (2011). Understanding cognitive presence in an online and blended community of inquiry: Assessing outcomes and processes for deep approaches to learning. *British Journal of Educational Technology*, *42*(2), 233–250. doi:10.1111/j.1467-8535.2009.01029.x

Bador, P., & Lafouge, T. (2011). Comparative analysis between impact factor and h-index for psychiatry journals. *Analyse Comparative du Facteur d'Impact et de l'Indice h dans les Revues de Psychiatrie, 35*(2), 109-121.

Bower, M., Hedberg, J. G., & Kuswara, A. (2010). A framework for Web 2.0 learning design. *Educational Media International*, *47*(3), 177–198. doi:10.1080/09523987.2010.518811

Bowman, A. (2007). Interdisciplinary research: the importance of learning other people's language. *Advances in Statistical Analysis, 91*, 361-365.

Brannen, J. (2005). Mixing methods: The entry of qualitative and quantitative approaches into the research process. *International Journal of Social Research Methodology*, *8*(3), 173–184. doi:10.1080/13645570500154642

Cheak, A. M., Angehrn, A. A., & Sloep, P. (2006). *Enhancing the social network dimension of lifelong competence development and management systems: A proposal of methods and tools*. Paper presented at the Workshop Learning Networks for Lifelong Competence Development. Sofia, Bulgaria.

Chen, H. (2012). Introduction. In H. Chen (Ed.), *Approaches to quantitative research: A guide for dissertation students* (pp. 1-6). Cork, Ireland: Oak Tree Press.

Chesebro, J., & Borisoff, B. (2007). What makes qualitative research qualitiative? *Qualitative Research Reports in Communication*, *8*(1), 3–14. doi:10.1080/17459430701617846

Christiansen, A., & Bell, A. (2010). Peer learning partnerships: Exploring the experience of pre-registration nursing students. *Journal of Clinical Nursing*, *19*(5/6), 803–810. doi:10.1111/j.1365-2702.2009.02981.x PMID:20500324

Cole, M., John-Steiner, V., Scribner, S., & Souberman, E. (Eds.). (1978). *Vygotsky, Lev.: Mind in Society: The development of higher psychological processes*. Cambridge, MA: Harvard University Press.

Creswell, J. W. (2009). Research design: Qualitative, quantitative, and mixed methods approaches (3rd ed.). SAGE Publications, Inc.

Dagger, D., Conlan, O., & Wade, V. (2003). *An architecture for candidacy in adaptive e-learning systems to facilitate the reuse of learning resources.* Paper presented at the World Conference on E-Learning in Corporate, Government, Healthcare, and Higher Education 2003. Phoenix, AZ.

Davidson, J., & Jacobs, C. (2008). The implications of qualitative research software for doctoral work. *Qualitative Research Journal*, *8*(2), 72–80. doi:10.3316/QRJ0802072

Dawson, S. (2010). 'Seeing' the learning community: An exploration of the development of a resource for monitoring online student networking. *British Journal of Educational Technology*, *41*(5), 736–752. doi:10.1111/j.1467-8535.2009.00970.x

Dermo, J. (2009). E-assessment and the student learning experience: A survey of student perceptions of e-assessment. *British Journal of Educational Technology*, *40*(2), 203–214. doi:10.1111/j.1467-8535.2008.00915.x

DIT. (2007). *Dublin Institute of Technology*. Retrieved from http://www.dit.ie/catalogue/Programmes/Details/DT380?tab=Additional%20 Information

Doering, T., Pereira, L., & Kuechler, L. (2012). *The use of e-textbooks in higher education: A case study*. Paper presented at the E-Leader. Berlin, Germany.

Dolan, D., O'Connor, C., Mullally, A., & Jennings, A. (2004). *Experience in the use of synchronous eLearning in a traditional university for non-traditional learners*. Paper presented at the Hawaii International Conference on Education. Hawaii, HI. Retrieved from www.hiceeducation.org

Donnelly, R., & O'Rourke, K. (2007). What now? Evaluating e-learning CPD practice in Irish third-level education. *Journal of Further and Higher Education*, *31*(1), 31–40. doi:10.1080/03098770601167864

Duncan-Howell, J. (2010). Teachers making connections: Online communities as a source of professional learning. *British Journal of Educational Technology*, *41*(2), 324–340. doi:10.1111/j.1467-8535.2009.00953.x

Edwards, M., Perry, B., & Janzen, K. (2011). The making of an exemplary online educator. *Distance Education*, *32*(1), 101–118. doi:10.1080/01587919.2011.565499

Fossey, E., Harvey, C., McDermott, F., & Davidson, L. (2002). Understanding and evaluating qualitative research. *The Australian and New Zealand Journal of Psychiatry*, *36*(6), 717–732. doi:10.1046/j.1440-1614.2002.01100.x PMID:12406114

Garfield, E. (2006). The history and meaning of the journal impact factor. *Journal of the American Medical Association*, *295*(1), 90–93. doi:10.1001/jama.295.1.90 PMID:16391221

Glahn, C., Steiner, C., De Bra, P., Docq, F., & O'Donnell, E. (2010). *GRAPPLE (Generic Responsive Adaptive Personalized Learning Environment): Second documentation and training for GRAPPLE users*. Retrieved from http://grapple-project.org/public-files/deliverables/D9.4-WP9-SecondTrainingReport-v1.1.pdf

Glahn, C., Steiner, C., de Bra, P., Docq, F., O'Donnell, E., Verpoorten, D., et al. (2011). *GRAPPLE (Generic Responsive Adaptive Personalized Learning Environment): Second empirical evaluation in academic settings*. Retrieved from http://www.grapple-project.org/public-files/deliverables/D9.5-WP9-FinalEvaluation-v1.0.pdf/view

Granić, A., & Ćukušić, M. (2011). Usability testing and expert inspections complemented by educational evaluation: A case study of an e-learning platform. *Journal of Educational Technology & Society*, *14*(2), 107–123.

GRAPPLE. (2008). *GRAPPLE Project Website*. Retrieved from http://www.grapple-project.org/

Hassad, R. (2010). *Toward improving the quality of doctoral education: A focus on statistics, research methods, and dissertation supervision.* Paper presented at the International Conference on Teaching Statistics: Data and Context in Statistics Education: Towards an Evidence-Based Society (ICOTS8). Slovenia.

Hoyles, C., Küchemann, D., Healy, L., & Yang, M. (2005). Students' developing knowledge in a subject discipline: Insights from combining quantitative and qualitative methods. *International Journal of Social Research Methodology*, *8*(3), 225–238. doi:10.1080/13645570500154899

Hwang, G.-J., & Tsai, C.-C. (2011). Research trends in mobile and ubiquitous learning: A review of publications in selected journals from 2001 to 2010. *British Journal of Educational Technology*, *42*(4), E65–E70. doi:10.1111/j.1467-8535.2011.01183.x

ISI. (2012). *Thomson Reuters (ISI) Web of knowledge*. Retrieved from http://thomsonreuters.com/products_services/science/science_products/a-z/isi_web_of_knowledge/

Jung, I., & Latchem, C. (2011). A model for e-education: Extended teaching spaces and extended learning spaces. *British Journal of Educational Technology*, *42*(1), 6–18. doi:10.1111/j.1467-8535.2009.00987.x

Kalyuga, S., & Sweller, J. (2005). Rapid dynamic assessment of expertise to improve the efficiency of adaptive e-learning. *Educational Technology Research and Development*, *53*(3), 83–93. doi:10.1007/BF02504800

KDEG. (2013). *Knowledge and Data Engineering Group, School of Computer Science and Statistics*. Trinity College Dublin. Retrieved from http://kdeg.scss.tcd.ie/

Lokker, C., Haynes, R. B., Chu, R., McKibbon, K. A., Wilczynsk, N. L., & Walter, S. D. (2012). How well are journal and clinical article characteristics associated with the journal impact factor? A retrospective cohort study. *Journal of the Medical Library Association: JMLA*, *100*(1), 28–33. doi:10.3163/1536-5050.100.1.006 PMID:22272156

Moderato, P. (2006). Behaviourism and the science of behaviour: Its development in Italy. *International Journal of Psychology*, (41): 6.

Murphy, A. (2008). APEL matters in higher education. Co. Kilkenny, Ireland: Red Lion Press.

Nigam, A., & Nigam, P. K. (2012). Citation index and impact factor. *Indian Journal of Dermatology, Venereology and Leprology*, *78*(4), 511–516. doi:10.4103/0378-6323.98093 PMID:22772633

O'Donnell, E. (2008). Can e-learning be used to further improve the learning experience to better prepare students for work in industry. (Masters in Information Systems for Managers). Dublin: Dublin City University. Retrieved from http://arrow.dit.ie/buschmanoth/1

Oscail. (2007). *Distance Education*. Retrieved November 2, 2007, from www.oscail.ie

Parkinson, M. (2009). The effect of peer assisted learning support (PALS) on performance in mathematics and chemistry. *Innovations in Education and Teaching International*, *46*(4), 381–392. doi:10.1080/14703290903301784

Piaget, J. (2008). Intellectual evolution from adolescence to adulthood. *Human Development: Reprint of Human Development, 15*(1-12), 40-47.

Power, R., Miles, B., Peruzzi, A., & Voerman, A. (2011). Building bridges: A practical guide to developing and implementing a subject-specific peer-to-peer academic mentoring program for first-year Higher Education students. *Asian Social Science*, *7*(11), 75–80. doi:10.5539/ass.v7n11p75

Radicchi, F., & Castellano, C. (2012). A reverse engineering approach to the suppression of citation biases reveals universal properties of citation distributions. *PLoS ONE*, *7*(3), 1–9. doi:10.1371/journal.pone.0033833 PMID:22479454

Resnick, L., B. (1987). The 1987 Presidential address: Learning in school and out. *Educational Researcher, 16*(9), 13-20, 54.

Ribot, T. (1901). Tvorcheskoe voobrazhenie [Creative Imagination]. St. Petersburg: Iu. N. Erlikh.

Rovai, A. P. (2002). Development of an instrument to measure classroom community. *The Internet and Higher Education*, *5*(3), 197–211. doi:10.1016/S1096-7516(02)00102-1

Salmon, G. (2009). The future for (second) life and learning. *British Journal of Educational Technology*, *40*(3), 526–538. doi:10.1111/j.1467-8535.2009.00967.x

Scott, P., Castañeda, L., Quick, K., & Linney, J. (2009). Synchronous symmetrical support: A naturalistic study of live online peer-to-peer learning via software videoconferencing. *Interactive Learning Environments*, *17*(2), 119–134. doi:10.1080/10494820701794730

Sitthiworachart, J., & Joy, M. (2008). Computer support of effective peer assessment in an undergraduate programming class. *Journal of Computer Assisted Learning*, *24*(3), 217–231. doi:10.1111/j.1365-2729.2007.00255.x

Skinner, B. F. (1981). Selection by consequences. *Science*. *New Series.*, *213*(4507), 501–504.

Smyth, R. (2011). Enhancing learner-learner interaction using video communications in higher education: Implications from theorising about a new model. *British Journal of Educational Technology*, *42*(1), 113–127. doi:10.1111/j.1467-8535.2009.00990.x

Steiner, C., Hillemann, E., Verpoorten, D., Kleinermann, F., Pekczynski, P., & O'Donnell, E. (2010). *GRAPPLE (Generic Responsive Adaptive Personalized Learning Environment): Refinement and improvement of evaluation guidelines*. Retrieved from http://www.grapple-project.org/public-files/deliverables/D8.2b-WP8-Evaluation-Guidelines-v1.0.pdf

Thompson, L., Jeffries, M., & Topping, K. (2010). E-mentoring for e-learning development. *Innovations in Education and Teaching International*, *47*(3), 305–315. doi:10.1080/14703297.2010.498182

Tous, R., Guerrero, M., & Delgado, J. (2011). Semantic web for reliable citation analysis in scholarly publishing. *Information Technology & Libraries*, *30*(1), 24–33.

Unwin, A. (2007). Statistical consulting interactions: a personal view. *Advances in Statistical Analysis, 91*, 349-359.

Vygotsky, L. S. (2004). Imagination and creativity in childhood. *Journal of Russian & East European Psychology*, *42*(1), 7–97.

KEY TERMS AND DEFINITIONS

Asynchronous Discussion: Refers to discussions which do not take place in real time. Each subscriber has the opportunity to research and present their opinion to a discussion board for peers to review at some later time. Asynchronous discussions enable subscribers to plan, research, structure, and reflect on their submission before they submit it to the forum for peers to review.

Blended Learning: Occurs when electronic learning resources are used to augment/enhance traditional teaching methods.

Community of Practice: Is formed when a group of people are drawn together through shared interests or goals.

E-Learning: Refers to various forms of teaching and learning which are facilitated through the use of technology.

E-Learning Module: Is stored in a predefined location on an e-learning platform and is dedicated to a particular subject area. Students are provided with user names and passwords to access and contribute to this module. Because the e-learning module is online, students can access this module at any time from any place, providing they have the appropriate computer equipment and broadband access.

Online Collaboration: Refers to people working together online to achieve a shared goal.

Qualitative Analysis: Qualitative methods facilitate the use of open ended questions which enable participants to give their views and opinions on issues without any influence from the researcher.

Quantitative Analysis: The use of techniques including ratios to analyse numerical data which represent measurable characteristics in order to make sense of available information.

Synchronous Discussion: Synchronous discussions refer to discussions which take place in real time. Subscribers respond to other subscribers' suggestions and comments without the opportunity to plan, research, structure, and reflect upon their submission to the forum.

Technology Enhanced Learning (TEL): Technology enhanced learning (TEL) refers to the support of teaching and learning through the use of technology and can be used synonymously with e-learning.

Technology Enhanced Research: Technology enhanced research has the possibility of supporting researchers through the use of technology and perhaps improving the quality of research.

This work was previously published in a Handbook of Research on Scholarly Publishing and Research Methods edited by Victor C.X. Wang, pages 231-251, copyright year 2015 by Information Science Reference (an imprint of IGI Global).

Section 2
Tools and Technologies

This section presents an extensive coverage of various tools and technologies available in the field of Curriculum Design and Classroom Management that practitioners and academicians alike can utilize to develop different techniques. These chapters enlighten readers about fundamental research on the many tools facilitating the burgeoning field of Curriculum Design and Classroom Management. It is through these rigorously researched chapters that the reader is provided with countless examples of the up-and-coming tools and technologies emerging from the field of Curriculum Design and Classroom Management. With 13 chapters, this section offers a broad treatment of some of the many tools and technologies within the Curriculum Design and Classroom Management field.

Chapter 15
A Quest about eQuest and Blended Learning in Teacher Education: An Indian Study

A. Sivasankar
SASTRA University, India

K. Mohanasundaram
Government Arts College (Autonomous), India

ABSTRACT

While alternate modes of delivery in education are assuming importance, it is imperative to train the pre service teachers to use the web resources to maximise learning experience. This paper attempts to study the inquisitive nature of student teachers of south India to use the e resources named as e quest. This experimental study uses blended learning strategy as a treatment for experimental group and conventional method of teaching for control group with respect to some personal variables. The findings prove that blended learning strategy increases the e quest score of pre service teachers irrespective of their prior exposure.

OVERVIEW

Information and communication technologies (ICTs) are a major factor in shaping the new global economy and producing rapid changes in society. Within the past decade, the new ICT tools have fundamentally changed the way people communicate and do business. (Information and Communication Technologies in Teacher Education UNESCO Planning guide, 2002)

DOI: 10.4018/978-1-4666-8246-7.ch015

With the rapid progress of scientific and technological development, technology of education has also transformed accordingly. Internet has gained the limelight in providing any kind of information on any branch of study. The printed resources had been out moded by electronic resources in terms of creating, hosting, accessing and cost of production. The active seekers of knowledge through internet are increasing exponentially. Instead of totally depending on the instructions imparted by the teachers and the subject matter available in the printed media, the e learners can access the repot ire of information over the internet not only to seek information but also to form groups with interested peer members, to make threaded discussions and to form on line communities the way it happens in the real classroom environment.

Though e learning may be understood as an innovative technique or a form of ICT used in providing learning experiences to the learners through on line by using internet services and web technology, in real life situations it is not limited to internet and web technology alone. Therefore e learning in present day context may be considered as learning carried out, supported and facilitated by the advanced multimedia utilities as well as internet and web technology delivered to the end users in their computers, laptops and personal digital assistants. E learning may be in general classified into total e learning, support e learning and blended learning. In blended learning attempts are made for making use of a combination of traditional and ICT enhanced e learning practices. Blended learning describes the learning environment that either combines teaching methods, delivery methods, media formats or mixture of all these. It also refers to the integrated learning activities such as mixture of on line, off line and face to face learning. In other words blended learning is a mixture of traditional and e learning strategies. It is the combination of face to face learning with web based on line approaches the combination of media, methods and pedagogical approaches, to enhance control over learning, critical thinking and assessment.

In order to perpetuate the organized system of society, teacher education moulds the suitable persons as expected by the society to nurture the young minds as teachers. The strength of an educational system largely depends on the quality of its teachers. Whatever high the aims, however up to date the equipments, however efficient the administration, the performance of children is determined by the teachers. It is high time that we develop a class of teachers who are academically well prepared, trained professionally and can sustain the formidable task of nation building with confidence. These teachers must also posses experimental attitude with wholesome philosophy of education which calls for innovative approaches to prepare teachers at all levels. These teachers must be able to comprehend with findings of educational research, translate them into practice, and feed the same to the up coming generation for further research and development. The prospective teacher must be made to realize his duties and responsibilities in an emerging society like India. He must be taught what is relevant to the needs of the society. The teacher education program should be competent enough to inculcate the qualities, abilities, attitudes, ideals etc…..expected out of good teacher along with the ability to grab and refine the repot ire of information available in the World Wide Web, to scaffold the knowledge base of the learner instantly.

Educational machinery across the world is under severe pressure to use new Information and Communication Technologies (ICTs) to teach learners the knowledge, attitude and skills that are needed for the 21st century. With the help of emerging new technologies the teaching profession is evolving from teacher centric chalk and talk lecture based instruction to student centric, information rich interactive learning environments. Designing and implementing successful ICT enabled teacher education programs is the key to fundamental and wide ranging educational reforms. It is the universal truth that a teacher can not be substituted by any electronic gadget. Many times the newer gadgets are playing a supplementary role along with the teacher's aim of maximizing the learning experiences. In this context the teacher can be said well informed and fully competent only when he is well versed with the usage of web resources and optimal use of them in the required proposition along with his sturdy commitment to discharge his lively role.

Many countries are engaged in a number of efforts to effect changes in the teaching learning process to prepare students for information and technology based society. ICTs may provide an array of powerful tools that may help in transforming the present isolated, teacher centric and text-bound class rooms into rich, student focused, and interactive knowledge environments. To accomplish this goal, it requires both a change in the traditional view of the learning process and an understanding of how the new digital technologies can create new learning environments in which the students are able to take greater responsibility for their own learning and for constructing their own knowledge.

Blended learning strategy can maximize the learning experience with the minimum utilization of resources. It can promote relearning in terms of drill and practice without space constraint. Through blended learning strategy educational cost becomes cheaper, and that makes it cost benefit and cost effective. Storage, preservation of content and timely retrieval of them is easy in blended learning. In case of non formal education it is the powerful medium and can very well replace class room teaching and books as it can provide content with media and animation to promote modernization of education. Blended learning strategy will be more entertaining and encouraging to the students of all age group. If it is employed appropriately the positive attitude towards education can be fostered among young learners which will make learning with out burden a reality. When the ignited learners acquire unquenchable thirst for knowledge, then mastery of learning will be achieved easily. Blended learning strategy can address two important expectations of policy makers namely learning with out burden and mastery of learning. All can be a reality only when we generate a group of passionate teachers who have the real urge in them to better serve the younger generation with the help of net resources. As the urge may be attributed to various factors, the influence and addictive proportions of the e resources collectively termed as e quest which makes the individuals to plunge into the internet again and again. Invariably blended learning strategies may trigger the taste buds of prospective teachers and make them use it as their regular teaching aid. The possible effects of blended learning strategy on e quest need to be assessed, this paper attempts to study the e quest of the pre service teachers in southern part of India through an experimental study using blended learning strategy as treatment.

Objectives of the Study

1. To measure the e quest scores of student teachers.
2. To study whether blended learning environment increases e quest scores.
3. To assess the e quest scores with reference to few personal variables.

Variables of the Study

The independent variable of this study is the blended learning strategy. The dependent variable is e quest scores of student teachers. Other personal variables involved in this study are gender, generation of graduation, and surfing habit.

Hypotheses of the Study

1. There is no significant difference in the post test e quest scores between the control and experimental group student teachers.
2. There is no significant difference in the post test e quest scores between the control and experimental group men student teachers.
3. There is no significant difference in the post test e quest scores between the control and experimental group women student teachers.
4. There is no significant difference in the post test e quest scores between the control and experimental group first generation graduate student teachers.

5. There is no significant difference in the post test e quest scores between the control and experimental group second generation graduate student teachers.
6. There is no significant difference in the post test e quest scores between the control and experimental group student teachers who are surfing regularly.
7. There is no significant difference in the post test e quest scores between the control and experimental group student teachers who are not surfing regularly.

Method

To study the e quest of student teachers the Pre-test, Treatment, Post-test equivalent group experimental design was adopted in the study.

Sample

A sample of 40 B.Ed student teachers each comprising Physical science, Biological science and Computer science optional subjects were selected for the study from a private College of Education and SASTRA University, Kumbakonam a semi urban area of south India as the control and experimental group respectively. They were selected through purposive sampling technique.

Tool of the Study

e Quest scale constructed and validated by the investigator was the tool used.

Research Procedure

The student teachers studying B.Ed in school of education, SASTRA University, Kumbakonam were treated as experimental group, and the student teachers studying B.Ed in a private College of Education, Kumbakonam were treated as control group. Initially the scores secured by the students in their degree examination were analysed. Fifty students from each institution who secured an average range of marks were selected. Then an intelligence test of g culture fair scale 2, form B prepared by R.B. Cattel and K.S Cattel was administered to these students. Then forty students were selected for each control and experimental group with matched pair. Both groups were formed with gender, generation of graduation and other variables of the study. The blended learning environment was created with face to face instruction sessions followed by asynchronous on line sessions comprising word documents, slide shows, audio and video clippings already uploaded through blogs. The online testing tools were also the part of the strategy along with off line media for experimental group and traditional method for control group for a period of six weeks.

e Quest Scale

The act of searching gives the rays of hope for learning. World Wide Web is a place where seekers and learners alike bonded together in search for knowledge. The unquenchable thirst of learning mass in search of information in the electronic media has been termed as e quest by the investigator. What for the individuals are searching or what skill that they feel will improve over browsing have been collectively named as e quest. The investigator intended to study the influence of blended learning strategy over e quest and to measure the relation ship. e Quest was assessed by using e quest scale constructed by the investigator. There are various factors which make the individual to surf in the net. The investigator had identified ten such factors as ten dimensions of the tool and the test contains 50 statements with five point scale. These 50 statements in e quest scale with five point Likert type was assigned a weight age ranging from 4 (strongly agree) to 0 (strongly disagree). For each student a total score in the scale can be obtained by summating his score for the individual items. Thus a range of 0-200 scores can be obtained.

The test items were generated based on opportunity to learn, ability to understand, chances for collaborative learning, Meta cognitive skills and social learning. This scale had been developed to assess the inner urge of the teachers to utilize the internet revolution in their teaching learning process, It is also intended to evaluate any change in the e quest score of student teachers after blended learning strategy.

TEN DIMENSIONS OF eQUEST

Content

Content refers to enormous amount of digital content that can be transmitted over a computer network such as internet. It includes text, audio, video, graphics, animation and so on. Many seekers enter the web in anticipation that their search will end with internet.

Performance

Performance refers to the ability to carry out or the act of execution or sense of accomplishment or achievement. Those who assume that their performance increases through e media favour the dimension performance.

Simulation

The act or an instance of simulating with the assumption of false appearance, form or sequence is simulation. Facing the representation of a problem situation in order to estimate its characteristics or solve problem is simulation. Those who prefer a feign experience or an act of fictious assumption prefer this dimension.

Multi Tasking

Multi tasking refers to the ability of an individual to perform more than one task or many tasks at the given time. In the field of human resource development multi tasking is an important term that is used to describe how busy managers or academic administrators are able to accomplish a challenging amount of work in a given time period. e learner must also posses such multi tasking abilities to grab more.

Collective Intelligence

Collective intelligence refers to shared or group intelligence that emerges from the collaboration and competition of many individuals and appears to be essential for decision making. In order to allow relatively large number of people to co operate in one process leading to a reliable action.

Judgment

Judgment refers to the cognitive process of reaching a decision or drawing conclusions. The ability of an individual to assess situations or circumstances meticulously and to make meaningful conclusions. An opinion formed by judging something seems to be essential for new age learning.

Cross Media Navigation

Cross media navigation is the advantage that the end users are getting by means of navigating from high reach base medium to interactive target media as one can switch from text to graphics then to animated and virtual media where the switch is attractive, rich in information and interaction.

Cyber Relationship

Cyber relationship means a relationship that either was generated or continued solely through the internet as a medium for meeting or communication. The relationship anonymously connect people to share experiences, get feedback, give comment, meet new friends and board in discussion forum.

Group Dynamics

Group dynamics refers to the underlying features of group behaviour such as motives and attitudes. It is concerned with the flexibility in thinking rather than stability in thinking. The interactive process with in the group about the changing patterns of tension, conflict, adjustment and cohesion.

Research Aptitude

Research aptitude refers to an innately acquired or learned or developed component of a competency to do a kind of research work at certain level. Research aptitude represents knowledge or ability that is gained through the internet learning environment.

Expert Opinion

The test items constructed were subjected to jury's opinion consisting of research supervisor, two principals of colleges of education and four experienced teacher educators. The jury's were requested to review each item and its validity with reference to the objectives, appropriateness and suitability to B.Ed students. The suggestions given by them were incorporated to finalize the test items.

Pilot Study

The refined test items were administered to a sample of 25 students. The test items total correlation of each item was computed. The 50 items with significant 'r' values were selected and included in the final test.

Reliability

The reliability of the test was established by test re-test method. The test was administered after a gap of three weeks to 25 student teachers. The co efficient of correlation between the two set of scores was found to be 0.81. The reliability of the test was established by using split half method also. The co- efficient of correlation between the scores of the odd and even items was calculated for 25 students. Split half reliability was found to be 0.76 and using Spearman- Brown formula for the full length of the test 'r' was estimated to be 0.78. Thus the e quest scale for blended learning strategy possesses adequate reliability.

Validity

The content validity was established by the experts and construct validity was established by the investigator, which is 0.82 for e quest. The test items were constructed based on opportunity to learn, ability to understand, chances for collaborative learning, Meta cognitive skills and social learning. Therefore the test possesses content, construct and face validity. This establishes the validity of the tool.

Analysis and Inferences

Hypothesis 1: There is no significant difference in the post test e quest scores between the control and experimental group student teachers. The calculated value of't' is significant at 0.01 level of significance. This makes it obligatory to reject the above said null hypothesis. It is concluded that there is significant difference between the experimental and control group student teachers in their e quest scores. The experimental group student teachers are at a higher level than the control group student teachers in their e quest scores (Table 1).

Hypothesis 2: There is no significant difference in the post test e quest scores between the control and experimental group men student teachers. The calculated value of't' is significant at 0.01 level of significance. This makes it obligatory to reject the above said null hypothesis. It is concluded that there is significant difference between the experimental and control group men student teachers in their e quest scores. The experimental group men student teachers are at a higher level than the control group men student teachers in their e quest scores.

Hypothesis 3: There is no significant difference in the post test e quest scores between the control and experimental group women student teachers. The calculated value of't' is significant at 0.01 level of significance. This makes it obligatory to reject the above said null hypothesis. It is concluded that there is significant difference between the experimental and control group women student teachers in their e quest scores. The experimental group women student teachers are at a higher level than the control group women student teachers in their e quest scores.

Hypothesis 4: There is no significant difference in the post test e quest scores between the control and experimental group first generation graduate student teachers. The calculated value of't' is significant at 0.01 level of significance. This makes it obligatory to reject the above said null hypothesis. It is concluded that there is significant difference between the experimental and control group first generation graduate student teachers in their e quest scores. The first generation graduate student teachers of experimental group are at a higher level than the first generation graduate student teachers of control group in their e quest scores.

Hypothesis 5: There is no significant difference in the post test e quest scores between the control and experimental group second generation graduate student teachers. The calculated value of't' is significant at 0.01 level of significance. This makes it obligatory to reject the above said null hypothesis. It is concluded that there is significant difference between the experimental and control group second generation graduate student teachers in their e quest scores. The second generation graduate student teachers of experimental group are at a higher level than the second generation graduate student teachers of control group in their e quest scores.

Hypothesis 6: There is no significant difference in the post test e quest scores between the control and experimental group student teachers who are surfing regularly. The calculated value of't' is significant at 0.01 level of significance. This makes it obligatory to reject the above said null hypothesis. It is concluded that there is significant difference between the experimental and control group student teachers who are surfing regularly in their e quest scores. The experimental group student teachers who are surfing regularly are at a higher level than the control group student teachers who are surfing regularly in their e quest scores.

Hypothesis 7: There is no significant difference in the post test e quest scores between the control and experimental group student teachers who are not surfing regularly. The calculated value of't' is significant at 0.01 level of significance. This makes it obligatory to reject the above said null hypothesis. It is concluded that there is significant difference between the experimental and control group student teachers who are not surfing regularly in their e quest scores. The experimental group student teachers who are not surfing regularly are at a higher level than the control group student teachers who are not surfing regularly in their e quest scores.

Effect Size Analysis

Effect size analysis was carried out using pooled standard deviation to find out the relative effectiveness of the blended learning strategy over the conventional method. Effect size was 0.8864 and Cohen's d was 3.83 both are relatively large for the achievement of the student teachers in e quest scores as shown in Table 1 and Table 2.

Table 1. Comparison of e quest scores

Variable	Group	N	Mean	S.D	t Value	p Value
e Quest	**Control**	**40**	**64.27**	**22.74**	**17.132****	**0.000**
	Experimental	**40**	**141.82**	**17.39**		
Men	**Control**	**19**	**53.37**	**15.71**	**16.655****	**0.000**
	Experimental	**23**	**141.25**	**18.02**		
Women	**Control**	**21**	**67.00**	**23.60**	**10.879****	**0.000**
	Experimental	**19**	**141.96**	**17.53**		
First Generation	**Control**	**23**	**65.25**	**23.35**	**12.324****	**0.000**
	Experimental	**20**	**139.96**	**14.73**		
Second Generation	**Control**	**17**	**62.23**	**22.20**	**11.272****	**0.000**
	Experimental	**20**	**146.72**	**23.15**		
Surfing Regularly	**Control**	**22**	**62.81**	**19.04**	**14.433****	**0.000**
	Experimental	**21**	**141.81**	**16.71**		
Surfing not Regularly	**Control**	**18**	**65.25**	**25.26**	**10.626****	**0.000**
	Experimental	**19**	**141.83**	**18.19**		

** Significant at 0.01 level

Table 2. Cohen's 'd' and effect size for the variable of the study

Variable of the Study	Mean Scores		Pooled SD	Cohen's 'd'	Effect size	Effect
	Cont.	Exp.				
eQuest	64.27	141.82	20.24	3.83	0.8864	large

Gain Score Analysis

Gain score analysis was carried out to find out the relative effectiveness of the blended learning strategy over the conventional method. The instructional objectives were same for the pre-test and post-test. The gain scores are as much as 56.94 is the convincing proof for the effectiveness of blended learning strategy in improving the achievement of the student teachers in e quest scores. The mean gain and gain percentage are shown in Table 3.

Case Study 1

Among the experimental group subjects the topper is a woman student teacher a mother of two children and aged about 33 years. Her husband is an officer in the army about thousand and five hundred kilometres away from the family. Leaving the two children in her parent's home she pursued her studies. In a personal interview she expressed better satisfaction with this blended learning strategy and rated superior over the conventional method of teaching. She reported that face to face component was very much useful and reiterated that in skill driven topics like micro teaching face to face sessions are vital. Reacting to the question about her confidence about handling the net resources, she expressed her fullest satisfaction over the approach and revealed that so far she never communicated with her husband through internet enabled services and only after this exposure she is doing so. She also reported that cross media navigation was the phenomenon that kept up her

Table 3. Gain score analysis

Group	Samples	Mean Gain	Gain Percentage
Control Group	40	37.37	18.69
Experimental Group	40	113.87	**56.94**

inquisitive nature to go on and on. According to her the total way in which she looks the world had changed with the positive mind set and stands testimony to the fact that blended learning strategy improves e quest of the learners.

Case Study 2

Another subject a twenty one year old woman student teacher from a rural background and not even having a mobile phone expressed better satisfaction after the blended learning strategy and stated that the e media always enhanced the thrill of learning and helped to bridge the cognitive gap between the men and material. She gave equal importance to the face to face components as well as on and off line components of the strategy. She attributed that her search for new knowledge had increased manifold like that of multitasking skills the dimensions of e quest

The above case studies confirm that the blended learning strategy is effective, interesting, offers better satisfaction to the learners and most important that it makes the learners active seekers of knowledge through e media that is e quest.

Discussions

The influence of online e-resources available for learning is inevitable in the global educational scenario. The alternate modes of delivery in education have been upgraded or advanced with the aid of computer and internet in many ways from traditional methods to modern methods. It matches well with Kathleen Gray and Jacinta Tobin (2010) study on clinical education which reports that introduction of online communities produced high student ratings on its quality about teaching and learning. It also produced academic results equal in that of face to face teaching.

Melek Yaman Dittmar Graf (2010) out of the study on International blended learning co-operation project in Biology teacher education had reported that overall the concept of blended learning received relatively high ratings. Mustafa Caner (2010) is of opinion that blended learning environment for teaching practice course could improve the teaching practice and ensure to the professional growth of student teachers.

Technological advancements like e-learning, mobile –learning, web based learning and blended learning would increase curiosity, enhance imagination, problem solving ability and analytical thinking capacity there by augment the research and development of next generation to newer heights. The study of Serap Samsa (2010) with pre-service teachers on scenario based blended learning environment revealed that the pre-service teacher satisfaction was significant over the conventional method.

But in many of the third world countries it seems to be a distant reality due to economy. In spite of the fact in countries like Botswana the blended learning solution attempted by Bopelo Boitshwanelo (2009) on teacher education high lights that, teacher educators should use blended methods and should develop good models for ICT practices, the author also suggests that, drastic changes in the culture of teaching are needed and to adopt situated, participatory and collaborative approaches. This reflects the fact that the thirst for newer educational media is a universal phenomena irrespective of economy and development.

In their study on teacher preparation with technology enhanced learning Hui- Wen Huang and Rodney McConnell (2009) students have in fact appreciated the educational benefits in the combination of online discussion with face to face discussion during their blended approach; they also reported that there is a change in their normal classroom roles from being passive to more active than earlier that is in favour of the dimension of e quest.

Mei –Ya Liang and Curtis J.Bonk (2009) investigated the principle and practices of blended learning for teaching English as a foreign language by applying the concept of interaction to the challenge of creating blended curriculum with textual, social and technological dimensions of interaction. They suggest that interaction driven approach should be the focal point of future development and implementation of blended learning strategies. Similarly this study underlines the preference of interaction by student teachers which will be long lasting.

This attempt of study is to encourage the teachers to use low cost and no cost web resources to enhance learning experience. This study records e quest of pre service teachers who are going to nurture the next generation learners and therefore it is essential to measure their e quest score. It is found that irrespective of personal variables the experimental group that received the treatment through blended learning strategy had got significant higher e quest score over their control group counterpart who received traditional method of instruction. It is attributed to the inbuilt components of blended learning strategy that would have imbibed the thirst in the learners of the group.

CONCLUSION

The instructional effects of blended learning as a strategy may be related to better achievement of the student teachers, where as the nurturant effects may be related to e quest. The instructional effects are immediate and cognitive in nature where as nurturant effects are long lasting and affective in nature. Once we ignite the passion of budding teachers the effect will be a chain reaction.

Ramos – Elizondo A.I and others (2010) study on developing cognitive skills through mobile learning revealed that m learning changed any environment into a collaborative and innovative environment. It also suggests that m learning resources must be based on educational theories and strategies to be effective. It also promotes cognitive skills such as problem solving, decision making, critical thinking, creative thinking and melioration. So making the right blend and making the learners as starvers of knowledge lies with the policy makers.

India has been ranked 69th among 142 nations in inherent capacity to leverage information and communication technologies (ICT) for progress, in the year 2012 issue of Networked Readiness Index report brought out annually by the world economic forum and the business school, INSEAD. It ranked India 48th in the year 2011, against 43rd the previous year. Providing the right ambit for the new generation learners seems to be crucial to face the challenges of digital age learning.

From the above findings of the study it is inferred that blended learning strategy in teacher education will significantly increase the e quest of student teachers irrespective of the gender, generation of graduation and surfing habit. This in turn will create life long learners and long lasting effects on the community.

Teacher education is the grass root of any nation's development and hence it is concluded that innovative teaching strategies like e learning, web based classroom and blended learning will augment the necessary skills that are needed for new age teaching.

REFERENCES

Aggarwal, J. C. (2010), *Essentials of educational technology.* New Delhi, India: Vikas Publishing housing Pvt, Ltd.

Akkoyunlu, B. (2006). A study on students' views on blended learning environment. *Turkish Online Journal of Distance Education, 7*(3).

Akkoyunlu, B., & Yilmaz Soylu, M. (2008). A study of student's perceptions in a blended learning environment based on different learning styles. *Journal of Educational Technology & Society*, *11*(1), 183–193.

Al-Huwail, N., Al-Sharhan, S., & Al-Hunaiyyan, A. (2007). Learning design for a successful blended e-learning environment: Cultural dimensions. *INFOCOMP Journal of Computer Science*, *6*(4), 60–69.

Anastasi, A. (1970). *Psychological testing*. New York, NY: The Mac Millan Co.

Aycock, A., Garnham, C., & Kaleta, R. (2002). Lessons learned from the hybrid course project. *Teaching with Technology Today, 8*(6).

Best, J. W., & Kahn, J. V. (2006). *Research in education*. New Delhi, India: Pearson Prentice Hall Pvt. Ltd.

Biotshwarelo, B. (2009). Exploring blended learning for science teacher professional development in an African context. *International Review of Research in Open and Distance Learning*, *10*(4).

Bonk, C., & Graham, C. (2005). *Handbook of blended learning: Global perspectives, local designs*. San Francisco, CA: Pfeiffer Publishing.

Caner, M. (2010). A blended learning model for teaching practice course. *Turkish Online Journal of Distance Education, 11*(3).

Dittmar Graf, M. Y. (2010). Evaluation of an international blended learning cooperation project in biology teacher education. *Turkish Online Journal of Educational Technology, 9*(2).

Emily, M. L., Wong, S. S. C., Li, T.-H. C., & Lee, T.-N. (2008). Insights into innovative classroom practices with ICT: Identifying the impetus for change. *Journal of Educational Technology & Society*, *11*(1), 248–265.

Garrett, H. E., & Woodworth, R. S. (2008). *Statistics in psychology and education*. New Delhi, India: Surjeet Publications Pvt. Ltd.

Gaur, A. S., & Gaur, S. S. (2009). *Statistical method for practice and research*. New Delhi, India: SAGE Publications India Pvt. Ltd.

Gray, K., & Tobin, J. (2010). Introducing an online community into a clinical education setting: A pilot study of student and staff engagement and outcomes using blended learning. *BMC Medical Education*, *10*(6). PMID:20100354

Huang, H.-W., & McConnell, R. (2009). Students experiences of technology-enhanced learning in two traditional teacher preparation classrooms. *Journal of Online Learning and Teaching*, *5*(3), 522.

Jefferies, A., & Hyde, R. (2010). Building the future students' blended learning experiences from current research findings. *Electronic Journal of e-Learning, 8*(2), 133.

Karl Smart, L., & Cappel, J. (2005). An exploratory look at students' perceptions of blended learning. *Issues in Information Systems*, *4*(1), 147.

Koohang, A., Behling, R., & Behling, S. (2008). Adding a new dimension to education: Students' perceptions toward hybrid/blended course delivery. *Issues in Information Systems*, *9*(1), 1.

Laster, S., Otte, A., Picciano, G., & Sorg, S. (2005). *Redefining blended learning*. Presented at the 2005 Sloan-C Workshop on Blended Learning, Chicago, IL.

Liang, M.-Y., & Bonk, J. C. (2009). Interaction in blended EFL learning: Priciples and practice. *International Journal of Instructional Technology and Distance Learning*, *6*(1).

Masood, M. (2010). An initial comparision of educational technology courses for training teachers at Malaysian universities: A comparative study. *Turkish Online Journal of Educational Technology, 9*(1).

McCray, G. E. (2000). The hybrid course: Merging on-line instruction and the traditional classroom. *Information Technology Management*, *1*(4), 307–327. doi:10.1023/A:1019189412115

Mellema, H. N., Shull, C. M., & Salmona, M. (2009). Blended learning and user satisfaction. *Issues in Information Systems*, *10*(1), 126.

Mohanasundaram, K., & Sivasankar, A. (2010). Blended learning: A new horizon. *University News*, *48*(3), 1–4.

Mohanasundaram, K., & Sivasankar, A. (2010). Effective blends and economical blogs: Successful change agents of higher education to meet new challenges. *University News*, *48*(28), 86–90.

Osguthorpe, R., & Graham, R. (2003). Blended learning environments definitions and directions. *The Quarterly Review of Distance Education*, *4*(3), 227–233.

Power, M. (2008). The emergence of a blended online learning environment. *Journal of Online Learning and Teaching*, *4*(4), 503.

Ramos-Elizondao, A. I., Herrera-Bernal, J. A., & Ramirez-Montoya, M. S. (2010). Developing cognitive skills with mobile learning: A case study. *Comunicar*, *34*, 201–209.

Resta, P. (2002). *Information and communication technologies in teacher education – A planning guide*. Paris, France: Division of Higher Education, UNESCO.

Samsa, S. (2010). The effect of scenario based blended learning environment on attitudes of preservice technologies teachers toward teaching profession. *Turkish Online Journal of Distance Education, 11*(2).

Schweizer, K., Paechter, M., & Weidenmann, B. (2003). Blended learning as a strategy to improve collaborative task performance. *Journal of Educational Media*, *28*(2-3), 211–224. doi:10.1080/1358165032000165699

Ufuk Karakus, O. K. (2009). The impact of blended learning model on student attitudes towards geography course and their critical thinking dispositions and levels. *Turkish Online Journal of Educational Technology, 8*(4).

Valiathan, P. (2002). *Blended learning models.* ASTD Learning Circuits, 2002. Retrieved September 7, 2008, from http://www.learningcircuits.org/2002/june2002/elearn.htm

Warrier, B. S. (2006). *The perfect 'blended learning*. Retrieved December 6, 2006, from www.thehindu.com/thehindu/edu/2006/05/08/stories/2006050800250700.htm

This work was previously published in the International Journal of Web-Based Learning and Teaching Technologies (IJWLTT), 9(2); edited by Mahesh S. Raisinghani, pages 14-31, copyright year 2014 by IGI Publishing (an imprint of IGI Global).

APPENDIX

Table 4. Scale of e Quest

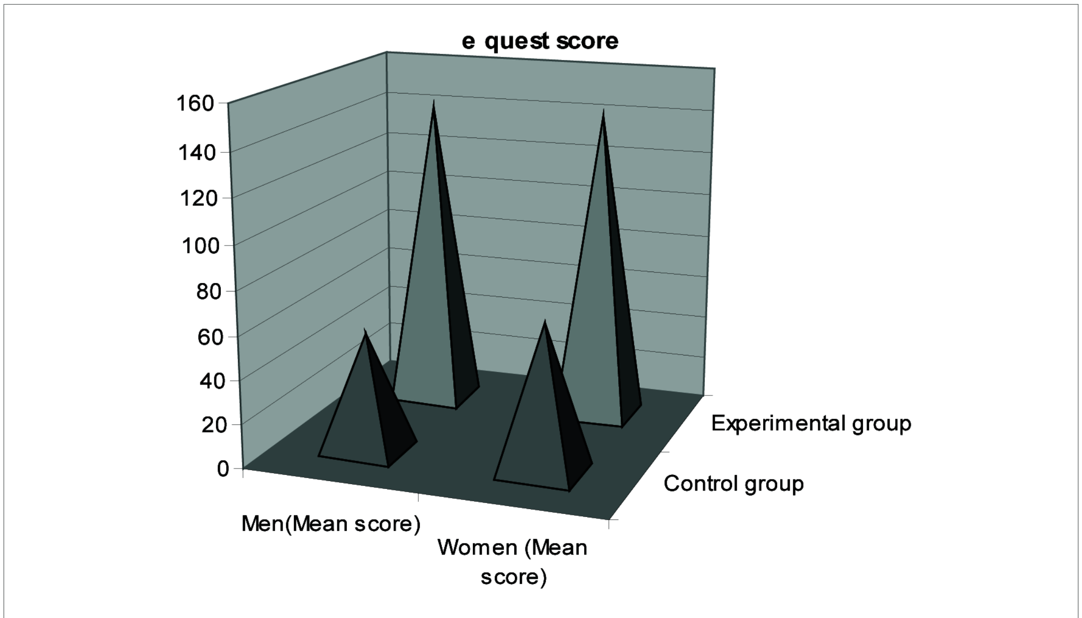
No	Description	Always	Many Times	Some Times	Rarely	Never
	I am getting instant information from net.					
	One way or other I manage to get required information from net.					
	Many times I am unable to get the required information from net.					
	The organization of the content in net is attractive.					
	I search for one thing and find so many unrelated things.					
	Net increases the quest for new knowledge.					
	More and more new knowledge mounts while browsing.					
	The thirst for gaining new knowledge grows day by day.					
	Many times I am not getting the connectivity and get irritated.					
	The materials I am getting are trust worthy.					
	I am confident that the world is in my finger tips.					
	Connectivity problems are short living; very soon I can get access.					
	My capacity to experiment with new ideas increases.					
	My ability to solve new problems increases.					
	My ability to understand unfamiliar information grows.					
	My ability of interpretation develops stronger.					
	My ability to adopt alternative ideas improves.					
	My ability of improvising research queries refines.					
	My ability to construct new model increases.					
	My ability to link my knowledge with real world outside increases.					
	My ability to think abstractly enhances.					
	My ability to transfer knowledge from one domain to another domain increases.					

continued on following page

Table 4. Continued

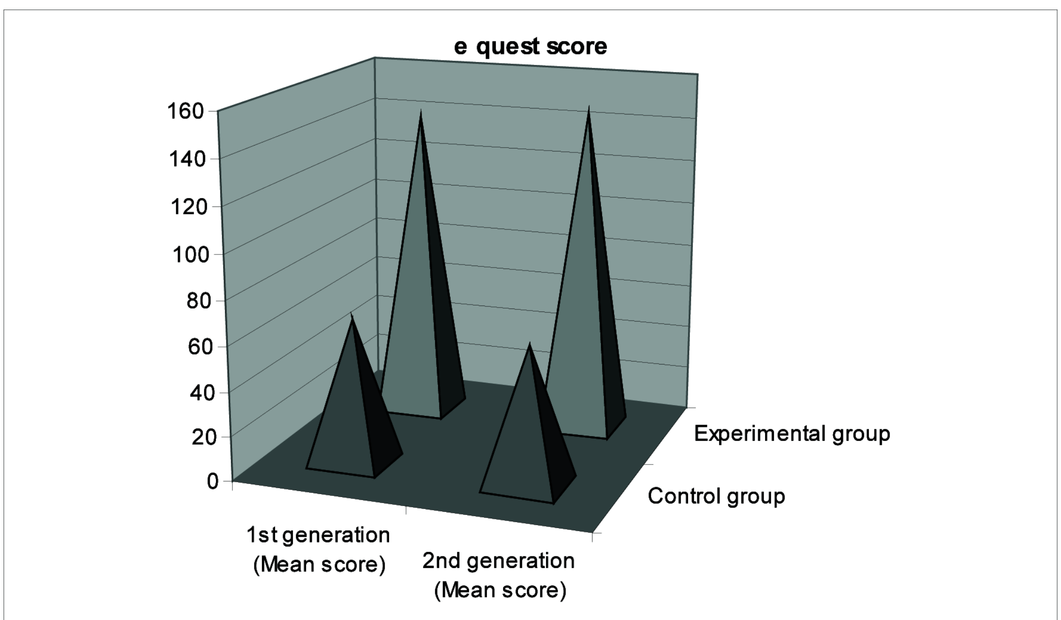
No	Description	Always	Many Times	Some Times	Rarely	Never
	My ability to locate the required content increases.					
	My ability to remix the media develops.					
	My ability to scan the content quickly increases.					
	My active vocabulary expands every time.					
	My ability to focus on a particular topic increases.					
	My Multi tasking ability increases.					
	My ability to interact meaningfully grows.					
	My ability of handling research tools improves.					
	My co-operation to attain common goal increases.					
	My ability to integrate my knowledge with others knowledge improves.					
	My listening skill improves.					
	My ability to follow the flow of information develops.					
	My ability to judge the credibility of the information improves.					
	My ability of cross media navigation improves.					
	My ability to synthesise new information increases.					
	My ability to analyse information improves.					
	My meta learning ability improves.					
	My ability to quickly access a network for various needs increases.					
	My ability of using different web tools improves.					
	My ability to build a network of like minded people develops.					
	My ability to make virtual community improves.					
	My communication with typed text chat improves.					
	My cyber space ethics improves.					
	I am managing well my cyber space.					
	My ability to make on-line relationship improves.					
	My ability to sustain long term on-line relationship develops.					
	My on-line and off-line living is synergistic.					
	I feel progressive while I am in the cyberspace.					

Figure 1. Comparison of mean e Quest score with respect to gender



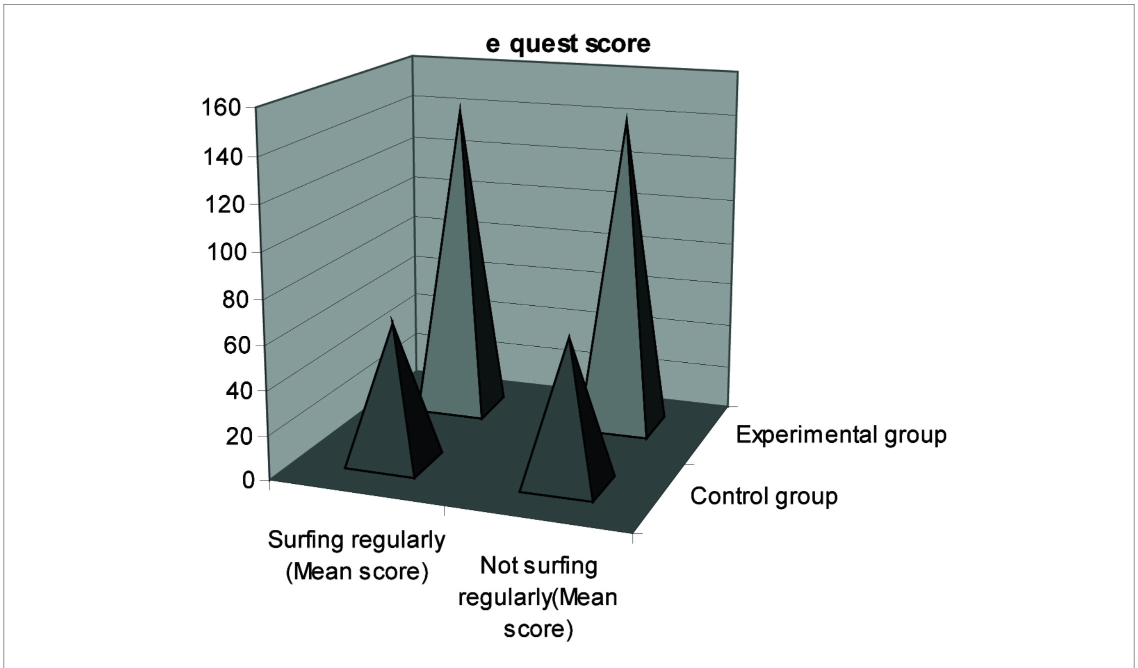
	Men(Mean score)	Women (Mean score)
Control group	53.77	67
Experimental group	141.25	141.96

Figure 2. Comparison of mean e Quest score with respect to Graduate Generation



	1st generation (Mean score)	2nd generation (Mean score)
Control group	65.25	62.23
Experimental group	139.96	146.72

Figure 3. Comparison of mean e Quest score with respect to surfing and not surfing regularly



	Surfing regularly (Mean score)	Not surfing regularly(Mean score)
Control group	62.81	65.25
Experimental group	141.81	141.83

Chapter 16
An Example Application of an Artificial Intelligence–Supported Blended Learning Education Program in Computer Engineering

Tuncay Yigit
Suleyman Demirel University, Turkey

Asim Sinan Yuksel
Suleyman Demirel University, Turkey

Arif Koyun
Suleyman Demirel University, Turkey

Ibrahim Arda Cankaya
Suleyman Demirel University, Turkey

Utku Kose
Usak University, Turkey

ABSTRACT

Blended Learning is a learning model that is enriched with traditional learning methods and online education materials. Integration of face-to-face and online learning with blending learning can enhance the learning experience and optimize seat time. In this chapter, the authors present the teaching of an Algorithm and Programming course in Computer Engineering Education via an artificial intelligence-supported blended learning approach. Since 2011, Computer Engineering education in Suleyman Demirel University Computer Engineering Department is taught with a blended learning method. Blended learning is achieved through a Learning Management System (LMS) by using distance education technology. The LMS is comprised of course materials supported with flash animations, student records, user roles, and evaluation systems such as surveys and quizzes that meet SCORM standards. In this chapter, the related education process has been supported with an intelligent program, which is based on teaching C programming language. In this way, it has been aimed to improve educational processes within the related course and the education approach in the department. The blended learning approach has been evaluated by the authors, and the obtained results show that the introduced artificial intelligence-supported blended learning education program enables both teachers and students to experience better educational processes.

DOI: 10.4018/978-1-4666-8246-7.ch016

INTRODUCTION

Blended learning has various definitions in literature. In a study by Finn *et al.* (2004), C. Procter *et al.* (2003), it is defined as the combination of best features of traditional learning and online learning. However, the definition has evolved to encompass combinations of various learning strategies such as blending offline and online learning, blending structured and unstructured learning etc. Singh *et al.* (2003), Lotrecchiano *et al.* (2013). The goal is to combine the best parts of face-to-face education and online education. Students engage in interactive experiences. Additionally, the online courses provide students with rich multimedia content at anytime, anywhere with Internet access from university or home. This increases the scheduling flexibility of students. There are many ways of applying blended learning. Therefore there are no certain rules to define what the ideal blend might be. The term "blended" has a broad meaning and it includes the integration of e-learning and traditional face-to-face learning. The blend of these learning models depends on the online materials, the needs of the students, and the instructor requirements.

In our study, we define the blended learning as the coherent integration of face-to-face and e-learning to address our educational goals. When blended learning is understood and applied carefully, it will offer great advantage for students and teachers, Geraldine *et al.* (2012). Some of these advantages are as follows:

- Blended learning supports effective and strong socializing environment through face-to-face learning.
- Students' academic performance can be improved through blended learning.
- It allows reaping a profit by minimizing the cost of education, travel, and classroom.
- Blended learning can diagnose a student's learning level.
- It provides an environment for students to work in a relaxed environment, instead of moving through school.
- It gives students full control of their education.

In our approach, face-to-face and e-learning models are combined. Main courses such as programming and hardware-based courses are taught face-to-face and the other courses are taught online. Online courses part into two sections as synchronized and asynchronized. Asynchronous courses are applied through Learning Management System (LMS). Students can access the past courses; submit their homework and projects through this system. Additionally, they are allowed to choose how they will access the necessary learning materials. In synchronized section of the online courses, students join the class in specific time determined by the department. Through this education model, the courses are followed interactively and independent of location in the same time zone. Owing to developing technology, students now have the opportunity to participate in education remotely and communicate online without meeting face-to-face as it is in traditional learning model. It is important that the related e-learning process has been supported with also an intelligent program, which is based on teaching C programming language. In this way, it has been aimed to improve educational processes within the related course and the education approach in the department. The blended learning approach has been evaluated by the authors and obtained results show that the introduced artificial intelligence supported blended learning education program enables both teachers and students to experience better educational processes.

The rest of the paper is organized as follows: In Section 2, we define the blended learning and its components, explain internet based, computer based and mobile learning that comprise the online learning section of blended learning. Section 3 presents the application of blended learning on

Table 1. Differences between traditional learning and blended learning model

Main Features of Education	Traditional Learning	Blended Learning
Location	In Physical Classes (Not Flexible)	Anywhere (Flexible)
Learning Method	Face-to-Face	Face-to-Face and Online
Learning Time	At Specific Time (Not Flexible)	Any time (Flexible)
Technology Usage	No obligation for using the technology	It is a necessity to use the technology

Algorithm and Programming course that is taken by junior students in fall semester in Computer Engineering Department. In Section 4, we discuss about the Artificial Intelligence based program, which has been used along the e-learning side of the blended learning. Next, in Section 5, we discuss about the evaluation results of the performed educational application and finally, in Section 6, we provide conclusions of our study.

BLENDED LEARNING AND ITS COMPONENTS

In traditional learning, the classes are always physically located in specific places and the courses are thought at specific times. On the other hand, in blended learning, the learning process can take place at anytime, anywhere by benefiting from technology. Table 1 shows the main differences between the traditional learning model and the blended learning model Asif *et al*. (2012).

Blended learning is an educational model that is the combination of traditional (face-to-face) and online learning (e-learning) models Asif *et al.* (2012). It provides easily accessible and motivating learning environment by combining the motivation and inspiration of traditional learning approach with the convenience and flexibility of e-learning, Demirer et al. (2009). Online portion of blending learning model has two sub-parts that are network based and non-network based learning. While network based learning comprises of Internet and web based learning, the other part comprises of computer based and mobile learning. Figure 1 shows the components of Blending learning model Hadjerrouit *et al*. (2008).

Online Learning (E-Learning)

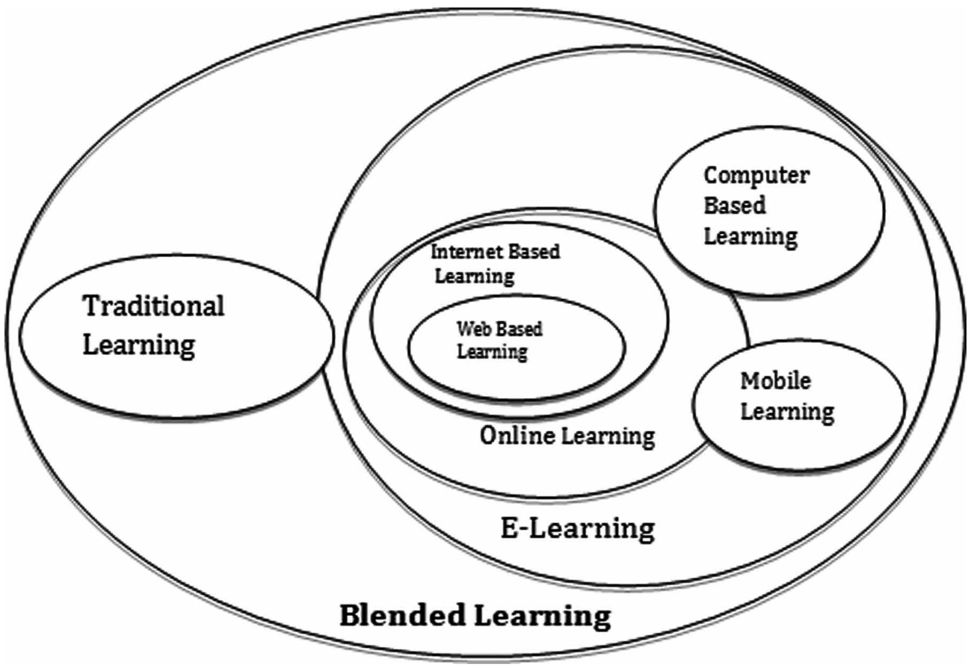
Rapid evolution of technology has a positive effect on education system and changes the education environment. With the widespread use of the personal computers and Internet, computer based learning has been popular and the education environment has moved to Internet. In 21st Century, this technology has been indispensable part of our lives and the name is changed to e-Learning.

e-Learning is a learning and teaching model that is designed to be carried out by using electronic media, Bourne et al. (1996). It is less expensive than the traditional learning approach, not limited to a specific geographic location and more flexible in terms of time. It replaces the traditional learning where it cannot operate. While the computers make the learning easier, Internet technology acts as a communication bridge interconnecting other computers and people making the learning process interactive, Bell et al. (2013). Online learning or e-learning has two sub-parts that are Internet and web based learning Hadjerrouit *et al*. (2008).

Internet Based Learning

The formal use of Internet Based Learning began with the establishment of moderated newsgroups in 1960s, Georgiev et al. (2004). However, it is a new type of distance learning model that uses the Internet technology to deliver the course materials to students Torkul et al. (2005). In this model, a virtual communication way is established between the students and teacher. On one end, teacher lectures and on the other end students join the class and take courses from different cities, countries.

Figure 1. Blended learning and its components



The learner does not only takes information, she or he also contributes, interacts, constructs the knowledge that enable the learning process, Hill et al. (2004).

Universities, colleges, schools, training facilities have seen the power of the Internet and this power removed the time and place barriers for the delivery of education:

- Many companies have begun to develop computer-based training software and continuing to develop software modules that are accessible via an Internet browser.
- HTML editors, web-publishing tools are being used by many educators to prepare assignments, presentations, post announcements, videos, animations. to support course activities.
- Corporate organizations are now focused on rich multimedia systems to share knowledge within the company and train their employees by teaching them the new technology.
- Virtual universities are being established that offer online courses and degrees using Internet technologies.
- Software development companies such as Google, Microsoft, Adobe have been developing sophisticated learning platforms that include interactive collaboration tools such as email, interactive discussion, shared spaces, video conferencing.

Although there have been many advancements in technology that empowers the Internet based learning, current bandwidth and speed limitations are the only limiting factors that prevents the Internet based learning from being the de facto technology standard for education.

Web Based Learning

We use the web to acquire information. In computer engineering education, the web is increasingly used as a learning tool and as a delivery method for online learning. Web based learning is similar to computer based learning that provides an environment independent of time and location, yet differs because web browser is used for communication, Khalifa *et al.* (2002). It is a hypermedia based teaching program that uses the resources on World Wide Web (WWW) to promote and support learning process in a rich learning environment. In this model, web is used as learning and teaching tool and it is not the main goal, Boisvert et al. (2000).

Current research on web-based learning shows that one of the effective ways of learning and teaching is using the technology. Teachers, trainers can create interactive course materials that include online activities, animations, and presentations via programming or plug-ins. These affect the learning process in a positive way, and learning is meaningful and enjoyable.

In these types of systems, students login with a user name and password assigned to them. It is possible to generate student reports containing the exact time a student connected to the system, duration of connection, information regarding the lectures he/she studied, quizzes, exams he/she took. In addition, students' course performance can be evaluated, students and the teacher can meet online and realize interactive learning activities.

There are several types of teaching strategies for Web Based Learning. By applying some of these strategies, computer-engineering education can be more effective. Some of these strategies are:

- **Discussions:** This involves establishing relations, discussing ideas with other students in the classroom environment. Teachers can assign reading tasks, start a discussion; students can gain access to e-mail, discussion boards, or chat with other students and teacher.
- **Interactive Support:** Teachers can evaluate students based on their work and provide feedback. Students have the opportunity to partner with other students and create a synergy. The support can be in any direction such as faculty-to-faculty, student-to-student, faculty to student and it can make use of whiteboards, discussion boards, cloud based sharing.
- **Data Sharing:** This involves data sharing with others locally or remotely sharing. The collected data can be further analyzed to conduct a research, produce results.
- **Collaborative Software Development:** Students have the opportunity to work on a project with others independent of location and time, code together to develop a software product, share resources such as databases, exchanging ideas and documents and work on the same document simultaneously. Teachers can comment on the work, identify the weaknesses and improve students' ability to code.
- **Simulations:** Online simulations can help students better understand how stuff works by seeing them in action.
- **Data Exploration:** Students can see real world cases, use Web data to make decisions, develop and test software based on the data that has been gathered from the web.
- **Online Practice:** This involves accessing and preparing online materials; practicing and applying acquired knowledge, create exercises; code software using popular programming languages such as Java, Flash and distribute them online.

Computer Based Learning

This type of learning model contains computer-aided education. Learning materials and activities are delivered via computers without connecting to a network, Inga *et al.* (2013). Computers are used as an environment where the learning takes place. They are not the purpose, yet a learning tool that provides information to learners Pea *et al.* (1990). The underlying principles of this learning model are stimulation, response and strengthen elements.

Along the learning process, students strengthen themselves by answering the questions directed at them and interact with the courses loaded to their computers that establish the learning.

There are many advantages of computer based learning in comparison to traditional face-to-face learning. Some of the advantages are:

- Location independency.
- Time and cost reduction.
- Ability to choose learning materials freely according to knowledge level and learning skills.
- Self-paced learning.
- Flexibility.
- Interactive learning.
- Applicability of different learning styles and facilitates the learning process.
- Develops computer and Internet skills.
- Building self-confidence, self-knowledge and encouragement through computer-based courses.

Although there are many advantages, there are some disadvantages. Some of these are:

- Causes falling behind if the students have low motivation or wrong studying habits.
- If students have weak computer skills, they may be confused or loose focus about course activities.
- Physical isolation from other students and the teacher.
- Unavailability of instructor when help is needed.
- Slow Internet connections or computers may have bad influence on learning.

Mobil Learning (M-Learning)

Mobile Learning (M-Learning) is the newest type of learning model where the learning process takes place in mobile phones or tablets, Georgiev et al. (2004). The term "Mobile" is also percepted as portability. Owing to this perception, the number of various devices and approaches that are to be used in this model has increased. M-Learning provides a new environment for the learning model that does not follow a formal and specific plan, Peters *et al.* (2010).

There are differences that separate this model from other learning activities. Most distinctive difference is that the learners are always on the move. This makes the learning process independent from time and location. The learner can start and interfere the learning process anytime, anywhere. Furthermore, people are to communicate with the rest of the world without needing big personal computers and cables.

According to the statistical data that International Telecommunication Union (ITU) published in 2013, currently, there are 6.8 billion mobile phones in the world, ITU *et al.* (2013). The results of this data shows that it is possible to reach these many people via M-Learning and how powerful this model can be. In the near future, integrating the flash animations, Web 2.0 tools and virtual reality applications to all mobile systems will make these platforms more attractive. Considering the advances in mobile technologies, fast Internet connection that the 4G technology provides and increasing number of mobile users, it is feasible to say that M-Learning will become more attractive, effective and it will be applied extensively in near future, Keskin *et al.* (2010).

THE APPLICATION OF BLENDED LEARNING IN COMPUTER ENGINEERING

This study analyzes the Algorithm and Programming course in an artificial intelligence supported blended learning program in 2012 and 2013 fall semesters. Before discussing about the artificial intelligence side of the work - approach, it is also better to talk about the general application of the blended learning approach in our study.

Table 2. Weekly schedule of algorithm and programming course

Schedule	Units	Course Subject
Week 1	Unit 1	Description of Algorithm, Using flowchart, Mathematical expressions Using conditional expressions in algorithms Loop algorithm
Week 2		
Week 3		
Week 4		
Week 5	Unit 2	Basic input/output libraries Basic input/output transactions
Week 6		
Week 7	Unit 3	While loop, Do-While loop
Week 8	Midterm Exam	Midterm exam that includes first three units
Week 9	Unit 4	For loop, infinite and dead loops
Week 10	Unit 5	Arrays, Powers of array: loops, character arrays and multi-dimensional arrays.
Week 11	Unit 6	Structures in C Pointer with Structures Nested structures in C
Week 12	Unit 7	Definition of pointers Usage of pointers Pointers with functions
Week 13	Unit 8	Description of Function Function prototypes Local and global variables Some most frequently used functions in C
Week 14	Repetition Units	Course Summary
Week 15	Final Exam	Final exam that includes all units

Algorithm and Programming course is given to the students who are enrolled in computer engineering program in Engineering Faculty in the first year of their education semester. The main purpose of this course is to help students gain programming abilities through participating in C programming applications. This course is taught for duration of 15 weeks with 3 hours theory, 1-hour lab. Subjects are divided into 8 main units as shown in Table 2.

Conceptualizing Phase: Programming Concept

Algorithm and Programming course is designed to support conceptualizing phase in blended learning model. The aim in this phase is to establish a connection between students past knowledge and course structure. The most important mission of the teacher is to eliminate the students' prejudgments about programming. Thus, the teacher needs to demonstrate that the students' past knowledge will help them to understand the new subjects about programming. For example, if the teacher is teaching while-loop structure and student has past knowledge of if condition, integers, students must be able to learn the new subjects by using their past knowledge. Teacher should prove that students' past knowledge is not the exact solution. If a student wants to create a set that includes ten numbers, they should use an array instead of defining ten variables. Therefore, the new learning concept is combined with students' past knowledge. According to Hadjerrouit et al. (2008), some pedagogical methods can be applied to algorithm and programming concept:

- **Multiple Presentations:** Multiple presentations should be used when teaching programming. The presentation can be linguistic, verbal, symbolic and pictorial. All programming concepts must include many kinds of presentations.
- **Comparison and Opposition:** Programming concept should include comparison and opposition.
- **Forward and Backward Samples:** Samples should be referenced according to previous programming knowledge and the new programming concepts.
- **Investigation:** Applicability conditions of programming concepts should be investigated.
- **Classification and Categorization:** Concepts should be classified and categorized according to the specifications of concepts.

Structural Phase: Programming Action

Algorithm and Programming course is redesigned to support structural phase in blended learning model. This model is a process that computer programs are created with task-based activities [In our study, we have supported these activities with also artificial intelligence based C programming program, which enables students to solve problems via intelligent feedbacks (the program will be introduced in the Section 4)]. During the process, students are directed to produce C programs. This process should be continuous and always renew itself. Students must be able to build application with the knowledge they have already learned. Difficulty level of application should be made incremental such as spiral model. Assigning tasks that are feasible in real life motivates the students during structural phase. According to Hadjerrouit *et al*. (2008), programming requires analytical and critical thinking abilities, which are as follows:

- **Analysis and Design:** Having the ability to analyze and design is crucial since the students always tend to code without analyzing and designing. Students should learn to analyze programming problems by gaining the ability to analyze and design. In analysis phase, they should solve the programming problem and design a suitable algorithm before coding. It is required for a student to develop these skills before coding.
- **Improvement:** This strategy is highly important. Some problems are resolved through prior encountered and solved problems. Students should be able to renew their knowledge and improve themselves to solve similar problems.
- **Comparison and Opposition:** Comparison and opposition are alternative methods for finding the most effective solution.
- **Estimation of Program Behavior:** Estimation of Program behavior is an important subject. Thus, students should be able to estimate the situations about program behavior.
- **Producing Alternative Solutions:** Students usually have only one way to reach the solution during coding. When they find a solution, they directly start coding, and never stop. However, this approach is not effective since they may be alternative solutions that are more effective.

Face-to-Face Conversation Phase: Interactions, Collaborations, and Discussions

Algorithms and Programming course is designed to support the face-to-face conversation techniques of blended learning model. In other words, it is evaluating the programming techniques and activities of students through dialogs. This approach can be applied parallel to the first and second education models or separately. According to Hadjerrouit *et al*. (2008), some pedagogical strategies may be applied to this approach:

- **Illustration (Summarizing, Defining, Discussing):** This strategy facilitates student learning by allowing them to explain the programming process, produce solutions for new conditions and applying ideas.
- **Meta-Communication:** Students generally think that a solution is only valid for a specific program. However, the program must be readable and understandable by others, thus facilitating fixing the program specific errors. Establishing a clear meta-communication is important for successful programming. Teachers should explain and emphasize the importance of meta-communication to the students.

Online Resources

Most important criteria for online resources that are designed for conceptualization are preparing accurate presentations, accessibility, and effective illustrations. These criteria have direct influences upon students. Strategies for online resource strategies that are designed for conceptualization are as follows:

- Explaining the programming techniques according to pedagogical principles.
- Designing user-friendly interfaces and providing accurate links for study materials.
- Explaining the programming concepts in a clear and understandable manner.

In the next phase, online resources are re-designed to support structural methods. Most important online resources for structural methods are as follows:

- Preparing well-designed online programming examples for students to work with.
- Providing interactive online support for students to solve programming problems.
- Providing program codes that are easy to use and modify.
- Preparing online presentations that contain multiple components such as text, graphics, pictures and symbols.
- Providing links to past online exams and programming exercises.

Finally, this course is re-designed to support face-to-face conversation phase of blended education model, discussing students' solutions for programming exercise, sharing solutions with students and teachers via e-mail and Internet.

Thus, online resources should contain the followings:

- Synchronized communication for students to communicate in real time.
- Asynchronous communication for accessing forums, e-mails at anytime, anywhere.
- Programming questions that are to be solved by students individually or with a group and graded, commented on by teachers.

In addition to the related online resources, the intelligent side of our blended learning model approach can also be evaluated in the context of online resources (actually, the artificial intelligence program could be analyzed in every phase - application side of our model). The program is some kind of online material and can be used by students along the learning activities. It can be expressed here that the program is the most important educational component of our model; among other online resources.

Applied Artificial Intelligence Supported Blended Learning Model

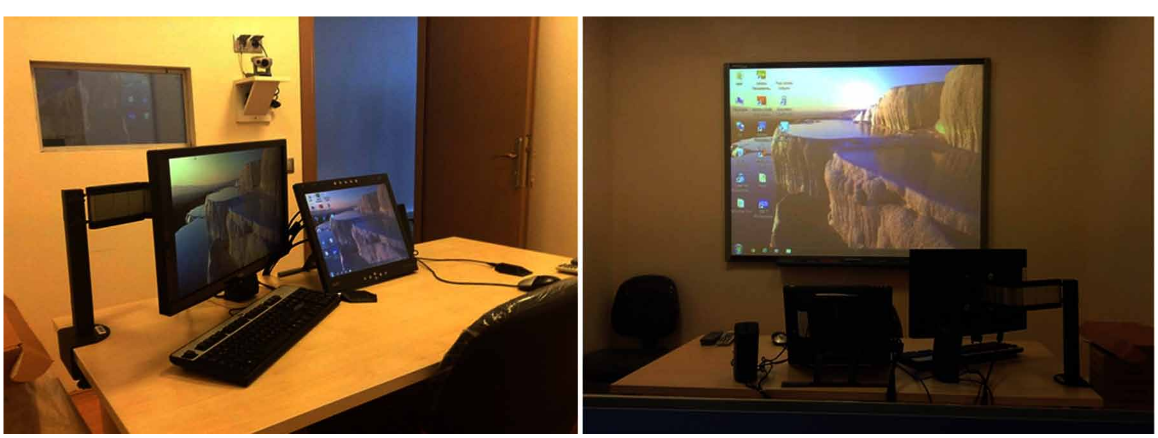
Application of our blended learning model involves three methods in learning cycle. First, the teacher determines the concepts and the programming activities to be taught every week through 15 weeks. The teacher identifies the insufficiencies of the applied methods by examining the activities and establishes links between previously known concepts with the new concepts to be taught. Along these activities, an artificial intelligence based C programming teaching program takes active role in order to improve the process.

The main purpose of the course is to teach programming and provide algorithmic reasoning skills to students. Teacher cultivates the students' abilities to understand the programming concepts. Subsequently, students endeavor to produce solutions for programming problems. For instance, if the programming concepts that are to be taught are related to "while loop", students perform activities related to "while loop" structure. Students work individually or by joining to small groups. The task of the teacher is to direct the students to think more deeply, creatively. Learning how to program is an iterative and continuous process that lasts for 15 weeks and comprises of renewal, improvement and change. Students spend their most important time on programming activities. Through this time, students provide solutions and present their ideas. Along these activities, they are also directed with the artificial intelligence based program as a supportive component. Briefly, it can be said that students are free to spend their time on the program; but in our study the teacher is more encouraged to decide when the program will be used by the students along the educational process. So, it has given a flexible, intelligent blended learning flow along the work. As another flexible aspect of the model, teachers also have had the opportunity to improve themselves, renew course materials, and change the way they teach by meeting students face to face or creating online surveys, polls.

Blended Learning Studio Environment

Computer engineering department has a studio that includes synchronous and asynchronous education that is a part of blended learning. The studio is built in a 15 m^2 area that has a high level sound insulation. The studio has a fully equipped computer, a high definition camera and a microphone to create an interactive course environment. In addition, there is a smart board, which provides a large screen for teaching, and a projector that reflects computer screen to smart board (Figure 2).

Figure 2. Some photos from the studio environment



Blended Learning Course Delivery Method

In computer engineering blended learning program, 30% of courses is taught face-to-face, and 70% is taught online. To protect the education quality, same teachers teach the courses in traditional education program and the distance education program. Additionally, students in traditional education program and blended learning program take the same exams at the same place. Teachers decide carefully when choosing face-to-face courses. Face-to-face courses must be suitable for online delivery and must enable interaction.

ARTIFICIAL INTELLIGENCE PROGRAM FOR TEACHING C PROGRAMMING

As it was mentioned before, the related e-learning process of the blended learning model of this study has been supported with also an artificial intelligence based program, which aims supporting the activities of teaching C programming language. The program has been designed and developed by Kose, and Deperlioglu (2012) along with some other Artificial Intelligence based programs, which were introduced in the context of their research work. Because the related programs have been applied successfully along different courses and caused positive results, programs have also been employed for some other experimental research works performed in different time and environment conditions (Tufekci, & Kose, 2013). From their work, the main features and functions of the program can be expressed briefly as follows (2012):

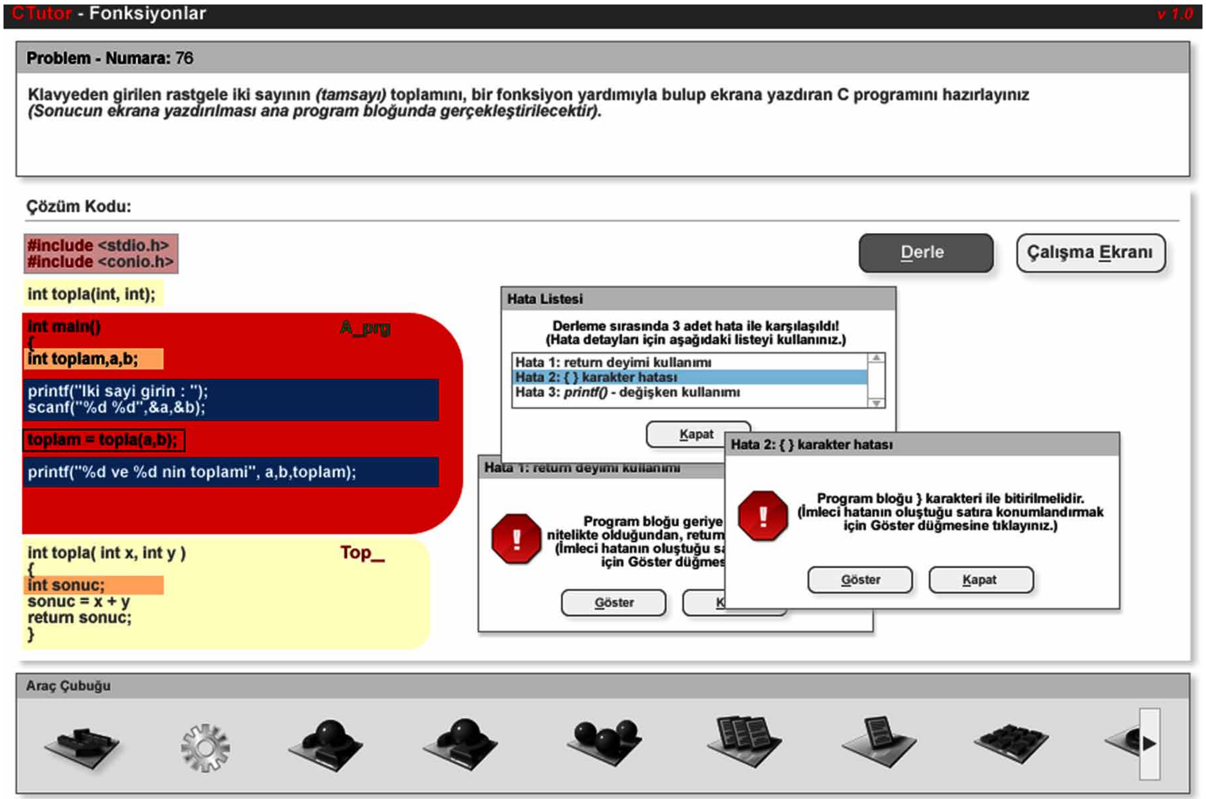
"The artificial intelligence based program for teaching C programming language is some kind of an intelligent learning environment in which students can take some exercises by using an easy to use interface and teachers can define new C programming exercises with the provided tools. The program allows teachers to create new exercises by using a management interface provided in the system. For each exercise, the teacher can define the problem text and develop what would be the correct solution to that problem in the same way as a student would do. Moreover, domain expert knowledge of the program can also be adjusted for specific exercises by using the management interface of the system. All of these operations can be done easily by using the interface supported with drag and drop feature and simple system controls.

From students' perspective, the program interface is some kind of tool, which assembles different system controls to get the representation of solutions and deliver exercises, feedbacks and information. Over this program, students must apply their knowledge on C programming to develop solutions for given exercises. Related solutions must be given in a special form, which can be parsed and understood easily by the system of the program. To achieve this, some specific using features and functions were included in the system. For instance, the system interface allows solution C programs to be built by means of a drag and drop feature, which limits the actions that can be done in the program and focuses students' ideas on solving processes instead of writing C source codes. Eventually, this function permits the program to trace all actions performed by students and facilitates the adaptation, which can be provided by the system."

Figure 3 represent a screenshot from the interface viewed by students (Kose, & Deperlioglu, 2012).

"The interface, which can be viewed by students, consists of three different parts. These parts provide all necessary elements, which enable students to understand problem of the given exercise, develop a possible solution for this exercise and view obtained results. The first part is located on top of the interface and used to show 'problem text' of the given exercise. Under this part, the 'workspace', where students can develop a solution C code for the given exercise, is located. By using this part, the student can start to create

Figure 3. A screenshot from the interface viewed by students



a solution C code or edit the developed one according to the received feedbacks. It is easy to edit any written code (block) by double-clicking on it. The workspace includes two buttons named as 'Compile' and 'Runtime Screen' respectively. The 'Compile' button is used to execute developed solution programs. On the other hand, the 'Runtime Screen' button is used to open a new window, where students can view the "runtime" of the solution program after the compiling process. After a successful compiling process, this window is also opened automatically by the program. The last part of the interface, which is also named as 'Tool Bar', is located under the workspace. The Tool Bar includes many different elements that can be used to develop a solution C program on the workspace. Students can use the provided elements to define different program parts like declarations, preprocessors, if statements, iteration (loops), functions…etc. Each element can be added to the workspace by dragging the element icon and dropping it into the workspace. When adding an element to the workspace, some additional information such as names, parameters, types…etc. is also requested by the system. The program also views different code types in separate 'layer' elements. This feature allows teachers and students to understand code structure easily and enables system to evaluate developed programs faster.

After developing a solution for the given exercise, the student can start the evaluation process by clicking on the Compile button. After the evaluation process, the program gives feedbacks about errors that were made within the solution program. Evaluation mechanism of the program is based on a domain prepared according to the expert knowledge. At this point, the domain of C programming is very complex. There is no fixed sequence of actions that will enable users to get the solution, nor is there only one solution for a given exercise. Indeed, there are an infinite number of C code combinations which will lead the user to a valid solution.

The program over here employs a student modeling called 'Constraint Based Modeling' for providing wide space of solutions. Constraint Based Modeling is based on Ohlsson's theory of learning from errors (Ohlsson, 1994). A formal notation has been introduced by Ohlsson and Rees to be used for constraints within models (Ohlsson, & Rees, 1991). The unit of knowledge is called as a state constraint and each state constraint is used as an ordered pair of $<C_r, C_s>$, where C_r is the relevance condition and C_s is the satisfaction condition. C_r identifies the class of problem states for which the constraint is relevant whereas C_s identifies the class of (relevant) states in which the constraint is satisfied. Each member of the pair can be thought of as a set of features or properties of a problem state. At the same time, constraints are encoded by rules of the form: *If C_r is satisfied, then C_s should also be satisfied; otherwise a principle is being violated*. Briefly, the domain model consists of a set of rules, which represent general principles that must not be broken (Corbett *et al.*, 1995)".

In the domain model of the program, some examples can be the followings (Deperlioglu, & Kose, 2012):

- C_r = 'a problem requirement is to apply a function to a range of numbers' and C_s = 'it must be the case that the solution program contains a loop'
- C_r = 'exist an assignation element' and C_s = 'it must be the case that there is a valid expression on the right-hand side of the element'
- C_r = 'exist an assignation element' and C_s = 'data types associated on both sides of the assignation must be equal'

In our study, we have also added some more examples - rules to the related domain model; according to our experiences along past educational processes at the Suleyman Demirel University Computer Engineering Department. In this way, we have also aimed to improve the standard model of the program employed here.

EVALUATION

The artificial intelligence supported blended learning approach has been applied along one term, in order to figure out if usage of such "intelligent educational approach" can enable students to experience effective educational processes and improve their academic success levels. As it was also mentioned before, the application has been based the Algorithm and Programming course; during 2012 and 2013 fall semesters. More details regarding to the course content and educational objectives have been expressed briefly under the Section 3.

In the context of the evaluation processes, experimental evaluation and student survey based evaluation methods have been performed. More details regarding to these methods and obtained results are presented briefly as follows:

Experimental Evaluation

In the experimental evaluation, a total of 200 students (from Computer Engineering Department of the Suleyman Demirel University, Turkey) have taken active part. 100 of the related students have formed the experimental group which will experience the artificial intelligence supported blended learning approach. Then remaining 100 students have formed the control group which will experience the traditional - default lectures. It is important that the groups were formed as balanced, according to the chosen students' academic success levels. The related experimental evaluation has been based on the percentage of students who have

Table 3. Obtained experimental evaluation results at the end of the term; for the algorithm and programming course

Group	Number of Students	Number of Students Who has Passed the Course	Mean Success Grade
Control	100	63 (63%)	64,88
Experimental	100	82 (82%)	76,30

passed the Algorithm and Programming course, and also on mean grades of the groups. Passing the related course needs having a success grade, which is equal to or bigger than 60 [The success grade has been calculated via (0,4 * visa exam grade) + (0,6 * final exam grade)].

Table 3 presents the obtained experimental evaluation results at the end of the term; for the Algorithm and Programming course.

As seen from the results, it can be said that using Artificial Intelligence supported blended learning approach has enabled students to improve their grades and success levels for the Algorithm and Programming course.

Student Survey

In addition to the experimental evaluation method, a student survey based work has also been performed at the end the term – course. At this point; students, who have taken part in the experimental group, have filled a survey to give feedback about their opinions on 10 different statements regarding to the performed educational process and also employed intelligent C programming teaching program. Students have expressed their opinions on the Likert scale.

Statements provided in the performed student survey and the received responses for these statements are presented in Table 4.

According to the feedback - responses received via the Student Survey, we can express that the students had enjoyed the performed artificial intelligence supported blended learning process, liked using the intelligent C programming teaching program and had positive experiences along the application. It is also remarkable that they think their academic success levels have been improved and they also think positive on applying the related educational approach - process in other technical courses.

Table 4. Student survey statements and the received responses

S. No	Statement	Responses for:*				
		1	2	3	4	5
1	"Thanks to the intelligent C programming program, I felt more self-confident about learning course subjects."	0	2	3	9	86
2	"I think it is better to take part in such intelligent blended learning processes rather than other approaches."	1	1	4	16	78
3	"I don't want to take part again in such learning - education process."	87	5	7	1	0
4	"I enjoyed the educational process performed along the term."	0	0	7	8	85
5	"By using the intelligent C programming teaching program, it is more effective to learn C."	0	4	8	14	74
6	"I felt that it was easier to learn difficult algorithm and programming subjects, thanks to the intelligent C programming program."	0	2	5	11	82
7	"It was difficult to use the intelligent C programming program."	79	11	9	1	0
8	"My academic success level has been improved after this learning - education process."	0	0	0	23	77
9	"I felt bored while studying on the intelligent C programming program."	80	11	8	1	0
10	"I think this learning - education process should be applied also in other technical courses."	0	4	6	8	82

* Likert Scale:
1: "I strongly disagree" 2: "I disagree" 3: "I have no opinion" 4: "I agree" 5: "I strongly agree"

CONCLUSION

This study introduced the application of an artificial intelligence supported blended learning approach in Computer Engineering education. It is remarkable that the blended learning is one of the most appropriate educational solutions that can be applied in order to combine advantages of different educational aspects. Because of this, application side of our study has benefited from advantages provided by the blended learning. In this sense; in addition to the advantages of the blended learning, we have also employed an intelligent C programming teaching program in order to improve effectiveness of the educational process. Briefly, the employed program is based on using intelligent feedback mechanisms for directing students to solve C programing programs by thinking about their mistakes in the code structures. As an intelligent learning environment, the program is effective at enabling students to perform their own-learning process in an efficient way.

The introduced educational approach has been employed at the Algorithm and Programming course of Computer Engineering program given at the Suleyman Demirel University. For the application, resources of the university have been activated greatly along the term: 2012 and 2013 fall semesters. In the context of the evaluation, results of the performed experimental and student survey related evaluation processes show that the introduced "intelligent learning solution" is effective at enabling students to gain necessary theoretical and applied knowledge, and abilities on C programming. In terms of the applied learning model, students were satisfied with the educational activities, which caused positive experiences during the process. More generally, obtained results encourage the authors to apply the related approach in different kinds of technical courses given at the Computer Engineering Department.

REFERENCES

Bell, B., & Federman, J. E. (2013). *E-Learning Works--Exactly How Well Depends on Its Unique Features and Barriers: CAHRS ResearchLink No. 1*. Center for Advanced Human Resource Studies, Cornell University.

Boisvert, L. (2000). Web-based learning. *Information Systems Management*, *17*(1), 35–41. doi:10.1201/1078/43190.17.1.20000101/31212.5

Bourne, J. R., Brodersen, A. J., Ccampbell, J. O., Dawant, M. M., & Shiavi, R. G. (1996). A Model for On-Line Learning Networks in Engineering Education. *The Journal of Engineering Education*, *85*(3), 253–262. doi:10.1002/j.2168-9830.1996.tb00241.x

Corbett, A. T., Anderson, J. R., & O'Brien, A. T. (1995). In P. Nichols, S. Chipman, & B. Brennan (Eds.), *Student modeling in the ACT programming tutor* (pp. 19–41). Erlbaum.

Demirer, V., & Sahin, I. (2013). Effect of blended learning environment on transfer of learning: An experimental study. *Journal of Computer Assisted Learning*, *29*(6), 518–529. doi:10.1111/jcal.12009

Finn, A., & Bucceri, M. (2004). *A case study approach to blended learning*. Los Angeles, CA: Centra Software.

Georgiev, T., Georgieva, E., & Smrikarov, A. (2004, June). M-learning-a New Stage of E-Learning. In *Proceedings of International Conference on Computer Systems and Technologies-CompSysTech*. Academic Press.

Glogger, I., Holzäpfel, L., Kappich, J., Schwonke, R., & Nückles, M. (2013). *Development and Evaluation of a Computer-Based Learning Environment for Teachers: "Assessment of Learning Strategies in Learning Journals"*. International Telecommunication Union (ITU).

Hadjerrouit, S. (2008). Towards a blended learning model for teaching and learning computer programming: A case study. *Informatics in Education-An International Journal*, *7*(2), 181-210.

Hill, J. R., Wiley, D., Nelson, L. M., & Han, S. (2004). Exploring research on Internet-based learning: From infrastructure to interactions. In Handbook of research on educational communications and technology, (vol. 2, pp. 433-460). Academic Press.

Keskin, N. Ö. (2010). Mobil Öğrenme Teknolojileri ve Araçları. *Akademik Bilişim*, *10*, 490.

Khalifa, M., & Lam, R. (2002). Web-based learning: effects on learning process and outcome. *IEEE Transactions on* Education, *45*(4), 350–356.

Khan, A. I., Shaik, M. S., Ali, A. M., & Bebi, C. V. (2012). Study of Blended Learning Process in Education Context. *International Journal of Modern Education and Computer Science*, *4*(9), 23–29. doi:10.5815/ijmecs.2012.09.03

Köse, U., & Deperlioğlu, O. (2012). Intelligent learning environments within blended learning for ensuring effective c programming course. *International Journal of Artificial Intelligence and Applications*, *3*(1), 105–124. doi:10.5121/ijaia.2012.3109

Lotrecchiano, G. R., McDonald, P. L., Lyons, L., Long, T., & Zajicek-Farber, M. (2013). Blended Learning: Strengths, Challenges, and Lessons Learned in an Interprofessional Training Program. *Maternal and Child Health Journal*, 1–10. PMID:23291875

Ohlsson, S. (1994). Constraint-based student modeling. In J. E. Greer & G. I. McCalla (Eds.), *Student Modeling: The Key to Individualized Knowledge-based Instruction* (pp. 167–189). Berlin: Springer-Verlag.

Ohlsson, S., & Rees, E. (1991). The function of conceptual understanding in the learning of arithmetic procedures. *Cognition and Instruction*, *8*(2), 103–179. doi:10.1207/s1532690xci0802_1

Pea, R. D. (1990). Augmenting the discourse of learning with computer-based learning environments. In *Proceedings of the NATO Advanced Research Workshop on Computer-Based Learning Environments and Problem Solving* (pp. 313-343). NATO.

Peters, K. (2009). m-Learning: Positioning educators for a mobile, connected future. *Mobile Learning*, *113*.

Singh, H. (2003). Building effective blended learning programs. *Educational Technology*, *43*(6), 51–54.

Torkul, O., Sezer, C., Över, T., & Över, A. G. T. (2002). İnternet destekli öğretim sistemlerinde bilişim gereksinimlerinin belirlenmesi. *Turkish Online*, *122*.

Torrisi-Steele, G., & Drew, S. (2013). The literature landscape of blended learning in higher education: the need for better understanding of academic blended practice. In *Proceedings of International Journal for Academic Development*. Academic Press.

Tufekci, A., & Kose, U. (2013). Development of an artificial intelligence based software system on teaching computer programming and evaluation of the system. *Hacettepe Üniversitesi Eğitim Fakültesi Dergisi*, *28*(2), 469–481.

ADDITIONAL READING

Allen, I. E., & Seaman, J. (2010). *Class Differences: Online Education in the United States, 2010*. Sloan Consortium.

Altıparmak. M., Kurt. I. D., & Kapıdere. M. (2011). Open-Source learning management systems in e-learning and distance education <> E-öğrenme ve uzaktan eğitimde açık kaynak kodlu öğrenme yönetim sistemleri (In Turkish). Akademik Bilişim’11 - XIII. Akademik Bilişim Konferansı Bildirileri 2 - 4 Şubat 2011 İnönü Üniversitesi, Malatya

Aydın, C. H. (2012). Assesment of blended in-service education in accordance with instructor opinions <> *Harmanlanmış hizmet-içi eğitimin öğretmen görüşleri doğrultusunda değerlendirilmesi* [In Turkish]. *Atılım Sosyal Bilimler Dergisi*, *2*(1), 33–56.

Baker, M. J. (2000). The roles of models in Artificial Intelligence and Education research: a prospective view. *Journal of Artificial Intelligence in Education*, *11*, 122–143.

Barbour, M. K., & Plough, C. (2012). Odyssey of the mind: Social networking in a cyberschool. *International Review of Research in Open and Distance Learning*, *13*(3), 1–18.

Beldarrain, Y. (2006). Distance education trends: Integrating new technologies to foster student interaction and collaboration. *Distance Education*, *27*(2), 139–153. doi:10.1080/01587910600789498

Bell, B. S., & Federman, J. E. (2013). E-learning in Postsecondary Education. *The Future of Children*, *23*(1), 165–185. doi:10.1353/foc.2013.0007

Bliuc, A. M., Goodyear, P., & Ellis, R. A. (2007). Research focus and methodological choices in studies into students’ experiences of blended learning in higher education. *The Internet and Higher Education*, *10*(4), 231–244. doi:10.1016/j.iheduc.2007.08.001

Cooner, T. S. (2010). Creating opportunities for students in large cohorts to reflect in and on practice: Lessons learnt from a formative evaluation of students’ experiences of a technology-enhanced blended learning design. *British Journal of Educational Technology*, *41*(2), 271–286. doi:10.1111/j.1467-8535.2009.00933.x

Deepwell, F., & Malik, S. (2008). On campus, but out of class: an investigation into students’ experiences of learning technologies in their self-directed study. *Research in Learning Technology, 16*(1).

Devedzic, V. (2004). Education and the semantic web. *International Journal of Artificial Intelligence in Education*, *14*(2), 165–191.

El-Deghaidy, H., & Nouby, A. (2008). Effectiveness of a blended e-learning cooperative approach in an Egyptian teacher education programme. *Computers & Education*, *51*(3), 988–1006. doi:10.1016/j.compedu.2007.10.001

Halverson, L. R., Graham, C. R., Spring, K. J., & Drysdale, J. S. (2012). An analysis of high impact scholarship and publication trends in blended learning. *Distance Education*, *33*(3), 381–413. doi:10.1080/01587919.2012.723166

Huang, E. Y., Lin, S. W., & Huang, T. K. (2012). What type of learning style leads to online participation in the mixed-mode e-learning environment? A study of software usage instruction. *Computers & Education*, *58*(1), 338–349. doi:10.1016/j.compedu.2011.08.003

Karaman. S., Ozen. U., Yildirim. S., & Kaban. A. (2009). Web-based education experience over open source education management system <> *Açık Kaynak Kodlu Öğretim Yönetim Sistemi Üzerinden İnternet Destekli (Harmanlanmış) Öğretim Deneyimi (In Turkish).* Akademik Bilişim’09 - XI. Akademik Bilişim Konferansı Bildirileri 11-13 Şubat 2009 Harran Üniversitesi, Şanlıurfa.

Kaya, İ., & Engin, O. (2011). Using artificial intelligence techniques in process of quality improvement <> Kalite İyileştirme Sürecinde Yapay Zeka Tekniklerinin Kullanımı (In Turkish). *Pamukkale University Journal of Engineering Sciences, 11*(1).

Lilje, O., & Peat, M. (2012, October). Use of traditional and elearning components in a blended learning environment. In *Proceedings of The Australian Conference on Science and Mathematics Education (formerly UniServe Science Conference)*.

Maritim, E. K. (2009). The distance learning mode of training teachers in Kenya: Challenges, prospects, and suggested policy framework. *Open Learning*, *24*(3), 241–254. doi:10.1080/02680510903202100

Marshall, S. (2012). Determination of New Zealand tertiary institution e-learning capability: An application of an e-learning maturity model. *Journal of Open. Flexible and Distance Learning*, *9*(1), 58–63.

Marshall, S., & Mitchell, G. (2004, January). Applying SPICE to e-learning: an e-learning maturity model? In *Proceedings of the Sixth Australasian Conference on Computing Education-Volume 30* (pp. 185-191). Australian Computer Society, Inc.

Mclaren, B. M., Scheuer, O., & Mikšátko, J. (2010). Supporting collaborative learning and e-Discussions using artificial intelligence techniques. *International Journal of Artificial Intelligence in Education*, *20*(1), 1–46.

Ossiannilsson, E., & Landgren, L. (2012). Quality in e-learning–a conceptual framework based on experiences from three international benchmarking projects. *Journal of Computer Assisted Learning*, *28*(1), 42–51. doi:10.1111/j.1365-2729.2011.00439.x

Pereira, J. A., Pleguezuelos, E., Meri, A., Molina-Ros, A., Molina-Tomás, M. C., & Masdeu, C. (2007). Effectiveness of using blended learning strategies for teaching and learning human anatomy. *Medical Education*, *41*(2), 189–195. doi:10.1111/j.1365-2929.2006.02672.x PMID:17269953

Picciano, A. G., Seaman, J., Shea, P., & Swan, K.Sloan Foundation. (2012). Examining the extent and nature of online learning in American K-12 Education: The research initiatives of the Alfred P. Sloan Foundation. *The Internet and Higher Education*, *15*(2), 127–135. doi:10.1016/j.iheduc.2011.07.004

Buckley S., Coleman, J. J., Davison, I., Morley, D., & Torgerson, J. (2013). *Effective Education*. Routledge, Taylor and Francis Group.

Sedig, K., & Parsons, P. (2012). Interactivity of Information Representations in e-Learning Environments. *Interactivity in E-Learning: Case Studies and Frameworks*, 29.

Smith, J., Groves, M., Bowd, B., & Barber, A. (2012). Facilitating the Development of Study Skills through a Blended Learning Approach. *International Journal of Higher Education*, *1*(2), 108. doi:10.5430/ijhe.v1n2p108

Voogt, J., Almekinders, M., van den Akker, J., & Moonen, B. (2005). A ‘blended’ in-service arrangement for classroom technology integration: Impacts on teachers and students. *Computers in Human Behavior*, *21*(3), 523–539. doi:10.1016/j.chb.2004.10.003

Yamamoto, Y., Nishimura, S., & Nojima, E. (2012, March). A Case Study on the Improvement of the Organization’s issues on e-learning Higher Education in Japan, Part II: Focus on the Academic Coaches’ and Graduates’ Data. In*Society for Information Technology & Teacher Education International Conference* (Vol. 2012, No. 1, pp. 2178-2182).

Yapıcı. U., & Akbayın H. (2012). *High school students' views on blended learning <> üniversite öğrencilerinin karma eğitime bakışları (In Turkish).* Turkish Online Journal of Distance Education-TOJDE October 2012 ISSN 1302-6488 Volume: 13 Number: 4 Article

KEY TERMS AND DEFINITIONS

Artificial Intelligence: Study and development of intelligent machines and software that to perform the tasks requiring human intelligence.

Asynchronous: Not coordinated, not occurring at the same time.

Blended Learning: A learning model that is enriched with traditional learning method and online education materials.

Distance Education: Education in which students receive instruction over the Internet instead of going to school.

E-Learning: Internet based learning model that provides access to information independent of time and location.

Mobile: Being portable, the ability to move or to be moved.

Studio: Sound isolated workroom.

Synchronized: Being simultaneous, occurring at the same time.

This work was previously published in Artificial Intelligence Applications in Distance Education edited by Utku Kose and Durmus Koc, pages 192-210, copyright year 2015 by Information Science Reference (an imprint of IGI Global).

Chapter 17
A Blended Course to Teach Graphical Programming Using LabVIEW

Yücel Uğurlu
Aoyama Gakuin University, Japan

ABSTRACT

In this chapter, the authors introduce a blended learning approach where LabVIEW, an e-learning environment, was integrated into a traditional graphical programming course for engineering students to teach advanced topics and to increase the programming skills of the students. In this course, the students were required to design projects using technology. The students designed small projects and frequently accessed the e-learning system to build real-world applications. The projects that students designed stimulated them to use the e-learning system. The impact of blended learning was evaluated on the basis of student surveys and certification test results. Experimental studies show that blended learning produced higher results in the students' self-assessment and certification test.

INTRODUCTION

Over the last decade, learning environments have changed considerably. Gone are the days when the only learning option was a face-to-face classroom experience, where the teacher came in and delivered a lesson or lecture on the topic of the day. Today, learning options include traditional, blended, and fully online education. To teach in these environments, educators have adopted a variety of pedagogical strategies and innovative technologies to enable better learning in higher education (Nistal, 2011; Macias, 2012; Maloy, 2010). The face-to-face strategies have been combined with technological tools and e-learning processes to form blended courses. Currently, 93% of higher institutions say they use blended learning strategies. Furthermore, they expect more than 40% of their courses to be blended by 2020 (Werf & Sabatier, 2009).

It is important to note that both components of blended education (traditional and online) have their benefits and challenges. In fact, no single learning environment is suitable for all learning needs. Educators who are interested in offering blended instruction need to be aware that they will

DOI: 10.4018/978-1-4666-8246-7.ch017

probably require various learning technologies in addition to traditional methods in providing an optimal learning experience that meets the needs of all students. A blended learning program combines e-learning and traditional learning methods (Bonk & Graham, 2005). Like many advances in educational practice, blended learning is defined and implemented in multiple ways. Statistics show that a number of schools and instructors have adopted blended learning, and the number has been increasing (Allen & Seaman, 2008). As more schools have adopted blended instruction, several different forms and practical usages have evolved. Many educators believe that blended learning is the best solution to today's educational challenges (Mendez & Gonzalez, 2011; Hadjerrouit, 2008; Hoic-Bozic, 2009).

To gain clarity and a deeper understanding of blended learning, there is a strong need to share the best practices in blended education. Additionally, investigating the impact of blended teaching and learning is extremely important. In this way, we can decide the best way technology can be used in the classroom and understand how it will affect student learning (Golden, 2006; Mohammad, 2012; Zhanga, 2006). Several studies have found that e-learning is as effective as or better than the traditional university class structure (Cybinski & Selvanathan, 2005; Gao & Lehman, 2003; Ho & Kuo, 2010). On the other hand, the results can vary according to the content taught, delivery method of the digital content, e-learning integration techniques, and motivation of students (Hasegawa, 2013). Therefore, more studies are required in order to completely understand the overall impact of blended learning in any discipline, particularly in engineering education. Engineering education has to deal with multiple levels of intelligence requiring intensive and one-on-one interaction with the instructor. Engineering students must be able to work across many different disciplines and fields and make the connections that will lead to deeper insights, more creative solutions, and the capacity to get things done.

BACKGROUND

The goal of the blended approach is to combine the best elements of face-to-face and online instruction. Classroom time can be used to engage students in advanced interactive experiences, while the online portion of the course provides multimedia-rich content anytime and anywhere there is Internet access—such as in computer labs, coffee shops, or at home. The students thus have more flexibility in their study schedules (Garrison & Kanuka, 2004). Moreover, there is early evidence that blended instruction can result in learning outcome gains and higher enrollment retention (Lim & Morris, 2009).

Blended learning is gaining popularity in higher education, although there are no rules in place to prescribe what the ideal mix might be. The term "blended" encompasses a broad continuum and can include any form of integration of face-to-face and online instructional content. The combination of face-to-face and online materials varies depending on the course content, needs of the students, and preferences of the instructor.

The following case study explores an efficient approach for blended learning in teaching graphical programming in higher education in Japan. This method has been implemented for science and engineering students in the last three years, and its positive impact on their learning has been demonstrated by the results of student surveys and final exams.

METHOD

A Description of the Traditional Course

In this chapter, a graphical programming course is introduced, along with the details of how the course was implemented in the traditional teaching approach. Graphical programming is most frequently used in the stages of engineering systems design. Engineers and programmers use graphical programs to translate information about physical events, such as vibrations and temperatures, into visual readouts. LabVIEW is a graphical programming environment tightly integrated with measurement hardware for engineers and scientists to quickly produce solutions for the acquisition, analysis, and presentation of data.

Graphical programming is a useful environment in engineering education, and it is offered to students who do not have a strong background in text-based programming. Engineering students can create a program using function blocks, wires, and loops in place of text strings, which looks similar to their whiteboard drawings of an application, instead of translating high-level design to specific text strings. In this way, they can easily build a PC-based virtual instrumentation (VI) system, which is advantageous to engineers and scientists who require increased productivity, accuracy, and performance. With virtual instruments, engineers and scientists build measurement and automation systems that are customized to their needs (user-defined) instead of being limited by traditional fixed-function instruments (Virtual Instrumentation, n. d.).

LabVIEW provides an entire development environment that makes the process of application development faster and easier. LabVIEW is a productive development environment for creating custom applications that interact with real-world data or signals in fields such as science and engineering. LabVIEW itself is a software development environment that contains numerous components, several of which are required for any type of test, measurement, or control application (Ugurlu & Nagano, 2011; Berger, 2009; Johnson & Jennings, 2006; King, 2012).

A LabVIEW-based graphical programming course has been taught at the Aoyama Gakuin University for the last three years. It is positioned as a multidisciplinary engineering course, and students from various departments are allowed to enroll. The class is organized to provide both theoretical and hands-on experience in graphical programming. Every student uses his/her own PC in the classroom, and hands-on lectures are conducted each time. The students use the student edition of LabVIEW as the graphical programming environment and a USB-type portable data acquisition device (myDAQ) as a hardware platform (NI myDAQ, n. d.).

The LabVIEW-based graphical programming course covers the following topics:

- Virtual instrumentation.
- LabVIEW programming environment.
- Execution, debugging, and handling errors.
- Data types and structures.
- Arrays and clusters.
- Subroutines and VI projects.
- Charts and graphs.
- Strings and file inputs/outputs.
- Data acquisition using portable hardware devices.
- Applications of graphical programming.

Students acquire analog or digital signals from various sensors using an NI data acquisition device and LabVIEW in the PC environment, and apply additional algorithms to build PC-based automation systems, such as a speech recognition-based on/off system, autonomous robot navigation, and image processing for student tracking. The course runs for 15 weeks, with 30 hours of teaching time.

Initially, the programming class focused on the traditional teaching approach, using slides, demos, and student assignments. We explained the programming techniques of LabVIEW and built sample programs step by step in every class. Students replicated the programs using their own PCs and thus understood the practical usage. In addition, we allocated 30 minutes per week to student design projects, during which students in groups of four or five worked together on their design projects and asked the instructor questions about their problems or recent progress.

Integration of an E-learning System

The traditional portion of the course only covers the fundamental techniques of LabVIEW programming; it does not explain the advanced features and practical implementations extensively. Therefore, e-learning content was introduced to supplement the face-to-face learning. The system provides videos and text for each topic based on tutorials, and it is easy to navigate and search for personal interests or needs. The e-learning system was developed in a separate server using a professional learning management system (LMS). A different instructor, not the one who has been teaching the face-to-face course for the past three years, was asked to develop the e-learning sections.

Figures 1 and 2 show the screenshots of some of the e-learning sections that were developed by the instructor in collaboration with the Aqtair and National Instruments Japan Corporation. The portal that was used consists of more than 200 topics and 30 hours of learning time, all dedicated to teaching graphical programming in LabVIEW to engineering students. The e-learning content included various components such as 5–10 minute videos (Figure 1), readings, and quizzes (Figure 2), and covered a variety of topics. A typical e-learning environment is shown in Figure 1, which explains the programming techniques of LabVIEW step by step. The user is able to select the subtopics from the right-hand side, while the check symbol indicates the competed topics. The user can stop the video or slide at specific times and topics. In the left-hand side, the programming environment of LabVIEW is displayed with its front panel and block diagram. Similarly, Figure 2 shows a typical multiple choice quiz environment. The user can see the correct answers only when he/she has completed the quiz. He can go back or skip the questions using the arrows at the right-hand side of the screen.

The e-learning portal is organized in six chapters:

- LabVIEW programming I.
- LabVIEW programming II.
- Data acquisition and analysis.
- FPGA (field-programmable-gate-arrays) programming.
- Real-time programming.
- Image acquisition and processing.

LabVIEW programming I and II cover basic, intermediate, and advanced topics of the programming environment. Data acquisition, FPGA, real-time programming, and image processing introduce practical applications of LabVIEW that can be used in student design projects, in combination with various plug-in hardware devices. The e-learning system is available to all students from the beginning of the course up to the final exam.

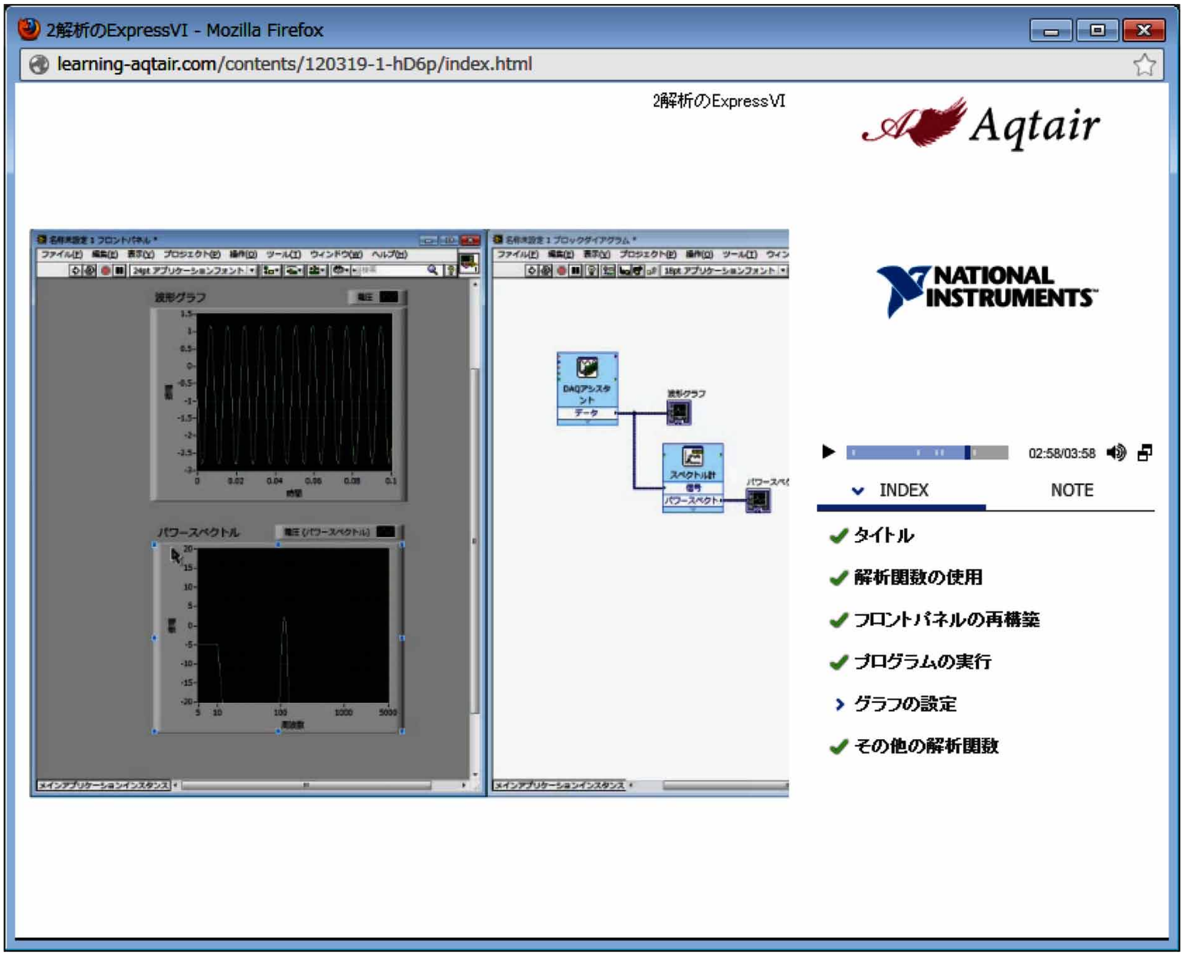
In the e-learning system, a student is given a unique user ID and password, which enable him/her to access all e-learning functions. Since students use their IDs to log into the system, it is easy to acquire their access history. The average view rate is 3.2 hours of e-learning usage, which is almost 10% of all digital content during three months of total access time.

Blended Course

A LabVIEW programming course has been taught at Aoyama Gakuin University for the last three years—two years in a blended format. The class is included in multidisciplinary engineering courses; 43 students from multiple departments enrolled last year. We have organized the class to provide both theoretical and hands-on experience in graphical system design. The overall course spans 15 weeks and includes 30 hours of teaching. After two weeks, the same course was blended with e-learning technology to enhance the programming skills of students.

Table 1 shows the number of students enrolled in traditional and blended courses (27 and 43, respectively). We conducted the course in a traditional way in the first year, and then ran the same course in

Figure 1. A video of the e-learning system



a blended format in the second. Therefore, student enrollment was rather higher in the second year. In both courses, students came from various departments and had no experience in LabVIEW. There were more electrical and mechanical engineering students in the blended course and more information science students in the traditional course.

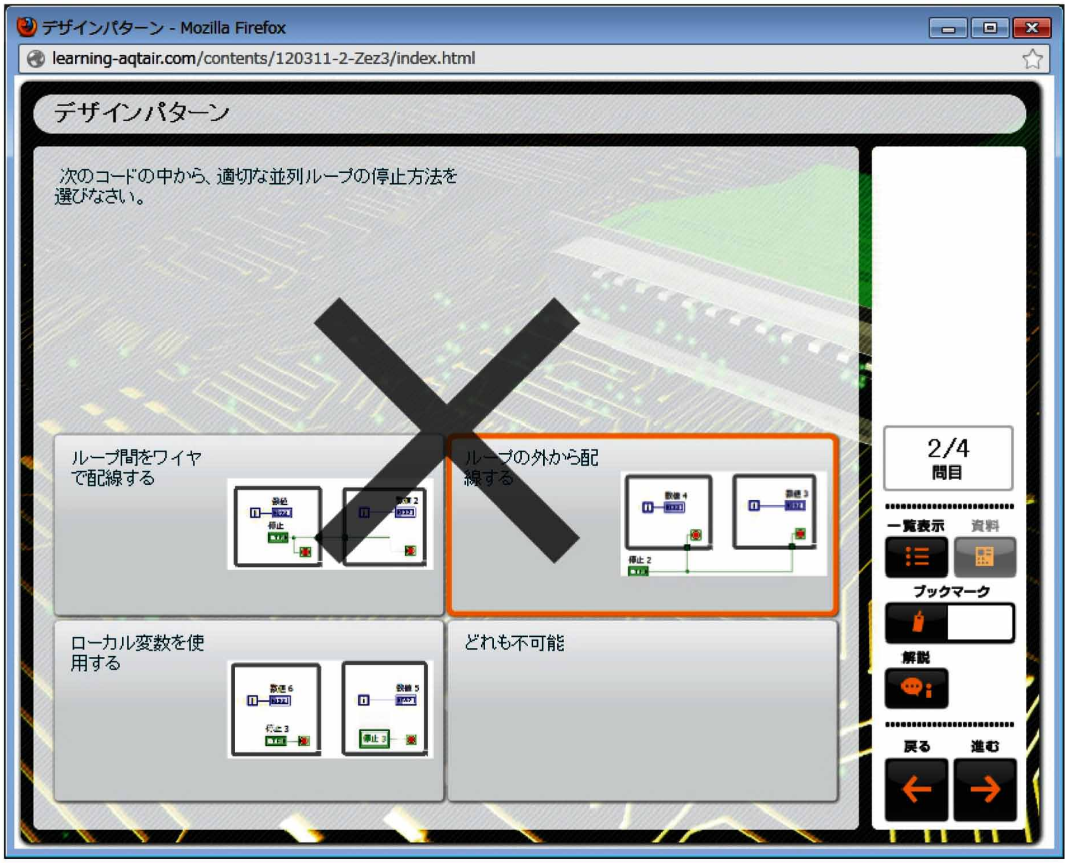
The students were granted free access to the e-learning portal to encourage them to use it, especially to be able to understand advanced topics and be successful in their design projects. However, e-learning usage was not mandatory, just an option for them to better understand and see the practical applications of graphical programming. Therefore, we explained the main benefit

Table 1.Student enrollment in traditional and blended courses

Disciplines	Traditional Course	Blended Course
Information	10	7
Electrical & Electronics	2	10
Mechanical	8	16
Management Technology	0	1
Fundamental Science	6	5
Bio-Science	1	4
Total number of students	27	43

Note. Traditional and blended courses have been implemented in consecutive years in the college of science and engineering at Aoyama Gakuin University.

Figure 2. A quiz on the e-learning system

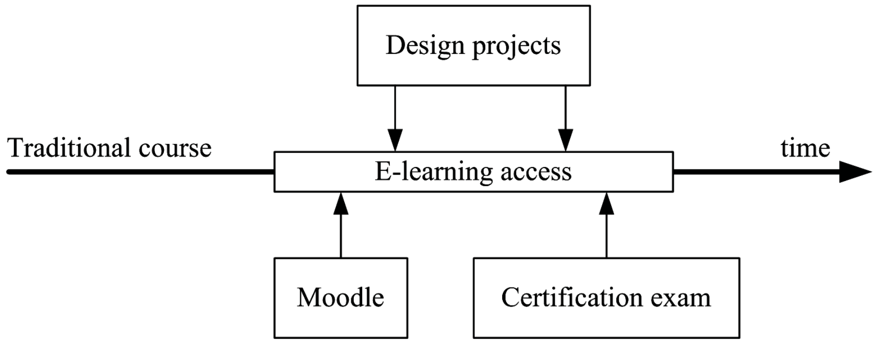


of e-learning during face-to-face teaching and showed typical examples to stimulate student usage. After that, the students asynchronously accessed the e-learning website based on their individual needs and interests.

The traditional course method and e-learning content were blended using the techniques described below. Figure 3 shows an overview of the blended teaching approach.

1. **Face-to-Face Introduction:** Traditional teaching approaches still have a better influence on students, especially in Japan. Therefore, we allocated a specific time in the classroom and showed the features of the e-learning system. We explained the main benefit and stimulated the students to proactively use the system.
2. **Moodle Announcements:** The Moodle course management system (CMS) was utilized to share the teaching materials, such as sample programs, power point slides, and weekly assignments of the design projects. Then, periodic updates and reminders were sent from the system to encourage students to access the e-learning portal. In particular, video and text-based on-demand e-learning modules were introduced so the students could conduct self-paced study and master the programming experience by learning advanced techniques and seeing real examples. When we scheduled the Moodle announcement, the student access rate increased.

Figure 3. Blending method using a traditional course and e-learning system



3. **Design Projects:** Project-based learning offers a wide range of benefits to both students and teachers (Mills & Treagust, 2003). Projects put students in active roles, such as inquirers, problem solvers, decision makers, and investigators. Therefore, we initiated several design projects for the students, who had been divided into groups, and gave them a chance to present their product in the classroom. Design projects were picked by students based on their personal interest, experience, and level of challenge. To complete the design projects, students accessed the e-learning sites to look at successful examples and learn new features of LabVIEW, such as low-level data and image acquisition and processing, etc. Design projects inspired students to investigate new features and revisit certain topics covered in face-to-face learning. In the design projects, 4−5 students were put in a group, and they worked together to build some real-world applications. Typical student design projects were the voice changer and recognition, light detection for an automated door opening system, earthquake detection for home safety, and remote vehicle control system. Figure 4 shows the examples of the student design projects for an earthquake detection system. The block diagram of the LabVIEW code is given in Figure 5.

Student Surveys

The survey results of the traditional and blended courses are compared to understand the overall impact of e-learning on students' programming skills. The survey, composed of six questions for evaluating the overall course, was announced right after the final exam using the course management system (CMS). The same set of questions was used in both the traditional and blended courses, and the students were asked to complete it within two weeks. An online survey tool called Survey Monkey was used; five levels of evaluation criteria were set up, where 1 corresponded to "poor" and 5, "excellent." A total of 53 students participated: 18 (out of 27) from the traditional course and 35 (out of 43) from the blended course. The results are summarized in Table 2.

Table 2. Student survey results

Survey Items	Traditional Course (Average)	Blended Course (Average)
Course coverage and content	3.6	3.8
Progress of the course	3.9	3.9
Demos and sample programs	4.0	4.1
Advanced applications	3.1	4.0
Idea and support for design projects	2.7	4.1
Overall course evaluation	3.46	3.98

Note. The evaluation criteria were 1: poor, 2: fair, 3: average, 4: good, 5: excellent.

Figure 4. An earthquake detection system using LabVIEW and myDAQ

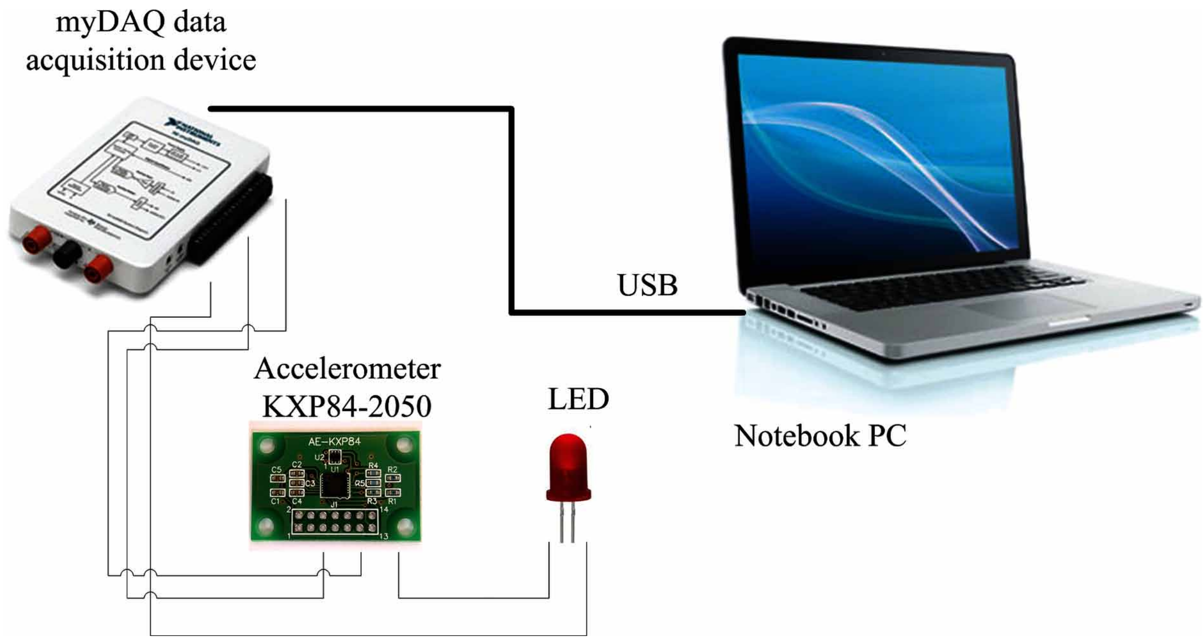
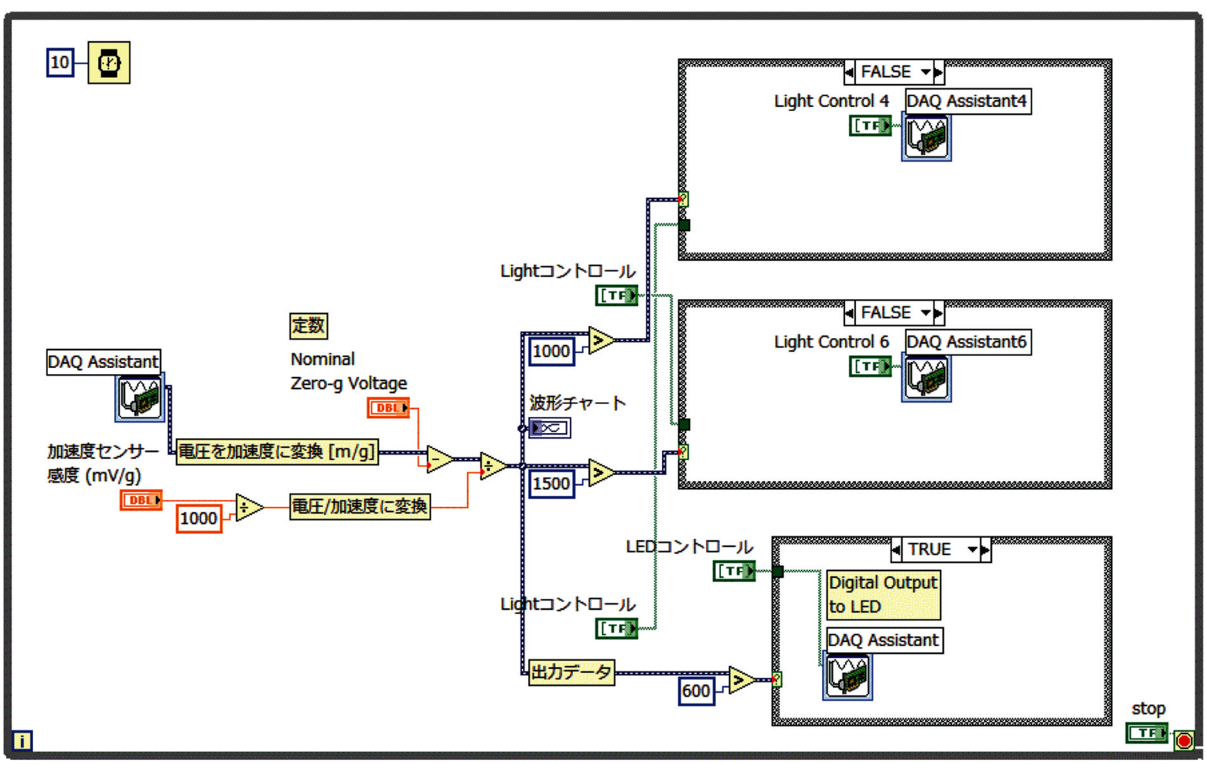


Figure 5. Block diagram of the LabVIEW code



As shown in Table 2, course coverage, the progress of the course, and demos were not changed in both the traditional and blended courses. However, topics related to advanced applications and the design project were mainly covered in the e-learning format. Therefore, student evaluation results were higher in these specific items. Since students utilized the e-learning system based on their personal needs, their satisfaction level was higher than in the traditional approach, and the survey results were significantly improved. The overall course evaluation was calculated based on the average value of the five survey questions. The mean values for the traditional and blended courses were 3.46 and 3.98, respectively—a 15% improvement. The survey results showed that blended learning significantly enhanced the students' self-assessment on programming skills and was able to teach some advanced programming topics. On the other hand, the traditional course focused on fundamental topics, and student programming skills depended on the course coverage. Popular online topics included data acquisition, advanced programming features, and teaching materials related to the design project that were not covered in traditional courses.

Certification Test Results

Thus far, the impact of blended learning was evaluated from the students' perspective. However, to have a deeper understanding of blended learning, we also needed to evaluate the results from an objective perspective. Hence, a LabVIEW certification test was scheduled. The certification test indicated a broad working knowledge of the graphical programming environment of LabVIEW and the ability to read and interpret existing code. We adopted the LabVIEW certification test to assess and validate the programming skills of students as a final exam. In practice, the LabVIEW certification test is executed and evaluated worldwide by the National Instruments Corporation to achieve a global standard (NI Certification, n. d.). In this test, students are required to answer 40 multiple-choice questions on paper within one hour.

To measure the impact of blended learning, the average scores of the traditional and blended courses in the certification test were compared. The average class values were 43.17 and 48.14 out of 100 for the traditional and blended courses, respectively. The comparative results showed that the mean scores improved 12% when the students had 3.2 hours of e-learning modules. The simple difference in averages is not reliable enough to determine the degree of significance. Therefore, statistical analysis is applied using the t-test and p value. The t-test assesses whether the means of two groups are statistically different from each other. We obtained $t=2.1888$ and $p=0.0401$ in the certification scores of the traditional and blended courses. Since $p<0.05$, the difference is considered statistically significant.

In general, certification test results vary according to the sample population, motivation of students, programming experience, and learning methods. Our sample motivation was not exactly the same in the traditional and blended courses, but it included enough students from all departments. Similarly, the survey results show that student motivation was not very different in either course. All the students did not have previous experience in graphical programming, and the LabVIEW concept was new to them. Finally, traditional and blended learning methods were the main reasons for the difference effects the certification test results.

CONCLUSION

A blended learning environment was introduced and the e-learning system in teaching graphical programming courses in higher education was examined. Practical implementation showed that the blended approach was successful in teaching graphical programming using LabVIEW. The blended approach was well received by students because of its rich content and user-friendly environment, and because it covered important engineering applications.

The impact of the blended learning system was evaluated using the student survey and certification test. Survey results showed that e-learning was a useful tool when students went through specific e-learning topics. The main contribution of blended learning is the customization of learning content according to the students' personal interests. Therefore, they are motivated to learn advanced topics and practical applications to be successful in their design projects. In addition, the certification test was used to evaluate blended learning because the test is implemented using global standards. The results indicate that blended learning has a positive impact in students' programming skills.

FUTURE WORK

Our case study represents a group of students and targets a specific programming course in Japan. Thus, the general impact of blended learning might not be similar for different courses, students, and countries. Additionally, adapting the e-learning system to the regular courses will affect student motivation and real usage. Therefore, further investigation is required to produce more general and detailed results. In the future, the adaptation of blended learning to various teaching courses and student populations can be considered to motivate and inspire them, thereby enabling them to meet various engineering challenges.

REFERENCES

Allen, I. E., & Seaman, J. (2008). *Staying the course: Online education in the United States*. Needham, MA: Sloan-C.

Berger, R. (2009). Scientific computing with graphical system design. In *Proceedings of Systems, Applications and Technology Conference* (pp. 1–2). Long Island, NY: IEEE.

Bonk, C. J., & Graham, C. R. (2005). *The handbook of blended learning: Global perspectives, local designs*. San Francisco, CA: Pfeiffer.

Cybinski, P., & Selvanathan, S. (2005). Learning experience and learning effectiveness in undergraduate statistics: Modeling performance in traditional and flexible learning environments. *Decision Sciences Journal of Innovative Education*, *3*(2), 251–271. doi:10.1111/j.1540-4609.2005.00069.x

Gao, T., & Lehman, J. D. (2003). The effects of different levels of interaction on the achievement and motivational perceptions of college students in a web-based learning environment. *Journal of Interactive Learning Research*, *14*(4), 367–386.

Garrison, D. R., & Kanuka, H. (2004). Blended learning: Uncovering its transformative potential in higher education. *The Internet and Higher Education*, *7*(2), 95–105. doi:10.1016/j.iheduc.2004.02.001

Garrison, D. R., & Vaughan, N. D. (2008). *Blended learning in higher education: Framework, principles, and guidelines*. San Francisco, CA: Jossey-Bass.

Golden, S., McCrone, T., Walker, M., & Rudd, P. (2006). *Impact of e-learning in further education: Survey of scale and breadth (report RR745)*. London: National Foundation for Education Research.

Hadjerrouit, S. (2008). Towards a blended learning model for teaching and learning computer programming: A case study. *Informatics in Education*, *7*(2), 181–210.

Hasegawa, D., Ugurlu, Y., & Sakuta, H. (2013). A case study to investigate different types of intrinsic motivation in using an e-learning system. In *Proceedings of IEEE Global Engineering Education Conference* (pp. 362–366). Berlin, Germany: IEEE. doi:10.1109/EduCon.2013.6530130

Ho, L. A., & Kuo, T. H. (2010). How can one amplify the effect of e-learning? An examination of high-tech employees' computer attitude and flow experience. *Computers in Human Behavior*, *26*(1), 23–31. doi:10.1016/j.chb.2009.07.007

Hoic-Bozic, N., Mornar, V., & Botikki, I. (2009). A blended learning approach to course design and implementation. *IEEE Transactions on Education*, *52*(1), 19–30. doi:10.1109/TE.2007.914945

Johnson, G. W., & Jennings, R. (2006). *LabVIEW graphical programming*. New York: McGraw Hill.

King, R. H. (2012). *Introduction to data acquisition with LabVIEW*. New York: McGraw-Hill.

Lim, D. H., & Morris, M. L. (2009). Learner and instructional factors influencing learning outcomes within a blended learning environment. *Journal of Educational Technology & Society*, *12*(4), 282–293.

Macias, J. A. (2012). Enhancing project-based learning in software engineering lab teaching through an e-portfolio approach. *IEEE Transactions on Education*, *55*(4), 502–507. doi:10.1109/TE.2012.2191787

Maloy, R. W., O'Loughlin, R. V., Edwards, S. A., & Woolf, B. (2010). *Transforming learning with new technologies*. Boston: Pearson/Allyn and Bacon.

Mendez, J. A., & Gonzalez, E. J. (2011). Implementing motivational features in reactive blended learning: Application to introductory control engineering course. *IEEE Transactions on Education*, *54*(4), 619–627. doi:10.1109/TE.2010.2102028

Mills, J. E., & Treagust, D. F. (2003). Engineering education—Is problem-based or project-based learning the answer? *Australasian Journal of Engineering Education*, *4*, 2–16.

Mohammad, M. (2012). The impact of e-learning and e-teaching. *International Journal of Social and Human Sciences*, *6*(2), 259–264.

NI Certification. (n. d.). Retrieved from http://www.ni.com/training/certification

NI myDAQ. (n. d.). Retrieved from http://www.ni.com/mydaq

Nistal, M. L., Rodriguez, M. C., & Castro, M. (2011). Use of e-learning functionalities and standards: The Spanish case. *IEEE Transactions on Education*, *54*(4), 540–549. doi:10.1109/TE.2010.2090154

Ugurlu, Y., & Nagano, T. (2011). Project-based learning using LabVIEW and embedded hardware. In *Proceedings of the IEEE/SICE International Symposium on System Integration* (pp. 561−566). Kyoto, Japan: IEEE. doi:10.1109/SII.2011.6147510

Virtual Instrumentation. (n. d.). Retrieved from http://www.ni.com/white-paper/4752/en

Werf, M. V. D., & Sabatier, G. (2009). The college of 2020: Students. *The Chronicle of Higher Education*. Retrieved from http://www.washington.edu/faculty/facsen/issues/college_2020.pdf

Zhanga, D., Zhoua, L., Briggs, R. O., & Nunamaker, J. F. Jr. (2006). Instructional video in e-learning: Assessing the impact of interactive video on learning effectiveness. *Information & Management*, *43*(1), 15–27. doi:10.1016/j.im.2005.01.004

KEY TERMS AND DEFINITIONS

Asynchronous Learning: A student-centered teaching method that uses online learning resources to facilitate information sharing outside the constraints of time and place among a network of people.

Blended Learning: Education that combines face-to-face classroom methods with computer-mediated activities.

Course Management System (CMS): A software package that provides Web-based infrastructure for the sharing of digitized information among teachers and students.

Graphical Programming Language: Also called visual programming language, in which the source code is itself graphical and does not principally consist of text.

LabVIEW: Stands for Laboratory Virtual Instrumentation Engineering Workbench, a system design platform and development environment for a visual programming language from National Instruments.

Learning Management System (LMS): LMS is a software application for the administration, tracking, reporting, and delivery of educational courses and training programs.

Project-Based Learning (PBL): An instructional method that provides students with complex tasks based on challenging questions or problems that involve problem solving, decision making, investigative skills, and reflection that includes teacher facilitation but not direction.

Synchronous Learning: A learning environment in which everyone takes part at the same time. A lecture is an example of synchronous learning in a face-to-face environment, where learners and teachers are all in the same place at the same time.

Virtual Instrumentation (VI): A customizable software and modular measurement hardware to create user-defined measurement systems.

This work was previously published in Practical Applications and Experiences in K-20 Blended Learning Environments edited by Lydia Kyei-Blankson and Esther Ntuli, pages 330-340, copyright year 2014 by Information Science Reference (an imprint of IGI Global).

Chapter 18
Fantasy Workshop:
Active Use of a Learning Management System (LMS) as an Approach to Blended Learning

Marit Grande Haugdal
Hunn Elementary School, Norway

Hilde Sundfaer
Åsveien Elementary School, Norway

ABSTRACT

Fantasy Workshop is a project focused on the active use of a Learning Management System (LMS), its-learning, in teaching and learning in a K-12 blended environment. As teachers in this study, the authors used an LMS as a learning platform in their 6th grade literature class. The focus for the class was creative writing and learning about Fantasy, a fiction genre. The aim of the project was to enable all students, not only those students who love to read and write, to learn about the Fantasy genre in a way that would build on their previous knowledge and interests. In addition, the project was aimed at facilitating students' writing processes in such a way that was meaningful and motivating for all students. Most importantly, as teachers, the authors used this project to establish an effective blended environment that worked for teaching and learning in the 6th grade classroom.

INTRODUCTION

The background for this chapter is a project we were involved in while we were at Nord Trøndelag University College in Norway in spring 2012. The main focus of this chapter is to share the teaching and learning experiences in our elementary creative writing classroom where we implemented blended instruction. We wanted to find out whether integrating a digital environment into our face-to-face class will help engage all students in the writing process as they learn about different literature genres. The results presented in this chapter demonstrate how the use of digital media can provide elementary students a greater sense of value in working with creative writing and learning about genre in K-12 schools.

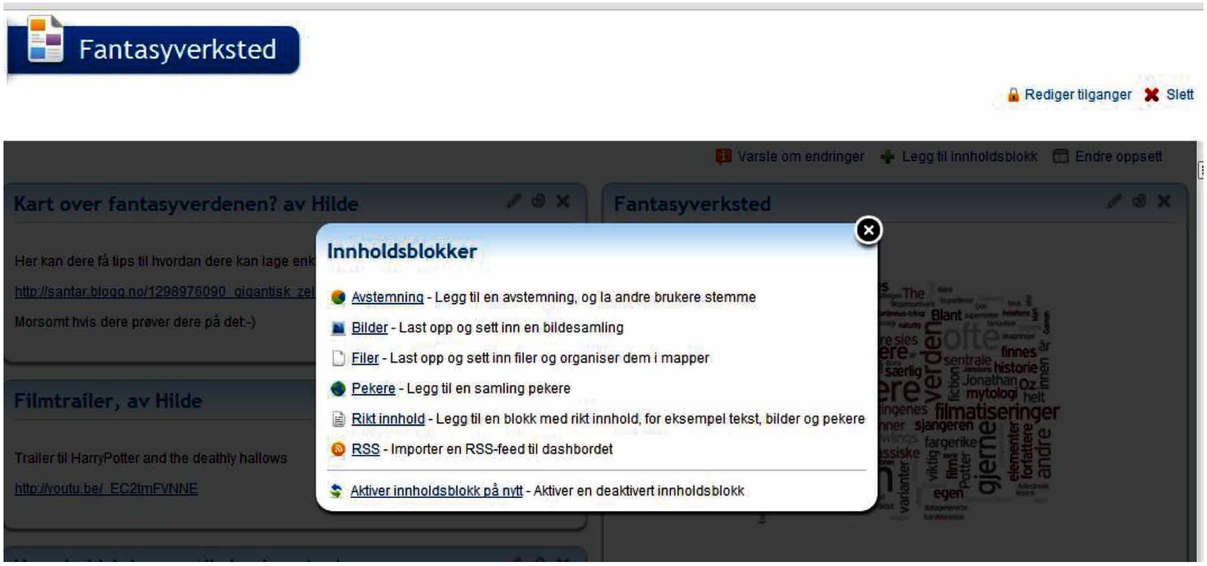
DOI: 10.4018/978-1-4666-8246-7.ch018

Figure 1.

For our digital environment, we adopted an LMS called “itslearning”. “itslearning” is a learning management system that is used in many schools, colleges and universities in Norway. It is also used in several teaching institutions worldwide. One of the functions of this LMS is that it allows one to construct theme pages, plan and publish creative work, and assess the creative works of others using different types of media. In our classroom, most of the students’ work was conducted in a tool known as “Page”. The interface of the Page tool is quite similar to the wall in the Facebook social media networking system (see Figures 1 & 2). The Page tool was mainly used to inspire our 6th grade students to connect with and provide feedback to their peers as they worked on their individual projects for the class. During the project our students were encouraged to seek advice from their peers regarding their texts and published music, movie clips and pictures related to the Fantasy genre. Some of the students even made their own short movies with book reviews that were published on the page. Hence forth, we will refer to the project as “Fantasy workshop”.

The learning objective for the Fantasy workshop was for our students to work on a project that will enable them gain a broader understanding of the Fantasy genre. In order to achieve this objective each student was asked to publish and share on the class’ Theme Page using text, internet resources, as well as the tools in the itslearning LMS. Students were encouraged to include sound, pictures, and weblinks in their project. The idea was to get the students to use the Page tool to inspire and support

Figure 2.



each other through the process of writing their own story. An underlying goal for us as teachers was to find out if this process was an effective way of teaching and working with students on their writing and whether the students would benefit from the Fantasy Workshop. As previously stated, in this chapter we share our insight on how we as teachers used a blended approach as we worked with our students. The main questions we had were: How can we work and involve all our students in the classroom with the use of a blended environment? Will the use of digital media in a blended environment help engage more students in the classroom? Will it give the students greater motivation to learn?

As teachers we went into this project believing that this process or strategy of combining different modes of delivery and learning (face-to-face and online) will help us reach out to all of our students. We wanted to trigger their interests especially in writing and in literature and to give them the opportunity to show the rest of the class their own strength. By working this way we believed that we could motivate the students so that everyone came out with a product they would be proud of.

We also wanted this project to make the students more active users of the technology as they worked through their own personal interests.

LEARNING

Before we share the outcomes of our project, we believe it is important to demonstrate how our work can be linked to the past literature on learning. Learning has through the years been defined in many ways and with different criteria for assessing whether learning has occurred. One thing that is common is that almost all theories of learning focus on the change in behavior as a result of new experiences and exercises. In her chapter on *Behavioral Views on Learning* in a book on *Educational Psychology,* Woolfolk (2001) discusses the concept of learning using other sources as follows:

In the broadest sense, learning occurs when experience causes a relatively permanent change in an individual`s knowledge or behavior (Hill, 2002). The change may be deliberate or unintentional, *for better or for worse. To qualify as learning, this change must be brought about by experience – by the interaction of a person with his or her environment (p. 200).*

Based on this definition, and also on work by Krokan (2012) one can conclude that there are three main types of explanatory models or theories that explain how we learn; behavioral theoretical models, cognitive learning theories, and constructivist learning theories. The behavioral view generally assumes that the outcome of learning is change of behavior and emphasizes the effect of external events on the individual (Woolfolk, 2001). Two of the most recognized names in behavioral learning theories are Pavlov for classical conditioning and Skinner for operant conditioning. Classical conditioning focuses on the learning of involuntary automatic responses associated with new stimuli while operant condition theory focuses on that which we can operate in our environment to affect the consequences. One learns to behave in certain ways based on the specific outcome in they have in mind.

Cognitive theories are based on our need to see and understand contexts. This means that context and understanding is emphasized. When we learn we must create mental images that can give understanding in a greater perspective. Learning is seen as an activity created by inner motivation which stimulates understanding (Krokan, 2012). Woolfolk (2001) also describes cognitive learning as "a general approach that views learning as an active mental process of acquiring, remembering, and using knowledge" (p.241). Constructivist learning theories emphasizes the active role of the learner in building understanding and making sense of information (Woolfolk, 2001). In practical pedagogy the use of group work, discussions and other forms of interaction is founded on the social constructivist paradigm. Knowledge is established through interaction with others. Learning in a paradigm like this happens by the initiative of the learner and his premises. (Krokan, 2012).

The way one views learning will influence teaching as well as the decision regarding the kind of digital tools to use in teaching in order to facilitate learning. Suppose one views learning as interactive, the theory that supports the use of interactive resources will be social constructivism. This way of thinking is supported by the way the interactive wall or page was used in our Fantasy Workshop. Lev Vygotsky has one of the most important voices in this direction. According to Vygotsky (1962) learning involves social processes. He sees learning as a result of interactions, in first hand social interactions. Vygotsky focused on the connections between people and the sociocultural context in which they act and interact in shared experiences. He believed that humans use tools that developed from a culture, such as speech and writing, to interact in their social environments and that the internalization of these tools leads to the development of higher thinking skills.

BLENDED LEARNING

The question is: Where does learning take place? The traditional mindset is that learning takes place in face-to-face settings. However, over the past number of years, we have come to understand that with the use of technology, learning can also occur in alternative environments such as online and with blended approaches. Blended learning has been hailed as the best environment. in his book *Blended learning*, the Danish pedagogic and writer Karsten Gynther (2005) describes blended learning in its broadest form as a way of teaching where one uses different pedagogical methods, different kinds of technology and mixes face-to-face teaching with online based teaching. Again, in her blog on Definition of Blended Learning which can be found on the Innosight Institute's webpage (see www.innosightinstitute.org), Staker (2011) describes blended learning as follows:

Blended learning involves a combination of online learning with an element of face-to-face.... Blended learning is any time a student learns at least in part at a supervised brick-and-mortar location away from home and at least in part through online delivery with some element of student control over time, place, path, and/or pace (par. 3-6).

Finally, on the itslearning website (see http://www.itslearning.net/blended-learning), Michael Horn (2013) defined blended learning as: "…the combination of online and face-to-face teaching. It promises to give more time with individual teachers and enable students to personalize their learning in and outside of school" (par. 2).

A good blended learning environment can be explained as a learning environment where students participate using both face-to-face classroom activities and online resources at the same time. Blended learning is considered the best environment because this environment provides students with a number of possibilities for learning and opportunities to for participation. For instance, students who learn best by interacting with the content on a number of occasions, have the opportunity to log on online to assess the same information they learned while in their face-to-face class. In the blended environment, the students who usually will not participate much in the traditional classroom will have an opportunity to assert themselves in the online environment, and will have a higher sense of participation. As such, the belief is that the blended learning environment could be a safer place for some students to learn; this environment provides students with a motivation to participate in class work and gives such students a good sense of achievement. Krokan (2012) notes that this kind of learning presents students with intrinsic motivation, rather than extrinsic motivation, causing students to be engaged in the learning process; which means that the students' actions in the learning environment will come from a genuine wish to learn something rather than just working because they have been asked to do. This makes the learning experience more pleasurable (Krokan, 2012).

As indicated previously the goal of a blended approach is to join the best aspects of both face-to- face and online instruction. Classroom time can be used to engage students in advanced interactive experiences. Meanwhile, the online portion of the course can provide students with multimedia-rich content at any time of the day and anywhere the student has internet access. In short, the blended approach provides variation in teaching and learning.

MOTIVATION AND VARIATION

Variation in teaching is important for students' motivation. In other words, students want practical and varied work as they learn. It makes them more motivated to do schoolwork. Regarding this area,Tong (2012, p. 4) cites the works of Marton and Booth's (1997) and Marton and Tsui (2004) as follows:

Marton and Booth's Theory of Variation is drawn from the phenomenographical research tradition. It argues that there is no single way to understand experience or think about a particular phenomenon; indeed there is considerable variation in people's discernment. In learning, individual students make sense of new concepts in different ways, according to their existing understandings and frameworks of knowledge. This requires teachers to engage closely with their students to grasp the variations in understandings and knowledge so they can take account of this diversity in structuring the learning activities in a lesson (Marton & Tsui, 2004).

Also, there must be a good balance between the variety of methods used. It is important that both practical and theoretical considerations are made in deciding on the methods to use as this will influence students' motivation to work. Motivation also comes from recognition; that is students are highly motivated to work, when they recognize features applied in teaching (such as the theme wall or page used in the Fantasy Workshop which bears similarity to Facebook and other social media channels). They become comfortable with the tools and find interest in the work.

The theme page we made was built using of different types of contributions (see figure 3). We included pictures, polls, video clips, documents and posts from both teachers and students. It was important that we built the page with varied information to motivate as many of our students as possible. We wanted the students to be interested in and curious about the project we posted on the page. We believed that the variation in the teaching materials will influence motivation and lead to a deeper level of learning. In addition, we wanted students to be interested enough to want to contribute at their own level of knowledge as the teaching was adapted to their level. Our hope was that by teaching this way, students will be able to find an inner motivation and an interest in the specific situation or lesson, leading to more contributions and more active learning as suggested by Dobson, Eggen, and Smith (2009).

FORMATIVE ASSESSMENT

Assessment is an evaluation of student outcomes as they learn from the teacher and also from learning. activities (Bloom, 1967, Lysne, 1999, Slemmen, 2009). Assessment can be done in a variety of formats. It could include for example answering questions in the lesson or homework tasks, meeting a set of criteria, performance in discussions, observations, short tests, assignments or projects. Formative assessments can be used to adjust teaching and/or learning. Dylan William (2011) states in his book *Embedded Formative Assessment* that "An assessment functions formatively to the extent that evidence about student achievement is elicited, interpreted, and used by teachers, learners, or their peers to make decisions about the next steps in instruction that are likely to be better, or better founded, than the decisions they would have made in the absence of that evidence" (p. 43).

In the Fantasy Workshop under discussion in this study, there was a variation of formative assessment formats used to assess learning. On-going peer assessment was used by allowing the students to respond to each other's texts and contributions on the page. Students were also assessed based on their communication with the teachers. This form of assessment was a very important part of the project.

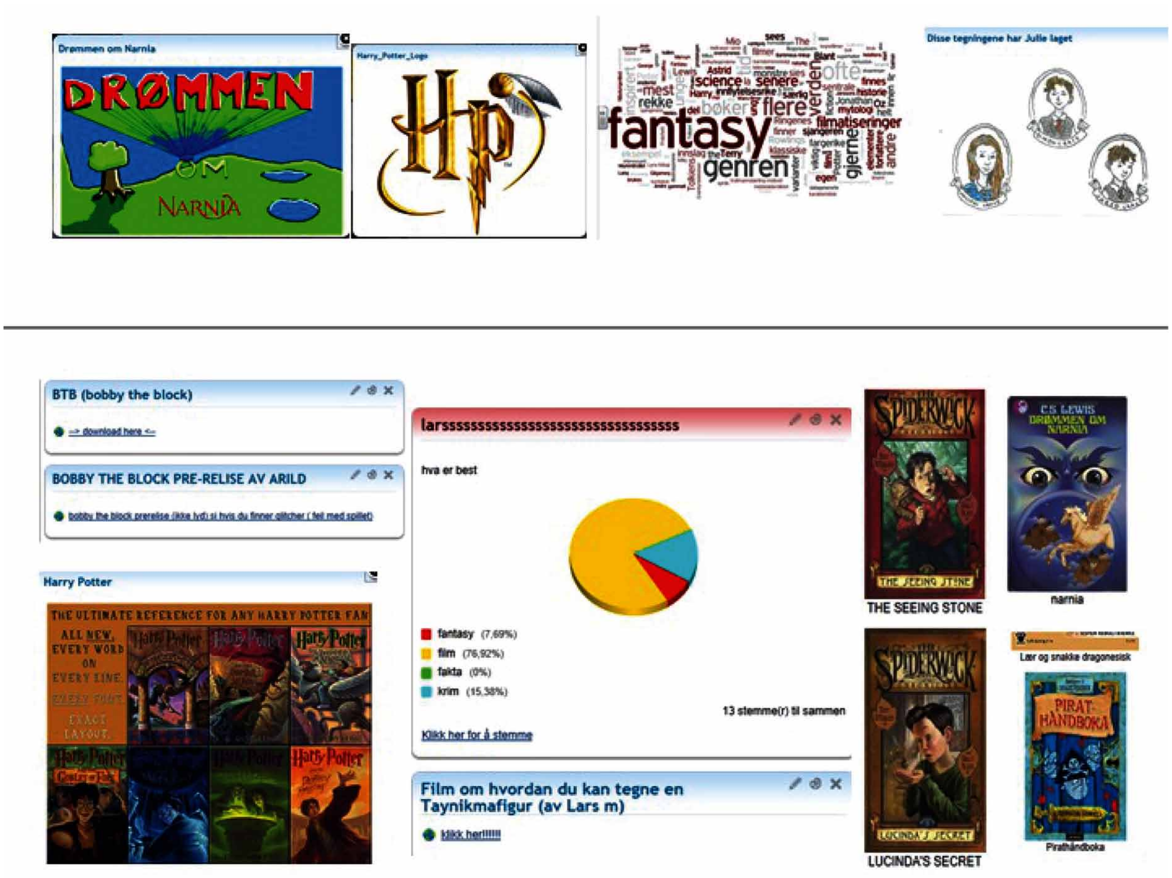
DIGITAL TRAINING MATERIALS AS SUPPORT FOR DIFFERENT STUDENT TYPES

Prior to introducing the use of digital media, it is important to evaluate how the media will support the different types of students with different learning styles and different intelligences in the classroom.

Different Student Types and Multiple Intelligence

Several factors are affected when one uses different digital media or information communication technologies (ICT) in the process of teaching and learning. One of the most important factors in the learning environment is the people that interact within the environment. A learning environment will always be complex and one will find all kinds of student types in it. As such when it comes to ICT and the different student types, students can be split into three different groups: the visual learner who will prefer to see things visually in order to understand, the auditory learner who prefers to hear before seeing and the kinetic learner who puts movement and body language high in their perception on what is to be learned (Eidsmo, 2005). Students may also be classified by identifying which learning styles suits them best or by identifying which type of intelligence strongly represented in them. No learning style or type of intelligence is better than the other, it just tells us that we learn, present, and use knowledge

Figure 3.



in many different ways. One kind of intelligence is stronger represented, but one type of intelligence does not rule out the others. "Each human being has a unique mix (or "profile") of strengths and weaknesses in the intelligences" (Gardner 2006, p. 11)

In 1983, Howard Gardner presented a theory that he called "multiple intelligence (MI)". This theory highlights the importance of seeing each student for who he or she is and not who he or she is expected to be. Since every student has their own mind they also learn, remember, understand and perform in different ways. Gardner divided intelligence into eight categories:

1. **Linguistic Intelligence:** The readers and writers who like to communicate through words.
2. **Logical–Mathematical Intelligence:** Logical and mathematical ability, as well as scientific ability.
3. **Spatial Intelligence:** The visual students, they are able to form a mental model of a spatial world and are able to maneuver and operate through it.
4. **Musical Intelligence:** The ones who sing, play, and make music. They have a good ear for musical shades and rhythm.
5. **Bodily–Kinesthetic Intelligence:** The ones who have the ability to solve problems using their whole body, or parts of their body. Characterized by high level of agility.
6. **Interpersonal Intelligence:** The ones with a strong ability to understand other people. They see how people work, what motivates

them and how to cooperate with others. Easy to work with and get to know.

7. **Intrapersonal Intelligence:** Often characterized by good self – knowledge. They will form an accurate, veridical model of oneself and are able to use the model to operate effectively in life.
8. **Naturalist Intelligence:** The ones who nurtures and relate information to one`s natural surroundings. They recognize and classify elements and patterns from nature.

"These intelligences constitute the ways in which individuals take in information, retain and manipulate that information, and demonstrate their understanding (or misunderstandings) to themselves and others" (Gardner and Veenema as cited in Gardner 2006, p. 76). Gardner argues that his theory of multiple intelligence is of great importance for educators. He wants the school system to recognize the many different and discrete facets of cognition, to acknowledge that people have different cognitive strengths and contrasting cognitive styles. He would like to see the school more individual – centered and says that the multifaceted view of intelligence has to be taken seriously.

An instructor will find all learner types in their classroom, and students with different strengths and intelligences. Therefore the need for the use of varied teaching methods and media or ICT to embrace all students. In our study, a good application involved the use of the interactive page used in the Fantasy workshop. In this environment, different students and all student types were embraced. For instance the theme page which was adapted for the students as they contributed content to their work allowed for the addition of images, sounds, and movement as required for all the different types of learners and their different intelligences.

THE STUDY-FANTASY WORKSHOP

Fantasy workshop is a subject for 6th grade students in Norwegian schools. The workshop typically involves the completion of a traditional project in reading and writing. This time around we decided to adjust our teaching and applied a blended approach to teaching and learning in the Fantasy workshop. The goal was to get the students to be familiar with the fantasy genre and to have them write a fantasy story. First of all, the students had to read fantasy literature to get to know the genre. The reading was done in reading circles; we divided them into groups of four or five students and they all had to read and discuss the same book.

In addition to the reading circles, an online environment was created using an LMS for students to work on the creation of a fantasy story. In the online environment, a resource page was created where students could gather relevant information for the project. It is important to note that the students worked collaboratively and with the teacher on this project. The students gathered all kinds of material they could find from a variety of sources that were relevant to the project. During this project, all participants including the teachers and students were encouraged to post the materials they found (trailers from fantasy movies, illustrations, facts about authors and pictures from the genre) to the online environment. The students were told that they could also make mobile phone videos about the books they had read and publish them on the theme page in the online environment. The online environment was accessible to everyone in the class and we could all log onto the page at any time. We used the school's library as well and made film reviews based on the books we located in the fantasy genre.

The Learning Management System (LMS)

The learning tool, itslearning, was used in this workshop. This LMS has several functions or tools which made it applicable to our work. As previously mentioned, we wanted to make an interactive resource page and it was important that the students could adapt the work around their own interests. With this LMS one can create content blocks and different tools such as polling tools and a theme page. The most popular function was the block which contained rich content. One could publish text, pictures and web links in the same block. The students posted YouTube links and wrote short messages or descriptions to explain the links to others who reviewed their work in the block. They also published pictures they had found or illustrations they made about their work in the block. Some even published parts of their fantasy texts and asked for feedback from their peers and the instructors in this area. The polling tools were used to ask for help from others as they made decisions regarding sections of their project such as the name of the hero in their story. They also made polls about the most popular books, films and writers others in the class had read or recommended.

The LMS also allowed us, the teachers, to add files to the learning environment. With this tool, we published everything we went through in class, like criteria, characteristics of the genre, schedule for the project, information about the project and examples of the project. In this way, everyone could find information whenever they wanted and it was always available to them. The theme page is a place where all the participants can find relevant notes, links, tests and so on. The teachers made decisions on who could assess and edit this page. We found it very safe to use this theme page as we knew who the contributors of the different parts were. In this way we were able to conduct the project with a rubric and students who did not follow the rubric were immediately noticed.

How the Project Developed

The students got a lot of inspiration from each other as they continuously posted their work in the online environment and became more active users of the LMS. The students got curious and wanted to find out what was new each day. They were eager to find out if someone had commented or answered their postings. This behavior towards this activity was very similar to that which can be experienced in social media channels such as Facebook. The students were familiar with this environment as they know “Facebook”. This made them comfortable and they were motivated, became engaged, and immersed themselves into the workshop as they created their work and communicated with each other and the instructors. The types of communication on the page showed us, the teachers, that the students were used to this way of communication on the internet. They got motivation from their classmates’ suggestions and wanted to do their best because they knew everybody could review their work and their contributions. The project also emphasized a need for them to show off their creative nature for others to see and notice their work. In this way, they learned a lot about the correct way to communicate on the internet and more importantly about the literature genre of fantasy. We saw students who would normally not do their work participate in class and submit excellent contributions on the page. This made them feel important and it lifted their status in the class. We saw qualities in students that we had never seen before; they had more creativity than we thought or had ever experienced or observed in the classroom. Both teachers and students came out of this with a new perspective.

While this arena or approach provided students with a lot of control and ownership over their work, it also ensured that they followed the class rules or rubric. We saw that this became a safe place to practice how to communicate on social media. Since the page was open only to the class and the teacher, we had a good overview and could weed out inappropriate comments or publications.

The Data

We worked with the "Fantasy workshop" for 5 weeks. During the middle and at the end of the project, we (the teachers) conducted a survey on student learning. The feedback we received suggested that the students enjoyed the project. The questions we asked were about how the students used the page, how often they used it, if they only looked at it or if they contributed on their own. We asked which tools they had used the most or if they had had any use for the page. Most of the survey questions were either of the yes/no-questions or multiple choice format. The survey was conducted in the itslearning learning system.

Outcomes from the Data: The feedback we received from our students suggested that the blended approach was a success and had a positive effect on student writing and reading of the fantasy genre. For instance, the majority of the students (76%) said that the feedback provided on the wall or theme page was of relevance to them and to the process of writing their own story. They indicated that they had good use of the page. The last question was an open-ended question where students were asked to indicate the ways in which they had used the online environment and whether the blended approach had been helpful to them. Here are a couple of the open-ended responses we received from the students:

I got lots of tips and ideas.

It has helped me to understand what others think, and I`ve been inspired by others.

I got help finding out what my magic passage should be, and finding a name for my fantasy city.

I posted my introduction and got help in how to go on with the story.

On the whole, we received good feedback from our students and observed that almost all students reached the goals set in the project. Student data showed that they did their best in reading the goals set in the project. Student data also showed that they did their best in reading books in groups, contributing on the theme page and writing a fantasy story, in groups or on their own. Everybody had a positive experience with working in this way and the students found it interesting and motivating.

For us, the teachers, the use of this blended approach and theme page in our work was new. We realized that our fantasy project was successful and presented students with a whole new perspective of the Fantasy genre. The students received much more complex knowledge about the fantasy genre, and of reading and writing. And above all, as teachers we observed important qualities in our students that did not stand out in the traditional face-to-face setting. In relating our processes and outcomes to the theory on different student types, we found that we were able to reach all student types in our classroom with this project. Different types of learning styles were met with the use of the LMS and online learning environment as a varied set of sensations were offered. The fact that students also got to form their contributions in their own way give them an arena where the pressure level to join was low. The project gave students the chance to receive and contribute with in-depth information as well as to receive and give positive feedback as they worked on reading and writing fantasy stories.

As teachers, we observed that our students were highly motivated during the process of the workshop. We believe this real life experience matches what students will ultimately need later in life. For instance, students learned such habits as collaboration, cooperation, critical thinking and providing constructive feedback.

RECOMMENDATIONS

Working with a project like this can be very valuable to teaching and learning and for students and teachers. The biggest value as we see it is how this project embraced students of all kinds. One important criterion that made this a success was that we created this learning activity around a theme and a genre. To engage the students in a big project like this, we will recommend that the teacher first formulates the project around a theme and one that will allow students to find relevant material easily.

For us, the Fantasy genre provided a perfect way to do this as one can easily find film trailers, pictures, stories and interviews mostly from the internet – a place where the students at this age spends a large amount of time anyway. Given the outcomes from our survey data and observations, we will highly recommend teachers to try out this blended approach to teaching and learning as such learning environments can be of high value to students. We know that many teachers use blogs in their teaching, and our idea is founded on the same thought where students have the possibility to work in a safe and interactive environment.

FUTURE RESEARCH DIRECTIONS

This topic of blended education continues to receive more and more attention in research. Researchers continue to encourage the use of digital resources at all levels of learning. The use of social media is also a big theme for researchers in higher levels of education. This approach can provide our students with a safe way for learning. As the number of people using social media is increasing every day, and the demographic of users includes more young students, we believe that if this form of teaching and learning is encouraged, it will be very useful at the K-12 level of education. The hope is that this chapter will provide K-12 teachers and researchers with insight on how they might implement a blended learning environment, the important factors to ensure a successful learning experience, and the outcomes of such processes.

Further research on this very complex field especially at the K-12 level is encouraged particularly as we know that the students even at young ages are now active users of the internet. Hence using this format will allow us to meet our students at their level and using techniques they are used to; techniques that allow them to be part of an interactive universe where they are engaged in higher levels of thinking. While the outcomes of project was positive, we will like to point out that challenges still exist on how best to blend face-to-face and online teaching at the K-12 level and in education in general.

CONCLUSION

The Fantasy workshop is an example of how blended teaching and learning can be used to engage and motivate young students in their classrooms. The project has an educational base but is also founded on the student`s interests and knowledge. These are what we see as important success criteria to this approach. As indicated previously, teachers need to work around a theme as they plan teaching and learning in an environment that combines face-to-face and online learning. Through relevant theory it is clear that working this way will give teachers the opportunity to challenge all kinds of students as they will be engaged at different levels that match their needs. Also such activities will be adapted to students' own reality. We can safely say that it might be almost impossible to reach such a success in a purely face-to-face classroom and without the integration of digital tools in an online environment. We see that the children of today are much more dependent on using their senses and getting stimuli on different levels and in different ways. Using interactive pages will help support the different student types and meet the challenges they struggle with from day to day in a face-to-face learning environment. The blended approach is an adaption that can be applied for teaching all students.

REFERENCES

Dobson, S., Eggen, A. B., & Smith, K. (Eds.). (2009). Assessment, principles and praxis: New perspectives on assessment of learning. Oslo, Norway: Gyldendal Forlag.

Eidsmo, A., & Kolås, L. (2005, March). *Information communication technologies and learning*. IKT og læring. Paper presented at Nord Trøndelag University College. Steinkjer, Norway.

Gardner, H. (1993). *The unschooled mind: How children think and how schools should teach*. New York: Basic Books.

Gardner, H. (2006). *The development and education of the mind: The selected works of Howard Gardner*. New York: Routledge, Taylor & Francis.

Gynther, K. (2005). *Blended learning. IT og læring i et teoretisk og praktisk perspektiv. Unge Pedagoger*. København: Norwegian.

Horn, M. (2013). *Blended learning*. Retrieved from http://www.itslearning.net/blended-learning

Staker, H. (2011). *The rise of K-12 blended learning: Profiles of emerging models.* Retrieved from http://www.innosightinstitute.org/media-room/publications/education-publications/blended_learning_models/

Staker, H. (2011). *Defining blended learning*. Retrieved from http://www.innosightinstitute.org/education-blog/defining-blended-learning/

Tong, S. Y. (2012). Applying the theory of variation in teaching reading. *Australian Journal of Teacher Education*, *37*(10). doi:10.14221/ajte.2012v37n10.3

Williams, D. (2011). *Embedded formative assessment*. Bloomington, IN: Solution Tree Press. doi:10.1017/CBO9780511794537

Woolfolk. (2001). *Educational psychology.* Needham Heights, MA: Pearson Education.

ADDITIONAL READING

Bergen, Fagbokforlaget (Norwegian)

Bjarnø, V., Giæver, T. H., Johannesen, M., & Øgrim, L. (2009). *ICT and education. DidIKTikk.*

Horn, M., & Staker, H. (2011). The rise of K-12 blended learning, Innosight institute, Retrieved from http://www.innosightinstitute.org/innosight/wp-content/uploads/2011/01/The-Rise-of-K-12-Blended-Learning.pdf

Krokan, A. (2012). *Smart learning: How ICT and social media changes learning. Smart Læring –hvordan IKT og sosiale medier endrer læring,* Bergen, Fagbokforlaget (Norwegian).

Munkvold, R., Fjeldavli, A., Hjertø, G., & Hole, G. O. (2008). *Online teaching. Nettbasert undervisning, Kristiansand, Høyskoleforlaget.* Norwegian.

Norwegian research and competence network for ICT in education (2012). Forsknings og kompetansenettverk for IT i utdanning, hjemmeside. http://www.itu.no/filestore/NSSL/NORLOM/NORLOM_v1_1_veiledning.pdf (Norwegian).

KEY TERMS AND DEFINITIONS

Blended Learning: A learning environment that manages to combine classroom teaching with online resources in a way that complements the learning situation.

Fantasy Workshop: A digital workshop where you go into the fantasy genre and world.

Interactive Page: Online based page where you can interact with other students and publish material in different forms.

It's Learning: Learning management system used at many schools in Norway

Theme Page: A web based page that is content specific, gives you insight on a theme.

This work was previously published in Practical Applications and Experiences in K-20 Blended Learning Environments edited by Lydia Kyei-Blankson and Esther Ntuli, pages 249-260, copyright year 2014 by Information Science Reference (an imprint of IGI Global).

Chapter 19
Evaluating a Learning Management System to Support Classroom Teaching

Tiago França Melo de Lima
Federal University of Ouro Preto, Brazil

Thiago Nazareth dos Passos
Federal University of Ouro Preto, Brazil

ABSTRACT

New pedagogical approaches are required to prepare future professionals. The educational model must be in consonance with the information and communication technologies. They help to improve knowledge dissemination and reduce space and time limitations between teachers and students. They should also motivate students and stimulate communication and collaboration among students, improving the learning process. Currently, the Institute of Exact and Applied Sciences of the Federal University of Ouro Preto (IEAS/UFOP) has no institutionalized tools of information and communication for teaching support. This allows the identification of some problems and difficulties on the educational process, such as absence of a centralized way to provide and access didactic resources, unavailability of a good communication tool between teachers and students, and lack of easy access to academic performance information for self evaluation. This chapter presents the authors' experience in choosing and evaluating a Learning Management System (LMS) to support classroom teaching at the IEAS. The authors investigate how the use of a LMS may improve teaching in the following aspects: (1) availability of didactic resources; (2) class planning and following up; (3) teacher-student communication; (4) monitoring of the academic performance of students during the course; (5) collaboration among students.

INTRODUCTION

Technological development always brings changes to people's lives. The expansion of information and communication technologies and the dissemination of the Internet have created unprecedented connectivity. Besides, easiness to create and publish content is increasingly generating an enormous amount of information. Due to these and other factors, new paradigms of social inter-

DOI: 10.4018/978-1-4666-8246-7.ch019

actions are emerging and becoming necessary (Cardoso and Castells, 2006; Takahashi, 2000). Individual work is being replaced for teamwork, which is conducted collaboratively (Mills, 2003). Organizations are reformulating their strategies on conducting operational, business and administrative processes. This is happening regardless of the kind of organization - it could be an industry or service such as education, originating from private or government initiative (Castells, 1997; Castells, 1999).

Likewise, new pedagogical approaches are necessary to prepare future professionals (Anderson, 2008; Clark and Clark, 2009; Moran, 2000; Plomp, 2013). Learning is no longer individualized as well, and it is becoming collaborative, shared and collectively built (Duderstadt, 1997; Stahl et al., 2006). Therefore, education plays a new role aimed at continuous learning, information sharing and collective knowledge construction (Duderstadt, 1997; Laurillard et al., 2009; Plomp, 2013; Williamson, 2013).

The educational model must comply with information technologies - which can serve as cognitive 'prosthesis', helping increase socio-affective processes (Fagundes et al., 1999), disseminate knowledge, decrease limitations of time and space between teachers and students, and enhance learning through the use of multimedia / hypermedia resources (Morais & Cabrita, 2007). To promote the expected changes in educational process, information and communication technologies (ICTs) should be used as pedagogical tools to create an interactive environment that enables learners, faced with a problem, to investigate, raise hypothesis, test and refine their ideas, thereby building their own knowledge according to their individual learning style (Vieira, 1999). Students are no longer mere information receptors, they are rather builders of their own knowledge (Lê, 2002; Moran, 2003).

As these technologies allow the improvement of information communication and production, a first proposal would be to think about the processes of storing and organizing information and communication as ways to enhance the teaching-learning process. The space extends beyond the classroom, into the virtual space (Moran, 2003). It brings the educational process closer to students' reality, once they already use these technologies in their everyday lives.

In this context, the teaching-learning process can be supported by many resources provided by ICTs. For example, Learning Management Systems (LMS) allow the integration of functionalities related to communication and content distribution. Although in general they are applied to distance learning, they could also be used to support classroom teaching, for example, by helping teachers manage didactic resources, facilitating communication with students, among other things.

In this sense, many institutions around the world use ICTs and the Internet to improve the education. Several e-learning (electronic learning) and b-learning (blended learning) initiatives have been developed. Many learning management systems have been created and used to support e-learning and b-learning activities (Hewagamage, 2007; Kalogiannakis, 2004; Ishitani et al., 2006; Ishitani 2009; Morais & Cabrita, 2007; Mortera-Gutiérrez, 2006; Silva et al. 2008, Wang et al. 2007). Some examples are: Moodle, LearnLoop, TelEduc, AulaNet, BlackBoard, WebCT.

Currently, the Institute of Exact and Applied Sciences (IEAS) of the Federal University of Ouro Preto has many problems and difficulties related to the educational process, such as the lack of a centralized way to provide didactic resources for students; absence of a good communication tool between teachers and students; need of fast and easy access to information on students' academic performance for self-assessment.

So, we propose the use of a learning management system to support classroom teaching at the Institute of Exact and Applied Sciences. We investigated and argued about how the use of a LMS can improve classroom teaching in the following aspects: (1) availability of teaching resources; (2) class planning and following up; (3) teacher-student communication; (4) monitoring of students' academic performance during the course; (5) collaboration among students.

This chapter presents the investigation and evaluation process of a LMS to support classroom teaching at the Institute of Exact and Applied Sciences. Initially, a diagnosis of the current reality of IEAS was made to identify teachers and students' main needs. Questionnaires and interviews were used to collect data. Then, based on the results, a comparative analysis of some LMSs indicated the Moodle platform as the best solution to address the institute's needs. Finally, the LMS chosen was deployed and evaluated.

The chapter is organized as follows: Section Learning Management Systems introduces some basic concepts about distance learning (e-learning and b-learning), learning management systems, and related works including some successfully examples of the use of LMS. Section Evaluating the Moodle Platform presents the development of work, starting with diagnosis, when the institute's needs were identified, following by analysis of LMS tools and choice of the Moodle platform, and finally, outcomes are shown and discussed. Lastly, conclusions and next steps are presented.

LEARNING MANAGEMENT SYSTEMS

In the Information Society, there is a need for constant contact with information. We frequently use information and communication technologies as tools to acquire information and knowledge for personal and professional development.

A definition for distance education is: "institution-based, formal education where the learning group is separated, and where interactive telecommunications systems are used to connect learners, resources, and instructors" (Schlosser & Simonson, 2009, p. 1). Distance learning can be defined as the teaching-learning process in which teachers and students are not together physically, but they can be connected by technologies such as the Internet (Keegan, 1996). Other media like television and radio can also be used. The media used before the Internet favored communication in a single direction: from teacher to students. Information was only transmitted, but there was almost no feedback. The Web allowed efficient bidirectional communication through the use of tools such as e-mails, instant messages, chats, forums. It enables more interaction between students and teachers during the teaching-learning process and favors collaborative learning. Thus, students are not just information receptors, they have become active participants of their own knowledge construction (Lê, 2002; Behens, 2007; Moran, 2007). Although collaborative learning is not restricted to the Web, the use of such resources enhances the results. Further discussions about distance education definitions, concepts and applications can be found in Moore (2013), Schlosser & Simonson (2009).

Computer-assisted learning (CAL) created new learning contexts, which require the use of new pedagogical approaches (Stahl, 2006). Examples of CAL applications and evaluations can be found in many areas and places (Millde-Luthander et al., 2012; Ecalle et al., 2013; Kalet et al. 2012; Schifferdecker et al., 2012; Veneri, 2011; Huang et al., 2012; Lai et al., 2013; Belal, 2011; Schittek et al., 2001; Shaw and Marlow, 1999). Students are not only receivers of content, they develop their own knowledge and manage their learning. Similarly, computers are not mere tools that teach something, but tools through which students develop things and, moreover, the learning process occurs when these devices are used to perform activities. Furthermore, by incorporating the Internet, we have been able to conceptualize e-learning.

The concept of e-learning refers to the use of information and communication technologies to provide resources and tools to improve knowledge acquisition and learning performance (Rosenberg, 2002). On e-learning both communication and distribution of didactic resources occur online. The paradigm shift is inevitable: the teacher is no longer the main source of information and responsible to pass on knowledge. The Internet plays a very important role as a source of information and a means for knowledge construction (Valente, 1995). In this context, teachers need to develop a new way to teach and build a new image of their work: reducing their interference and increasing students' responsibility for knowledge acquisition. Thus, teachers should use new approaches and strategies to teach, acting as tutors, and becoming learning mediators or managers, with new abilities and responsibilities (Almeida 2003; Kalogiannakis, 2004). E-learning allows students to learn at their own pace and offers benefits such as access to information in a nonlinear way and reduction of space and time limitations. This is another step in the evolution of distance learning, whose main specificity is the use of computers and the Internet as predominant means to promote learning (Santos et al., 2010). There is no consensus on e-learning definition - further discussions about this topic can be found in Andrews & Haythornthwaite (2007), Gomes (2005), Kahiigi (2007), Tsai & Machado (2002), Zhang & Nunamaker (2003).

E-learning does not exclude the traditional educational model, as both models can be combined. B-learning can be understood as a mixed learning. It is a combination of classroom teaching and distance learning, mediated over the Internet (Bonk & Graham, 2012; Sharma, 2010). Blended learning systems combine face-to-face instruction with computer-mediated instruction (Graham, 2006). This hybrid model arises as a complement and an extension of traditional and online learning. It has two distinct goals: (1) to minimize the face-to-face component, reducing the traditional model of education by performing most activities remotely, and; (2) to complement the face-to-face component – the remote element attempts to facilitate access to contents and improve communication and interaction between students and teachers, even outside the classroom (Adão and Bernardino, 2003).

Thus, b-learning aims to provide greater efficiency and effectiveness to the traditional teaching model by using the remote component. The face-to-face environment is complemented by online activities, e.g. online discussions, quizzes, assignments, submission of assignments, engagement in collaborative activities (Duhaney, 2004). Moran (2007) emphasizes that the virtual environment can be remotely used by students for research activities (individually or in groups), discussions, as well as to solve doubts, delve into subjects covered and studies of more complex contents. He also emphasizes that, for quality education, these two spaces (virtual and presential) must be integrated. This opens up a range of possibilities in education and has several implications such as a more dynamic learning process, need for students to learn more independently and teachers to become facilitators and managers of students' learning. Blended learning also involves many discussions about its definition and related concepts (Graham, 2006; Graham et al. 2003; Kim, 2007; Picciano & Dziuban, 2007).

While traditional distance learning uses media such as radio and television to provide information, e-learning and b-learning use the Internet. However, merely using the Internet does not suffice. A tool which allows the management of learning processes is necessary, integrating and providing teaching resources, and also offering communication tools. To that effect, learning management systems are good alternatives.

Accordingly to the concept of virtualization (Lévy, 1996), virtual learning environments (VLE) can be viewed as virtual classrooms accessed over the Internet. They are social spaces, formed by social-cognitive interactions around a subject of knowledge (Valentini & Soares, 2010). Moreover, they use the cyberspace to convey content and enable interaction among actors of the educational process – aiming to facilitate or promote learning

(Pereira, 2007). Dillenbourg et al. (2002) identify some features that characterize virtual learning environments: (1) they are designed information space, (2) they are social space, where educational interactions occur, (3) the virtual space is explicity represented, ranging from text to 3D immersive worlds, (4) the virtual space is co-constructed by students; (5) they are not restricted to distance education, and could also enrich classroom activities, (6) they integrate heterogeneous technologies and multiple pedagogical approaches, (7) most virtual environments overlap with physical environments.

According to Weller (2007), a virtual learning environment is Web-based system designed to support teaching and learning, providing features and tools for communication, performing tasks and assessments, administration of courses (contents, students). A VLE is a software system that facilitates the e-learning. Such systems are also called learning management system (LMS), course management system (CMS), learning content management system (LCMS), managed learning environment (MLE), learning support system (LSS) or learning platform (LP) (Martin & Serrano-Fernández, 2009). Further discussion about definitions and terminology can be found in Moore et al. (2011), Paulsen (2002).

Thus, a LMS is intended to integrate resources in a common place, such as a virtual classroom as well as to help educators communicate with students and manage contents and courses. There are many free (Moodle, LearnLoop, TelEduc, LearningSpace) and commercial (BlackBoard, AulaNet, WebCT) learning management systems available with several resources and characteristics. In this work, the following tools were analyzed: Moodle, Teleduc, AulaNet, LearnLoop. All of them are Web-based applications and can be accessed by students and teachers using a Web browser. Despite the fact that they present several distinct characteristics, in general, learning management systems have many similar resources and tools, which can be grouped according to their functionality, as described below and presented in Table 1.

Table 1. Resources and tools grouped by functionality

Time Control	• Schedule • Event reminders
Evaluation	• Exercises • Projects and Research • Questionnaires
Communication	• Chat • Electronic mail • Forum • Messages (synchronous and asynchronous)
Personal Space	• Personal homepage • Blog • Wiki
Management of Activities and Didactic Resources	• Virtual drive • Interaction map statistics • Notes • Groups • Glossary
Platform Support	• Search engines • FAQ • User support • Virtual communities (users and developers)
Platform Maintainability and Development	• Plug-ins / Modules • SCORM (Sharable Content Reference Model)

- **Time Control:** helps organize time of events and activities during a course.
- **Evaluation:** allows the creation of evaluation activities and methods to verify the knowledge about a given subject.
- **Communication:** allows synchronous and asynchronous communication among users (students and teachers).
- **Personal Space:** enables users to create an individual profile and a public space to publish information and share contents.
- **Management of Activities and Didactic Resources:** allows the creation and management of didactic resources.
- **Platform Support:** helps users interact with the learning management system.
- **Platform Maintenance and Development:** supports the maintenance and development of learning management systems and courses.

Some of the advantages related to the use of learning management systems are: the possibility of grouping didactic resources in a single place; the ability to remotely perform activities and assessments; the capability to communicate synchronously and asynchronously; the potential to encourage collaboration; and support to manage processes in a course. Belloni (2002) highlights some of the advantages: (1) any time - possibility to attend a course at any time; (2) any place - ability to conduct and participate in a course at any place without the need of a physical space; (3) self-paced - the environment allows learners to set their own learning pace; (4) collaborative learning - students can learn from each other through group assignments, forums, debates and exchange knowledge by chat; (5) self-learning: students can learn autonomously.

However, the use of learning management systems alone does not suffice. The quality of the educational process depends on the involvement and analysis of technological, human and organizational dimensions. The technological dimension relates to the technical analysis of computers, devices, systems and network infrastructure needed to properly run the LMS. The human dimension refers to the people involved, such as students, teachers, tutors, and technical support. Finally, the organizational dimension refers the institution's educational processes (Neto & Takaoka, 2008).

Thereby, choosing the learning management system is an initial factor, yet, it is a very important one. This is directly related to the success or failure of its use in the educational process. In this work, the systems presented below were analyzed. They are used in many higher educational institutions in Brazil and worldwide.

The Moodle (Modular Object-Oriented Dynamic Learning Environment) platform is an open-source tool that allows the creation and management of courses. It offers many functionalities such as forum, chat, wiki, and calendar. In addition, it has a large user community and is currently used by many institutions around the world (Silva et al., 2008; Stewart, 2007).

Developed at Nucleus of Informatics Applied to Education of Unicamp (Campinas University – Brazil), the Teleduc is a free software whose goal is to provide teachers with a computational environment that enables them to prepare and monitor courses over the Web (Franco et al., 2003; Rocha, 2002; Rocha, 2003).

AulaNet is a collaborative Web-based learning environment. It was developed at the Software Engineering Laboratory of the Catholic University of Rio de Janeiro (Fucks et al., 1999; Fucks, 2000;).

LearnLoop is another open-source project that is used by many universities around the world. It has several resources such as synchronous and asynchronous communication tools, course management features and collaborative learning (Brugger et al, 2005).

The environments were analyzed in terms of resources and tools offered and, then, the one considered most suitable to meet the needs of IEAS was chosen. This analysis included technological and learning aspects. The Moodle stood out among others for offering more resources and tools, as well as for its larger user community. In addition, its acquisition and use are free of charge, as are all of its software requirements. Also, customizations and development of new features can be directly implemented by changing its source code. Finally, it has a large community of users, contributors and developers, from whom it is possible to get help and technical support.

Related Works

Learning Management Systems are currently being used in several higher education institutions in Brazil and worldwide to manage and support classroom courses and obtain more effective control of information and processes.

One example is study developed at the Institute of Informatics of the Catholic University of Minas Gerais, where the LearnLoop was used to assist teachers and students. In this study, the use of LMS was positively accepted by students and teachers, mainly in computer science area (Brugger et al., 2005).

In another work, developed at the CENSA Institute of Higher Education (ISECENSA), in addition to a good acceptance rate, it was possible to observe some improvement on students' learning performance. The Moodle platform was adopted to reinforce the classroom teaching in a mathematics course of undergraduate degree in Production Engineering. From surveys conducted in the study, authors noted that there was a good level of user satisfaction and that students improved their learning performance. The project was initially conducted as a case study was later adopted in other subjects (Silva et al., 2008).

At the Amazon Institute of Higher Education (IESAM), the TelEduc was used between 2004 and 2006 but was later replaced by the Moodle. It was used to train teachers and to support classroom learning. The platform was evaluated to identify improvements brought by its use. It was observed that students had better learning performance due to the adoption of multimedia resources, which made it easier for them to understand contents. Another positive aspect was the interactivity provided by tools such as chats and forums, which allowed discussion about issues related to courses. But research also showed that these advantages are directly connected to strategies used by teachers. Authors concluded that the Moodle helped teachers apply contents and students improve learning. In this work, the results suggest that the Moodle platform brought greater benefits than the TelEduc, which was used earlier (Batista & Cleidson, 2010).

Another study, conducted at the University of Brasilia (UnB), aimed to analyze the use of the Moodle in undergraduate degree in Librarianship. Usability tests, questionnaires and interviews were applied to evaluate the interaction with the environment and identify the benefits for classroom teaching. Results showed that students were favorable to the innovations introduced by the Moodle. The perceived advantages related to the use of tools and resources include better interaction between students and teachers, online submission of assessments and course activities (e.g. exercises, projects), easy access to additional resources. Teachers acknowledged the Moodle as a platform that makes it easier to provide didactic resources and allows communication with students outside class time. However, due to some difficulties and lack of knowledge, it was not efficiently used by teachers. Thereby, the author highlights that the deployment of the platform does not suffice, and ways to support, guide, help and encourage future users must be taken into account (Yunoki, 2009).

Morais and Cabrita (2007) analyzed mainly the communication and interaction perspectives on using a LMS in a b-learning context. They argue that a LMS favors a more active and autonomous participation of students. The Blackboard was used by undergraduate students of communication area. The results suggest that use of LMS brought improvements to interaction among students and between them and the teacher. Social interaction between students outpaced the physical boudaries of the school, reaching new dimensions in the virtual environment. In another study, Uzum and Senturk (2010) compared performance and attitudes of students when using two course delivery methods, and found that the blended course delivery method was more successful than face to face.

Bri et al. (2009) analyzed the following aspects of learning management systems: level of popularity, resources provided, utilization in Spanish universities, performance evaluation. The tools investigated were Moodle, Sakai, Blackboard, WebCT. The results indicated the Moodle platform as the better tool. Another comparative analysis was made by Gabardo et al. (2010). They analyzed several platforms (TelEduc, AulaNet, Amadeus, Eureka, Moodle, e-Proinfo, Learning Space, WebCT) based on the following criteria: distribution, pedagogical principles, collaborative learning, interactivity, multimedia, usability, accessibility. The results suggest that platforms present gaps in their construction and / or presentation. Some disparities were found regarding interactivity and availability of tools for collaborative learning. Some platforms, despite emphasizing the possibility of using multimedia systems, information about these features are not clearly available. Accessibility is the least contemplated issue. Therefore, authors argue that platforms are short of what they could represent in innovation.

The Moodle was also chosen in a study developed by Aydin and Tirkes (2010). They analyzed and compared some open source learning management systems (Moodle, ATutor, DOKEOS, OLAT). They highlight the advantages of using an open source software (OSS), such as the decreasing of dependency risk and associated costs, higher flexibility and frequency of updates when compared to proprietary software, security, and low cost. Despite all the tools offer sufficient basic functions for their use as LMS, the Moodle excelled among which. It presented advantages practically in all of the features compared. Moreover, its modular design leads to a great flexibility, its interface has greater usability, and its ease of installation and maintenance has led to enhance and spread their user community. Other analyzes can be found in Aberdour (2007), Georgiakakis et al. (2005), Graf & List (2005), Ozdamli (2007), Uzunboylu et al. (2006), Suri & Schuhmacher (2008), Hussain et al. (2011), Fertalj et al. (2006).

EVALUATING THE MOODLE PLATFORM

Analyzing and Choosing the Learning Management System

In this section we described the steps carried out to deploy a learning management system to support classroom teaching at the Institute of Exact and Applied Sciences of the Federal University of Ouro Preto. In a project of this nature, an initial challenge is to choose a tool that is appropriate to the institute's context and meets the needs of students and teachers.

In this sense, to guide the analysis, evaluation and selection of a learning management system, were initially defined the following aspects, which should bring either benefits or improvements to the academic community: (1) availability of didactic resources, (2) class planning and following up, (3) communication between teachers and students, (4) monitoring of students' academic performance during the course, (5) collaboration among students.

After identifying the basic guidelines to analyze and choose the most suitable tool, the following steps were taken: (1) diagnosis, (2) comparative analysis of learning management systems, (3) deployment, and (4) evaluation of chosen LMS. The diagnosis was initially conducted to identify main problems and demands of the institute and identify needs that the learning management system should meet. Based on the diagnosis results, a comparative analysis of learning management systems was made, in order

Table 2. Population and sample of diagnosis research

Students			
Course	**Population**	**Sample**	**Rate**
Computer Engineering	157	13	8.28%
Electrical Engineering	170	19	11.18%
Production Engineering	318	37	11.64%
Information Systems	258	41	15.89%
Total	903	110	12.18%
Teachers			
Teachers	59	19	32.20%

to select the most suitable system to meet the institute's needs. Then, the system was deployed and evaluated with a user groups composed of students and teachers.

A diagnosis was initially made to identify IEAS's current reality as well as the main needs of teachers and students. Based on the results, some LMS were analyzed. Data was collected by means of questionnaires, sent to teachers and students. The GoogleDocs platform was used to create questionnaires and manage the research, which happened in October 2012. The population and sample (response rate) are presented in Table 2.

The questionnaire was designed and organized according to the five aspects mentioned above (availability of didactic resources, class planning and following, communication between teachers and students, monitoring of students' academic performance during the course, collaboration among students). They included both open-ended questions as closed, of qualitative and quantitative nature. Thus, we identified problems related to each of these topics. Considering the results obtained, a comparative analysis of some learning management systems was made.

To make a comparative analysis of the learning management systems, their main features and resources were identified. The diagnosis outcomes helped define some criteria that were used on the comparison, such as: centralized publishing and delivering of didactic contents, synchronously and asynchronously communication, collaborative learning, and academic performance monitoring. Moreover, some case studies about the use of these tools were considered and also helped select the most suitable tool to address the needs of IEAS. All of the studied LMS are based on the LAMP (Linux, Apache, MySQL, PHP) platform. As a result, the Moodle platform was chosen to be deployed and evaluated.

After the Moodle was chosen as the platform to be used, the next step was to deploy it. An important issue before the installation and configuration was to identify hardware and software requirements (a Web server with PHP and MySQL database). It was installed and configured on a computer with the following configuration: Intel Dual core 2.8 GHz, 2 Gb RAM, 500 Gb HD. The Debian distribution of Linux operation system, with Apache Web server, PHP and MySQL were used to install the platform.

Finally, the following step was to evaluate the Moodle with a group of users. IEAS Teachers and students were invited to participate. The volunteers were organized in two groups: teachers and students. The evaluation with users was made from a brief training and use of the platform and a survey for data collecting.

During the training, both user groups were asked to perform some activities using the many resources provided by the platform. These activities were designed based on the aspects which were being investigated (availability of didactic resources, class planning and following up, communication between teachers and students, monitoring of students' academic performance during the course, collaboration among students). The group composed of students used the Moodle according to their viewpoint, performing activities such as accessing an educational resource (e.g. an article), creating an event (e.g. a test) on the calendar, sending an exercise, participating in a forum. In turn, the group composed of teachers performed activities such as planning a course, sharing teaching resources, creating educational activities (e.g. exercises and discussion forums), posting information and notices related to the course. After the training, each user group answered a questionnaire. The analyses were made considering the data collected in this step together with diagnosis outcomes. Some of the results obtained are presented in following section.

Results

This section presents the results obtained from the diagnosis. The analysis sought to identify limitations and shortcomings related to teaching activities in the institute, and to evaluate the improvements and advantages brought through the use of a learning management system as a tool to support classroom teaching. To facilitate identification, results are shown grouped and synthesized considering acceptance level, perceived benefits and improvements achieved considering the use of the Moodle platform. In addition, the results were organized and presented in accordance with the following points investigated: planning and following up of courses, provision of teaching resources, communication between teachers and students; monitoring of students performance, collaboration among students.

Planning and Following Up of Courses

Planning and following up of courses refers to the activity of planning and organizing the way a subject will be held, activities set, as well as the schedule and contents of classes. This activity is very important for teachers and students.

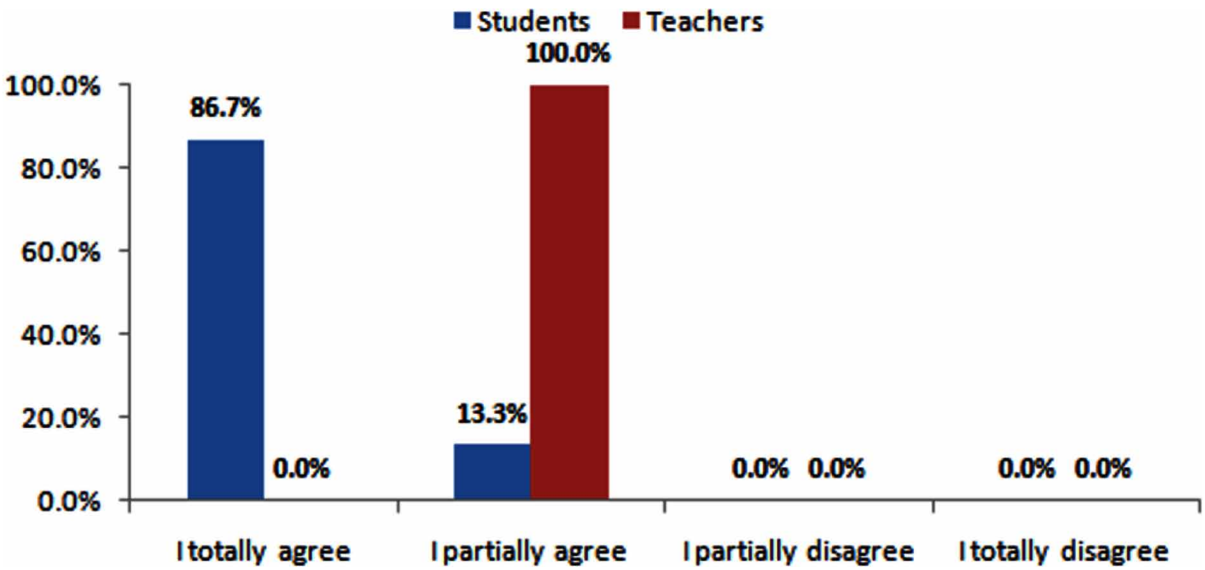
Planning lessons and activities of a course is a fundamental activity for teachers. In turn, the monitoring of lessons and activities (course schedule) is essential for students. The diagnosis identified that most teachers prepare a course plan, although a few do not. Also, it was identified that this information is often made available only in the classroom and in a non-digitalized form. Thus, it cannot be easily and remotely accessed by students. When information was digitally made available, the means used were mainly e-mail, websites and discussion groups. Teachers rarely used LMS. This variety of methods used by teachers prevents or makes it difficult for students to access and follow up on course planning. Most electronic media used had positive evaluations, showing the interest of participants in using digital media for this purpose. For good performance, it is essential that students be able to keep up with course activities effectively and efficiently.

The Moodle has many features that facilitate the planning and monitoring of lessons and activities of a course. After using it, it was possible to identify great acceptance of the tool among students and teachers. Virtually all participants agreed that the use of the platform would improve students' academic performance (Figure 1).

Availability of Didactic Resources

Availability of didactic resources refers to the provision of teaching materials such as articles, books, tutorials, documents, slideshows, that is, any support material which could be used by students during the course. Currently, most IEAS

Figure 1. The use of the Moodle platform improves efficiency in following up on courses and helps improve students' performance



teachers provide these resources, although this is not done by some of them (according to the data collected).

Investigation results indicate that the classroom is the main media used by teachers to make didactic resources available for students. Photocopies and e-mails are also frequently used, while websites and LMS are rarely used. But, in general, Web-based media were well evaluated by teachers and students with the purpose of making resources available, as shown in Figure 2.

Before the training, few people were familiar with the Moodle platform. After the training, it was possible to visualize a significant increase of positive evaluations related to the tool to make didactic resources available. Tools like e-mails and discussion groups, currently used for this purpose, were well evaluated on the diagnosis. The Moodle platform has many features that allow the management of a diverse and large volume of documents. There are tools to support teachers in storing and delivering materials, so they can be easily accessed by students. After being used, the Moodle platform was chosen as the best solution to this task (Figure 3).

Communication between Teachers and Students

Proper communication between teachers and students is critical to achieve an effective and efficient teaching-learning process. Only with facilitated communication can students clarify doubts about class contents, make questions, get advice about other learning resources, show interest and be oriented for further studies in a particular field.

The diagnosis showed that, currently, communication between students and teachers occurs mainly in the teacher's room and via e-mail. These forms of communication were well assessed. Other communication tools such as instant messages and groups are rarely used. However, after using some of the communication features offered by the Moodle, there was a positive change in how the communication means were evaluated. Due to the possibility of synchronous and asynchronous communication with teachers and with other students, the platform was very well evaluated and its use was recommended here as well.

Figure 2. Media use rates to make didactic resources available

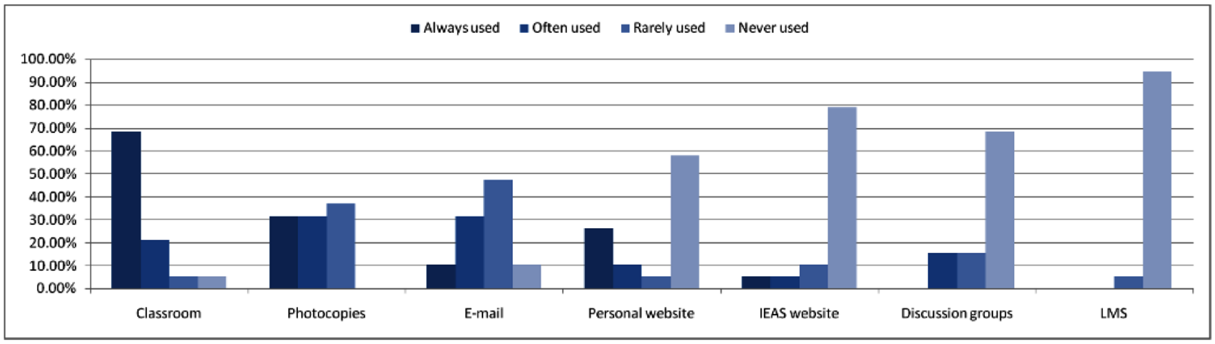
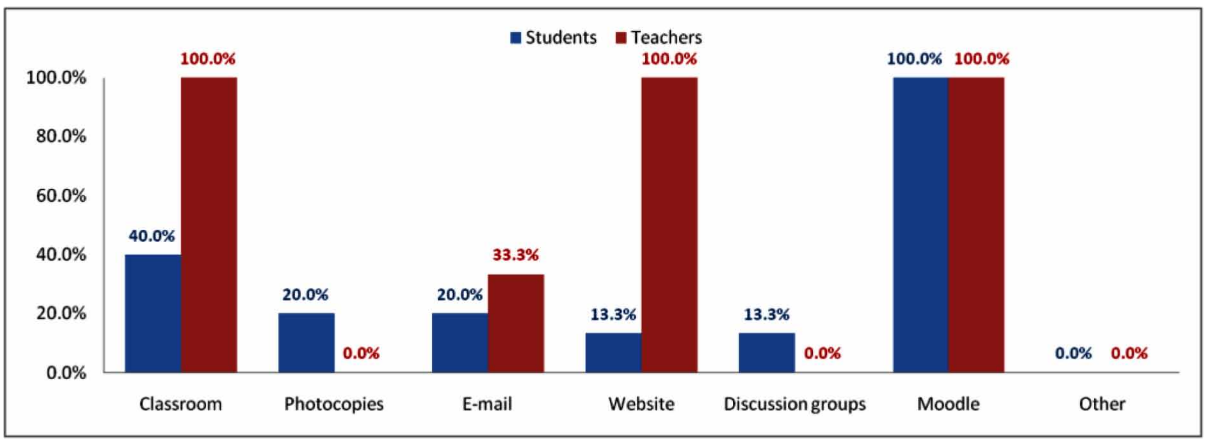


Figure 3. Media to share and make didactic resources available



Monitoring Students' Academic Performance

The assessment of students' performance during the course is based on information such as grades and attendance. Access to this information is essential to enable students to make self-assessments of their performance. As for this topic, outcomes identified some contradiction between the answers given by students and teachers in regard to the availability this kind of information and means used to make it available (Figure 4).

After the training, students and teachers recognized that the Moodle is an excellent alternative to share academic information with students, allowing them to evaluate and monitor their own performance.

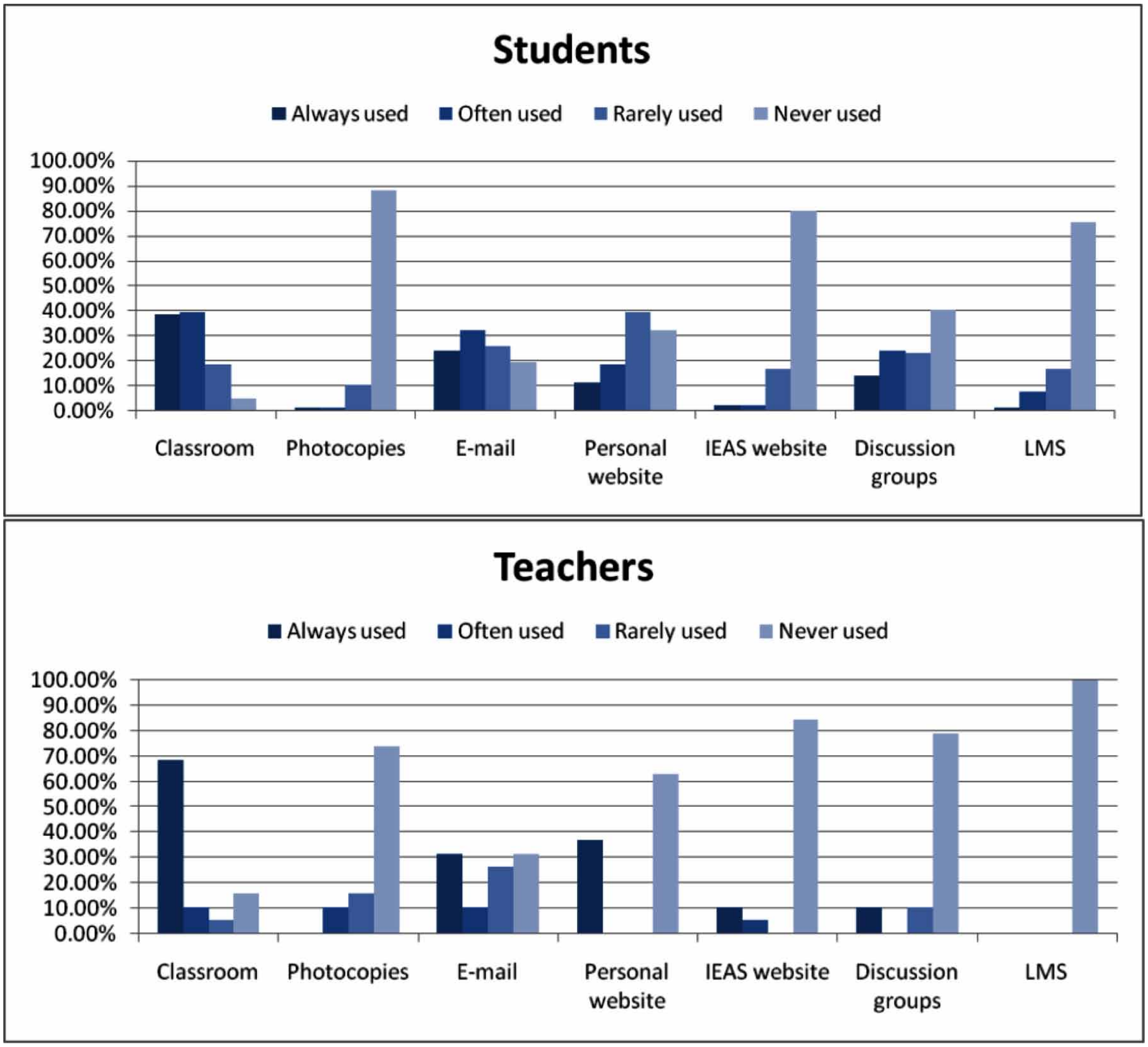
Collaboration among Students

In general, teachers do not use tools that facilitate collaboration among students. During the training, it was possible to present many resources of the Moodle which allow cooperative work and facilitate collaborative learning. Students and teachers seemed to be quite excited to use these resources.

SOLUTIONS AND RECOMMENDATIONS

The Moodle learning management system was deployed at IEAS. As described, this choice was based on the following factors: institute's needs identified in the diagnosis, comparative analysis

Figure 4. Media use rates to provide academic performance information

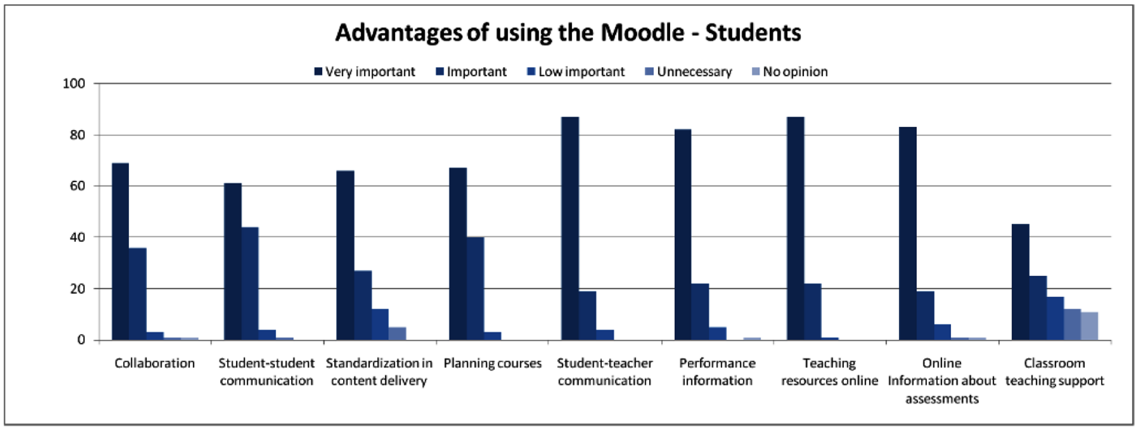


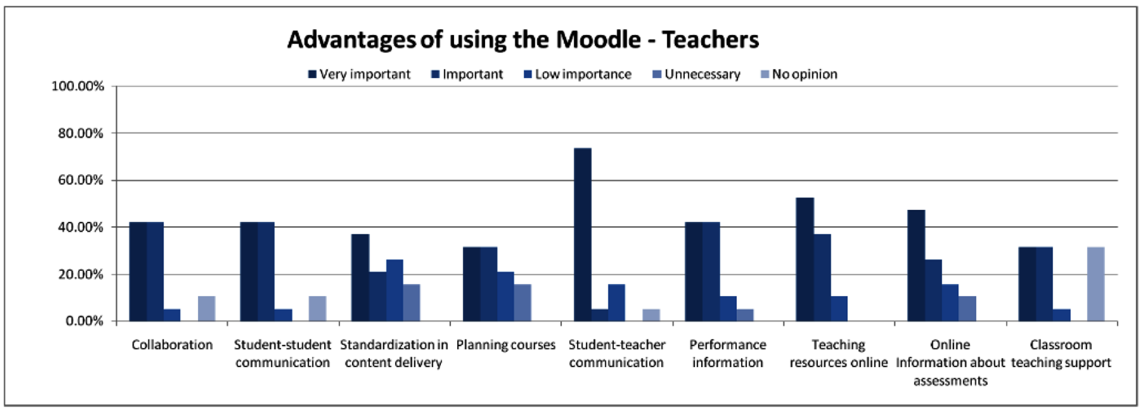
of some tools, and assessment of successful experiences.

First, it was possible to verify that only few students had knowledge or experience with learning management systems. This type of tool was rarely used by IEAS teachers. Among the systems analyzed, the Moodle stood out as the best one known. However, at the diagnosis phase, students and teachers agreed that improvements obtained by using a LMS to support classroom teaching are very important. Part of these data is shown in Figure 5.

Regarding the interest of students and teachers in adopting the LMS, in diagnosis step, most of them answered that they would like to use a system, but did not mention which one. However, after the training and evaluation steps, the Moodle was well accepted by participants. As for the Moodle's tools and resources, we also analyzed issues related to easiness of use and potential

Figure 5. Advantages of using the Moodle for students and teachers





improvements to students' performance. Most students and teachers recommended its adoption as a tool to support classroom teaching at IEAS, despite some difficulties faced by a few of them, which could be resolved with training.

These results suggest that the IEAS academic community had a great interest in using learning management systems to support classroom teaching. Also, it was possible to observe that the Moodle platform was well accepted and people were pleased to use its resources and tools. Thus, adopting the platform could bring teaching improvements, as well as improvement in the learning process for students and teachers at IEAS.

FUTURE RESEARCH DIRECTIONS

Next steps of research include an investigation about the current use of the Moodle platform at the Federal University of Ouro Preto. A set of questionnaires will be applied to collect data and measure the use of LMS to support classroom teaching and to evaluate the perceived benefits from its use. Then, a group of teachers will be selected to attend a training course on the Moodle. During this study, teachers and students will be accompanied and Moodle's use will be monitored. Thus, we will make a comparative analyzes between some subjects in which the Moodle was used versus others in which it was not.

CONCLUSION

Technological evolution and the growth of the Internet have considerably changed the teaching-learning process. A paradigm shift in education is necessary in order to improve learning. Advances in information and communication technologies have given rise to many platforms to support distance learning. Most of them can also be used to support classroom teaching. But to effectively get the possible benefits, it is essential to plan and choose the most suitable tool, considering the context in which it will be adopted. In addition, not only technological aspects should be taken into account, but also the organizational and human dimensions.

Some proposals for use learning management systems, like use them only to make available text and activities, are a simple replication of the traditional education conception to virtual environments. The learning remains centered on the teacher, the single holder of knowledge and responsible for passing it (Moran, 2003). Thus, the simple utilization of a learning management system does not means a modern teaching (Ishitani, 2009) and does not guarantee effectiveness per se (Dillenbourg et al., 2002). However, as suggested by Duhaney (2004), the use of blended learning activities should be introduced gradually - "instructors can begin the course in the traditional face-to-face environment and introduce the different strategies/techniques and technology as they become more comfortable using them and are able to determine how their use will help students achieve the learning targets" (Duhaney, 2004, p. 37). With these tools, the space extends from classroom to the virtual, the time to receive or send information expands for anytime and any day, and the communication process occurs in the classroom, on the Internet, email, chat, forum. As the relationship with time, space and communication with students are modifying, the teacher's role is changing. It is a role that combines attributions of a "conventional teacher" with others like encourage and manage research activities, stimulate and motivate students, promoting their autonomy on learning process (Moran, 2000).

Although some researchers have not found significant difference in course achievement between blended and face-to-face approaches (Tang & Byrne, 2007; Delialioglu & Yildirim, 2008), many others emphasized that the blended learning provides improvements in learning outcomes, sense of community, and satisfaction of students and teachers (Schrum et al., 2007; Amrein-Beardsley et al., 2007; Smith, 2005; Lonn & Teasley, 2009; López-Pérez et al., 2011; Garrison & Kanuka, 2004; Rovai & Jordan, 2004; Collopy & Arnold, 2009; Wingard, 2004). There are many reasons for using blended learning, such as: improves pedagogical richness, increases access/flexibility, favors access to knowledge, promotes social interactions (Graham et al., 2003; Osguthorpe & Graham, 2003). Although the learning environment is changed, the way that students learn does not change (Uzun & Senturk, 2010). While technology can be strategically used to deliver instructional content, the focus should be on the instructional uses rather than the technology itself (Pang, 2009).

This chapter presented the adoption of a learning management system to support classroom learning at the Institute of Exact and Applied Science of a Brazilian university. Based on the results, it was possible to observe that using the Moodle platform will benefit the teaching-learning process in several ways. Once the main immediate advantages of the use of the Moodle were identified, the next stage of the project is to evaluate the use of the platform in some courses over a one-year period. This will produce richer results in relation to the human and organizational dimensions.

REFERENCES

Aberdour, M. (2007). *Open source learning management systems*. Epic whitepaper.

Adão, C., & Bernardino, J. (2003). Blended-learning no ensino de engenharia: Um caso prático. In *Proceedings III Conferência Internacional de Tecnologias de Informação e Comunicação na Educação* (pp. 1-14). Academic Press.

Almeida, M. E. B. (2003). Educacão a distância na Internet: Abordagens e contribuições dos ambientes digitais de aprendizagem. *Educação e Pesquisa*, *29*(2), 327–340.

Amrein-Beardsley, A., Foulger, T. S., & Toth, M. (2007). Examining the development of a hybrid degree program: Using student and instructor data to inform decision-making. *Journal of Research on Technology in Education*, *39*, 331–357.

Anderson, R. E. (2008). Implications of the information and knowledge society for education. In *International handbook of information technology in primary and secondary education* (pp. 5–22). New York: Springer. doi:10.1007/978-0-387-73315-9_1

Andrews, R., & Haythornthwaite, C. (Eds.). (2007). *The Sage handbook of e-learning research*. Thousand Oaks, CA: Sage.

Aydin, C. C., & Tirkes, G. (2010). Open source learning management systems in distance learning. *TOJET, 9*(2).

Batista, J., & Cleidson, E. (2010). Avaliação da utilização do Moodle no IESAM. *Sistemas de Informação & Gestão de Tecnologia, 4*.

Behens, M. A. (2006). Projetos de aprendizagem colaborativa num paradigma emergente. In *Novas tecnologias e mediação pedagógica* (pp. 67–113). Campinas, Spain: Editora Papirus.

Belal, A. R. (2011). Students' perceptions of computer assisted learning: An empirical study. *International Journal of Management in Education*, *5*, 63–78. doi:10.1504/IJMIE.2011.037755

Belloni, M. L. (2002). *Educação à distância*. Campinas, Spain: Editora Autores Associados.

Bonk, C. J., & Graham, C. R. (2012). *The handbook of blended learning: Global perspectives, local designs*. Hoboken, NJ: Wiley.

Bri, D., García, M., Coll, H., & Lloret, J. (2009). A study of virtual learning environments. *WSEAS Transactions on Advances in Engineering Education*, *1*(6), 33–43.

Brugger, G. R., Costa, J. W., Franqueira, T. C., & Ishitani, L. (2005). Um ambiente de apoio ao ensino presencial. In *Proceedings XIII Workshop sobre Educação em Computação* (pp. 2363-2370). São Leopoldo, Brasil: Academic Press.

Cardoso, G., & Castells, M. (2006). *A sociedade em rede – Do conhecimento à acção política*.

Castells, M. (1997). An introduction to the information age. *City*, *2*(7), 6–16. doi:10.1080/13604819708900050

Castells, M. (1999). A sociedade em rede: Vol. 1. *A era da informação: Economia, sociedade e cultura*. São Paulo: Paz e Terra.

Clarke, T., & Clarke, E. (2009). Born digital? Pedagogy and computer-assisted learning. *Education + Training, 51*(5/6), 395 - 407.

Collopy, R., & Arnold, J. M. (2009). To blend or not to blend: Online and blended learning environments in undergraduate teacher education. *Issues in Teacher Education*, *18*(2), 85–101.

Delialioglu, O., & Yildirim, Z. (2008). Design and development of a technology enhanced hybrid instruction based on MOLTA model: Its effectiveness in comparison to traditional instruction. *Computers & Education*, *51*, 474–483. doi:10.1016/j.compedu.2007.06.006

Dias, P. (2004). Desenvolvimento de objetos de aprendizagem para plataformas colaborativas. In *Proceedings VII Congresso Iberoamericano de Informática Educativa* (pp. 3-12). Monterrey, México: Academic Press.

Dillenbourg, P., Schneider, D. K., & Synteta, P. (2002). Virtual learning environments. In A. Dimitracopoulou (Ed.), *Proceedings of the 3rd Hellenic Conference Information & Communication Technologies in Education* (pp. 3-18). Kastaniotis Ed.s.

Duderstadt, J. J. (1997). The future of the university in an age of knowledge. *Journal of Asynchronous Learning Networks*, *1*(2), 78–88.

Duhaney, D. C. (2004). Blended learning in education, training, and development. *Performance Improvement*, *43*(8), 35–38. doi:10.1002/pfi.4140430810

Ecalle, J., Kleinsz, N., & Magnan, A. (2013). Computer-assisted learning in young poor readers: The effect of grapho-syllabic training on the development of word reading and reading comprehension. *Computers in Human Behavior*, *4*(29), 1368–1376. doi:10.1016/j.chb.2013.01.041

Fagundes, L. C., Sato, L. S., & Maçada, D. L. (1999). *Aprendizes do futuro: As inovações começaram: Coleção informática para a mudança na educação*. Brasília: Estação Palavra.

Fertalj, K., Jerkovic, H., & Hlupic, N. (2006). Comparison of e-learning management systems. *WSEAS Transactions on Advances in Engineering Education*, *3*(9), 795.

Franco, M. A., Cordeiro, L. M., & Castillo, R. A. F. (2003). O ambiente virtual de aprendizagem e sua incorporação na unicamp. *Educação e Pesquisa*, *2*(29), 341–353.

Fucks, H. (2000). Aprendizagem e trabalho cooperativo no ambiente aulanet. *Revista Brasileira de Informática na Educação*, *6*, 53–74.

Gabardo, P., Quevedo, S. R. P., Ulbricht, V. R., & em Geral, E. C. (2010). *Estudo comparativo das plataformas de ensino-aprendizagem*. Encontros Bibli, UFSC, Florianopolis.

Garrison, D. R., & Kanuka, H. (2004). Blended learning: Uncovering its transformative potential in higher education. *The Internet and Higher Education*, *7*(2), 95–105. doi:10.1016/j.iheduc.2004.02.001

Georgiakakis, P., Papasalouros, A., Retalis, S., Siassiakos, K., & Papaspyrou, N. (2005). Evaluating the usability of web-based learning management systems. *Themes in Education*, *6*(1), 45–59.

Gomes, M. J. (2005). E-learning: Reflexões em torno do conceito. In P. Dias & V. de Freitas (Eds.), *Actas da IV Conferência Internacional de Tecnologias de Informação e Comunicação na Educação – Challenges'05*. Braga: Centro de Competência da Universidade do Minho.

Graf, S., & List, B. (2005). An evaluation of open source e-learning platforms stressing adaptation issues. In *Proceedings of the 5th IEEE International Conference on Advanced Learning Technologies* (ICALT'05). IEEE Press.

Graham, C. R. (2006). Blended learning systems: Definition, current trends, and future directions. In C. J. Bonk & C. R. Graham (Eds.), *The handbook of blended learning: Global perspectives, local designs*. Pfeiffer.

Graham, C. R., Allen, S., & Ure, D. (2003). *Blended learning environments: A review of the research literature*. Unpublished manuscript.

Hewagamage, K. P., Premaratne, S. C., & Peiris, K. H. R. A. (2007, August). Design and development of blended learning through LMS. In *Proceedings of Workshop on Blended Learning*. Edinburgh, UK: Blended Learning.

Huang, T.-H., Liu, Y.-C., & Chang, H.-C. (2012). Learning Achievement in Solving Word-Based Mathematical Questions through a Computer-Assisted Learning System. *Journal of Educational Technology & Society*, *15*(1), 248–259.

Hussain, S., Wang, Z., & Sun, C. A. (2011, October). A comparative study of open-source learning management systems. In Open-Source Software for Scientific Computation (OSSC), 2011 International Workshop on (pp. 86-93). IEEE.

Ishitani, L. (2009). Aprendizagem colaborativa no ensino presencial: TICs ajudam ou atrapalham? In *Proceedings of Workshop sobre Educação em Computação* (WEI). Anais do XXIX CSBC.

Ishitani, L., Guimarães, S. J., & Bruegger, G. (2006). A collaborative learning approach and its evaluation. In *Education for the 21st century—Impact of ICT and digital resources*. Berlin: Springer. doi:10.1007/978-0-387-34731-8_40

Kahiigi, E., Ekenberg, L., & Hansson, M. (2007). Exploring the e-learning state of art. In *Proceedings of Conference on E-Learning*. Academic Conferences Limited.

Kalet, A. L., Song, H. S., Sarpel, U., Schwartz, R., Brenner, J., Ark, T. K., & Plass, J. (2012). Just enough, but not too much interactivity leads to better clinical skills performance after a computer assisted learning module. *Medical Teacher*, *34*(10), 833–839. doi:10.3109/0142159X.2012.706727 PMID:22917265

Kalogiankis, M. A. (2004). Virtual learning environment for the france physics teachers. *Education and Information Technologies*, *9*(4), 345–353. doi:10.1023/B:EAIT.0000045292.59105.a2

Keegan, D. (1996). *Foundations of distance education*. New York: Psychology Press.

Kim, W. (2007). Towards a definition and methodology for blended learning. In *Proceedings of Workshop on Blended Learning* (pp. 1-8). Academic Press.

Lai, F., Zhang, L., Hu, X., Qu, Q., Shi, Y., Qiao, Y., & Rozelle, S. (2013). Computer assisted learning as extracurricular tutor? Evidence from a randomised experiment in rural boarding schools in Shaanxi. *Journal of Development Effectiveness*, *5*(2), 208–231. doi:10.1080/19439342.2013.780089

Laurillard, D., Oliver, M., Wasson, B., & Hoppe, U. (2009). Implementing technology-enhanced learning. In *Technology-enhanced learning* (pp. 289–306). Dordrecht, The Netherlands: Springer. doi:10.1007/978-1-4020-9827-7_17

Lê, T. (2002). Collaborate to learn and learn to collaborate. In *Proceedings of the Seventh World Conference on Computers in Education* (pp. 67-70). Australian Computer Society.

Lévy, P. (2003). O que é o virtual?. *Editora, 34*.

Lonn, S., & Teasley, S. D. (2009). Saving time or innovating practice: Investigating perceptions and uses of learning management systems. *Computers & Education*, *53*(3), 686–694. doi:10.1016/j.compedu.2009.04.008

López-Pérez, M., Pérez-López, M. C., & Rodríguez-Ariza, L. (2011). Blended learning in higher education: Students' perceptions and their relation to outcomes. *Computers & Education*, *56*(3), 818–826. doi:10.1016/j.compedu.2010.10.023

Martín-Blas, T., & Serrano-Fernández, A. (2009). The role of new technologies in the learning process: Moodle as a teaching tool in physics. *Computers & Education*, *52*(1), 35–44. doi:10.1016/j.compedu.2008.06.005

Millde-Luthander, C., Högberg, U., Nyström, M. E., Pettersson, H., Wiklund, I., & Grunewald, C. (2012). The impact of a computer assisted learning programme on the ability to interpret cardiotochography: A before and after study. *Sexual & Reproductive Healthcare*, *3*, 37–41. doi:10.1016/j.srhc.2011.10.001 PMID:22325800

Mills, K. L. (2003). Computer-supported co-operative work. In *Encyclopedia of library and information science*. Academic Press.

Moore, J. L., Dickson-Deane, C., & Galyen, K. (2011). e-Learning, online learning, and distance learning environments: Are they the same? *The Internet and Higher Education*, *14*(2), 129–135. doi:10.1016/j.iheduc.2010.10.001

Moore, M. G. (Ed.). (2013). *Handbook of distance education* (3rd ed.). New York: Routledge.

Morais, N. S., & Cabrita, I. (2007). Ambientes virtuais de aprendizagem no ensino superior: Comunicação (as)síncrona e interacção. In *Proceedings of IX Simpósio Internacional de Informática Educativa*. Academic Press.

Moran, J. M. (2000). Ensino e aprendizagem inovadores com tecnologias. *Informática na Educação: Teoria & Prática, 3*(1).

Moran, J. M. (2003). Contribuições para uma pedagogia da educação on-line. In *Educação on-line: Teorias, práticas, legislação, formação corporativa* (pp. 39–50). São Paulo: Editora Loyola.

Moran, J. M. (2007). Ensino e aprendizagem inovadores com tecnologias audiovisuais e telemáticas. In *Novas tecnologias e mediação pedagógica* (pp. 11–67). Campinas, Spain: Editora Papirus.

Mortera-Gutiérrez, F. (2006). Faculty best practices using blended learning in e-learning and face-to-face instruction. *International Journal on E-Learning*, *5*(3), 313–337.

Neto, S. C., & Takaoka, H. (2008). Visão sistêmica para a implantação de ambientes virtuais de aprendizagem. In *Proceedings IV Congresso Brasileiro de Sistemas*. Franca, Spain: Academic Press.

Osguthorpe, T. R., & Graham, R. C. (2003). Blended learning environments. *Quarterly Review of Distance Education*, *4*(3), 227–233.

Ozdamli, F. (2007). *An evaluation of open source learning management systems according to administration tools and curriculum design*. Paper presented at the Seventh International Educational Technology (IETC) Conference. Nicosia, Turkish Republic of Northern Cyprus.

Pang, K. (2009). Instructional design strategies for effective blended learning. *Journal of Interactive Instruction Development*, *20*(4), 3–8.

Paulsen, M. F. (2002). *Online education systems: Discussion and definition of terms*. NKI Distance Education.

Pereira, A. C. (2007). *Ambientes virtuais de aprendizagem em diferentes contextos*. Rio de Janeiro: Editora Ciência Moderna.

Picciano, A. G., & Dziuban, C. D. (Eds.). (2007). *Blended learning: Research perspectives*. Sloan-C.

Plomp, T. (2013). Preparing education for the information society: The need for new knowledge and skills. *International Journal of Social Media and Interactive Learning Environments*, *1*(1), 3–18. doi:10.1504/IJSMILE.2013.051651

Rosenberg, M. J. (2002). *E-learning - Estratégias para a transmissão do conhecimento na era digital*. São Paulo: Makron Books.

Rovai, A. P., & Jordan, H. (2004). Blended learning and sense of community: A comparative analysis with traditional and fully online graduate courses. *International Review of Research in Open and Distance Learning*, *5*(2).

Santos, M. R., Vaz, M., Braga, S. S., Jr., Ramos, A. L., Alonso, N., Jr., Dirceu, S., & Fanchin, M. (2010). A educação à distância como estratégia educacional nas organizações. In *Proceedings VII Simpósio de Excelência em Gestão e Tecnologia*. Resende,– Brasil: Academic Press.

Schifferdecker, K. E., Berman, N. B., Fall, L. H., & Fischer, M. R. (2012). Adoption of computer-assisted learning in medical education: The educators' perspective. *Medical Education*, *46*(11), 1063–1073. doi:10.1111/j.1365-2923.2012.04350.x PMID:23078683

Schittek, M., Mattheos, N., Lyon, H. C., & Attström, R. (2001). Computer assisted learning: A review. *European Journal of Dental Education*, *5*(3), 93–100. doi:10.1034/j.1600-0579.2001.050301.x PMID:11520331

Schlosser, L. A., & Simonson, M. R. (2009). *Distance education: Definitions and glossary of terms*. IAP-Information Age Publishing.

Schrum, L., Burbank, M. D., & Capps, R. (2007). Preparing future teachers for diverse schools in an online learning. *The Internet and Higher Education*, *10*(3), 204–211. doi:10.1016/j.iheduc.2007.06.002

Sharma, P. (2010). Blended learning. *ELT Journal*, *64*(4), 456–458. doi:10.1093/elt/ccq043

Shaw, G., & Marlow, N. (1999). The role of student learning styles, gender, attitudes and perceptions on information and communication technology assisted learning. *Computers & Education*, *4*(33), 223–234. doi:10.1016/S0360-1315(99)00020-2

Silva, S. V., Lopes, A. M., & Ribeiro, L. S. (2008). Reforço ao ensino presencial utilizando o ambiente colaborativo de aprendizagem moodle no curso de engenharia de produção do ISECENSA. *Revista Perspectivas On-Line, 5*.

Smith, S. (2005). The positive and challenging aspects of learning online and in traditional face-to-face classrooms: A student perspective. *Journal of Special Education Technology*, (20): 52–59.

Stahl, G., Koschmann, T., & Suthers, D. (2006). Computer-supported collaborative learning: An historical perspective. In *Cambridge handbook of the learning sciences*. Cambridge, UK: Cambridge University Press.

Suri, H., & Schuhmacher, M. (2008). Open-source vs. proprietary VLE: An exploratory study of staff perceptions. In *Hello! Where are you in the landscape of education technology?* Melbourne, Australia: Ascilite.

Takahashi, T. (2000). *Sociedade da informação no Brasil: Livro verde*. Ministério da Ciência e Tecnologia.

Tang, M., & Byrne, R. (2007). Regular versus online versus blended: A qualitative description of the advantages of the electronic modes and a qualitative evaluation. *International Journal on E-Learning*, *6*(2), 257–266.

Tsai, S., & Machado, P. (2002). E-learning basics: Essay. *ELearn Magazine,* (7), 3.

Uzun, A., & Senturk, A. (2010). Blending makes the difference: Comparison of blended and traditional instruction on students' performance and attitudes in computer literacy. *Contemporary Educational Technology*, *1*(3), 196–207.

Uzunboylu, H., Ozdamli, F., & Ozcinar, Z. (2006). An evaluation of open source learning management systems according to learners tools. *Current Developments in Technology-Assisted Education*, *1*, 8–11.

Valente, J. A. (1995). Diferentes usos do computador na educação. In *Computadores e conhecimento: Repensando a educação*. Campinas, Spain: NIED-Unicamp.

Valentini, C., & Soares, E. (2010). Fluxos de interação: Uma experiência com ambiente de aprendizagem na web. In Aprendizagem em ambientes virtuais: Compartilhando idéias e construindo cenários (pp. 77-86). Caxias do Sul: Editora EDUCS.

Veneri, D. (2011). The role and effectiveness of computer-assisted learning in physical therapy education: A systematic review. *Physiotherapy Theory and Practice*, *27*(4), 287–298. doi:10.3109/09593985.2010.493192 PMID:20690881

Vieira, F. M. S. (1999). *A utilização das novas tecnologias na educação numa perspectiva construtivista*. Retrieved from www.proinfo.mec.gov.br/upload/biblioteca/191.pdf

Wang, F. L., Fong, J., & Choy, M. (2007). Blended learning for programming courses: A case study of outcome based teaching & learning. In *Proceedings of Workshop on Blended Learning*. Academic Press.

Weller, M. (2007). *Virtual learning environments: Using, choosing and developing your VLE*. New York: Routledge.

Williamson, B. (2013). *The future of the curriculum: School knowledge in the digital age*. Cambridge, MA: The MIT Press. doi:10.1057/9781137031983.0006

Wingard, R. G. (2004). Classroom teaching changes in web-enhanced courses: A multi-institutional study. *EDUCAUSE Quarterly*, *27*(1), 26–35.

Yunoki, B. T. (2009). *Utilização do Moodle como ambiente de apoio ao ensino presencial: estudo de caso do curso de Biblioteconomia da Universidade de Brasília*.

Zhang, D., & Nunamaker, J. F. (2003). Powering e-learning in the new millennium: An overview of e-learning and enabling technology. *Information Systems Frontiers*, *5*(2), 207–218. doi:10.1023/A:1022609809036

This work was previously published in Multicultural Awareness and Technology in Higher Education edited by Tomayess Issa, Pedro Isaias, and Piet Kommers, pages 176-196, copyright year 2014 by Information Science Reference (an imprint of IGI Global).

Chapter 20

Blogs in Teacher Education:
Knowledge Sharing among Pre-Service Teachers on a Group Course Blog

Peggy Semingson
The University of Texas – Arlington, USA

ABSTRACT

This chapter examines the content of written blog postings of students enrolled in a face-to-face course focusing on literacy assessment methods and practice for Pre-Service Teachers (PST) seeking elementary teaching certification. The purpose of the study was to examine the transcription of the students' postings and Computer-Mediated Communication (CMC) to look for the three types of elements that comprise the Community of Inquiry according to Garrison, Anderson, and Archer (2001) as well as the examination of broader themes and trends across the data (Corbin & Strauss, 1990). Data included blog posts from a 15-week semester with a total of 702 combined posts and comments from a total of 40 undergraduate students. Data were analyzed using the constant-comparative method (Strauss & Corbin, 1990) and the framework of the Community of Inquiry Model (Garrison & Arbaugh, 2007). Students engaged in various levels of cognitive stages of inquiry while also building on and developing social presence throughout the course. Teacher presence also guided the social construction of knowledge throughout the course. Examination of the teacher presence suggests that the instructor needed to provide more scaffolding in modeling evidence-based practice and problem-solving on the blog as students did not always connect their practice to evidence-based or text-based support.

INTRODUCTION

An ongoing challenge for instructors is finding the best ways of using emerging technologies and tools without the benefit of robust research that what we are doing clearly benefits our students' learning and engagement. One technology tool that can be used in blended learning contexts (as well as online-only contexts) is that of the communal or shared weblog (blog) where the entire class of students can regularly post reflections, receive feedback that is visible to all, and share resources with peers. A blog is akin to an online diary and offers students a shared computer-mediated communication (CMC) space for group knowledge sharing and dialogue. In the case study described

DOI: 10.4018/978-1-4666-8246-7.ch020

in this chapter, I share how forty undergraduate students participated in a group blog in conjunction with a face-to-face undergraduate literacy course designed for pre-service teacher candidates.

The overall purpose of the qualitative exploratory study was to examine the transcription of the students' postings and computer-mediated-communication (CMC) across the semester to look for the three types of elements that comprise a "community of inquiry" according to Garrison, Anderson, and Archer (2000; 2001) as well as to examine the primary research question: *How did the communal blog function to support a "blended learning" context where learning primarily took place in a face-to-face setting?* The study examines the content of the written blogging postings of a class of students who were enrolled in a pre-service course focusing on literacy assessment methods and practice.

The undergraduate students communicated with each other within the digital blogging community and were guided by semi-structured professor-designed prompts, multi-modal supplemental readings (such as YouTube videos and podcasts) . Students were provided guidelines and a simple rubric for the blogging assignment. They posted blog commentary across the course of a full-length semester in spring, 2009. Through the blogging assignment and process, students made connections to key ideas in the course content, actively participated in an online community (within a face-to-face course), and developed their skills with digital writing and learning. The blog topics focused on their present understanding of course content as well as their goals in their case study and future teaching. The group blog served as a knowledge sharing tool towards building a community of practice (Lave & Wenger, 1991) as well as an assessment tool for participation and engagement with the course content and readings. The blog was also a way for students in a teacher education course to participate in new digital literacy practices (as described by Leu, Kinzer, Coiro, & Cammack, 2005) by reading and writing in an online-only format. This idea of group blogging in a face-to-face or blended teaching setting would be of interest to anyone teaching a face-to-face class where students share knowledge as it is being applied to specific teaching contexts or scenarios. The blogging experience would also be of broad interest to anyone looking to explore or improve their practice in the area of blended learning, broadly defined.

BACKGROUND

Community of Inquiry and Blended Learning

This research draws upon a sociocultural framework which emphasizes that learning is based on apprenticeship and teaching occurs as a result of the co-construction of knowledge in shared communities of practice (Rogoff, 1990; Vygotsky, 1962). I also draw on models of knowledge sharing and theories of tacit knowledge (e.g. Polanyi, 2009) to examine the complex ways that students supported one another in the blog space with the absence of the course instructor on the blog postings.

Within such a sociocultural framework, I specifically focus on the Community of Inquiry framework developed broadly by Garrison, Archer, and colleagues (especially Garrison & Arbaugh, 2007). In applications to online learning, this framework delineates three crucial but inter-related categories in designing and analyzing computer-mediated communication. The three types of elements that make up a Community of Inquiry according to Garrison, Anderson, and Archer (2000) include the teacher presence, cognitive presnce, and the social presence. Teacher presence is facilitated by the up-front design of the course or online experience, direct instruction by the teacher, and use of facilitating discourse (Garrison, Anderson, & Archer, 2000). Cognitive presence, for instance, includes problem-solving, application of knowledge, and attempts to solve the problem or problems; Social presence is characterized by online collaboration and expressiveness (Garrison, Anderson, & Archer, 2000).

Additionally, I draw on a broad definition of blended learning that captures the use of both online learning in conjunction with a face-to-face course setting. Blended learning can be hard to define but is generally thought of as a combination of both face-to-face teaching and online instruction to varying degrees; Picciano (2009) suggests the problem of the hard-to-define concept of "blended learning":

There is no generally accepted definition of blended learning. There are many forms of blended learning but a generally accepted taxonomy does not exist. One school's blended is another school's hybrid, or another school's mixed-mode. (p. 8).

Finally, blended learning has the potential to engage students. Garrison and Vaughan (2008) also suggest that blended learning is an active learning technique as opposed to lecture-style classes.

Distributed Cognition and Tacit Knowledge

This study is also informed by theoretical concepts from educational psychology such as distributed learning, or learning shared across groups beyond the individual's own understanding (e.g., Salomon, 1993) as well as a framework of tacit knowledge; tacit knowledge is shared through interpersonal experience (e.g., Polanyi, 2009) as well as the experience of others. Salomon (1993), in describing the types of thinking and information shared by interacting groups of people states, "People think in conjunction and partnership with others and with the help of culturally provided tools and implements." (Salomon, 1993, p. xiii)

Blogging as Blended Learning

Although there have been mixed outcomes for use of blogging with pre-service teachers as a tool for facilitating student reflection (Hungerford-Kresser, Wiggins, & Amaro, 2011; So & Brush, 2008; Top, 2011), there have been few studies on the ways that students who are novices in a practice (such as education) interact with one another to share distributed knowledge about literacy learning in a shared communal blog space. Additionally, digital knowledge sharing among students of a younger age demographic possibly has a higher level of appeal to "digital natives" who are accustomed to digital engagement in their learning (Prensky, 2001); such a practice is needed to stay current with the demographic of younger teachers within traditional teacher education programs.

METHOD

Context of the Study and Description of the Blog

The instructor of this course taught the Literacy Assessment course in spring, 2009 at a large, public university in a large urban city in the Southwest United States. The course is foundational and a required course for all teacher candidates enrolled in the elementary certification program. In conjunction with regular face-to-face settings, students also participated in required blog postings to a group course blog. The literacy course focused on furthering declarative knowledge (Snow, Griffin, & Burns, 2005), or general background knowledge related to classroom-based literacy assessment tools they will encounter in their future classroom. All students in the course were teacher candidates seeking elementary teaching certification at the university. As a required part of the course, students applied their knowledge of the course content by completing a "case study" where they assessed a child and tutored the child in areas of academic needs in reading and writing. The case study assignment began in earnest around the mid-way part of the course. At the beginning of the semester, student blog prompts designed by the instructor were based on more theoretical and conceptual understandings of the course content. However, around early March of the spring semester, students began the application component of the case study assignment and the course learning outcomes. Blog posts from March on reflected this transition towards more of an application of course content.

The instructor implemented blogging and the shared course blog as an alternative to the traditional "reflective journals" that are typically not shared in a public forum. In using interactive technologies such as blogging combined with viewing of multi-modal learning resources such as embedded videos (via YouTube) and podcasting, students engaged in a shared "community of practice" (Lave & Wenger, 1991) centered around lesson plan design and application of a case study assignment and teaching scenarios.

Data Sources

A total of 40 pre-service teacher candidates seeking initial elementary teaching certification (specifically, early childhood through 4th grade certification focus) were enrolled in the course. There were 37 females and 3 male students in the class who participated in the blog postings related to the course. The students were expected to compose and post an initial blog post as well as one to two follow-up comments on other students' initial posts. At the beginning of the course, students were required by the instructor to complete ten original posts (with follow-up replies to peers) over the course of the semester, permitting student choice in which topics they would choose to participate in. However, due to the instructor's realization mid-course that the amount of blogging may have been too much, the number of total posts required was scaled back to eight required posts over the course of the semester. The overall frequency of posts by week is listed below in Table 1 along with the weekly blog post topics. The frequency of comments includes both the student's initial post as well as any follow-up replies to peers. A total of 702 posts and comments were shared across the semester.

Table 1. List of weekly blog prompts designed to facilitate sharing and dialogue

Week	Frequency of Total Post and Comments	Topic
1	70	Welcome to [Name of Course]-Spring 2009!
2	60	Week 2: Major Concepts in Literacy Assessment
3	64	Topic for Feb. 10: Assessing Emergent Literacy
4	52	February 10: Choice Topic(s)!
5	49	Feb. 17: Choice topics again
6	49	Feb. 24: IRI's & Fluency
7	62	March 3: Word study
8	57	March 10: Resources for Case Study Success
9	51	Thoughts on ideas for case study part two-"Success stories"
10	60	March 24: Continue to share resources for your case study
11	53	Reader Response in the Classroom
12	24	April 7: Motivation
13	20	April 14: Videos on Word Study
14	13	Authentic Assessment
15	18	April 28:"Lessons Learned"

Data Analyses

Data were coded using the constant-comparative method (Straus & Corbin, 1990) and by using NVIVO 10 qualitative software. The course instructor (myself) also kept a reflexive journal during the course and used analytical memos (Miles & Huberman, 1994) while reading and rereading the blog posts for emerging themes and trends. To look at teacher presence, I examined the nature of blog post topics and the impact they had on the nature of the discussion generated by students. To examine social presence and cognitive presence, I examined the nature of the discussion that generated both socially-oriented talk as well as cognitive problem-solving discussion. My own reactions to the blogging experience and "lessons learned" were recorded in both memos and the reflexive journal (Miles & Huberman, 1994).

RESULTS

I report here the emerging themes across the blog posts as they relate to the three types of presence in the course from the Community of Inquiry Framework (Garrison, Anderson, & Archer, 2000; 2001; Garrison & Arbaugh, 2007): teacher presence, social presence, and cognitive presence. The data analyses suggest that through asynchronous discussion in a blended learning environment students engaged in various levels of cognitive stages of inquiry while also building on and developing social presence throughout the course. Teacher presence (e.g., design of the blog, guidance towards knowledge and information sharing, and resource sharing) also guided the social construction of knowledge throughout the course. Blog use by students represented both positive and productive reasons for its use as well as constraints or disadvantages.

Prominent themes arose from analyses of the data (blog posts) in looking for social and cognitive presence (Garrison & Arbaugh, 2007). Students specifically engaged in problem-solving by sharing information they found that would support another student's "plea for help". Students largely shared their specific case study scenarios and asked peers directly for ideas for helping, fostering a community of practice (Lave & Wenger, 1991). Additionally, students often drew on their own narratives and life experiences when engaging in problem-solving, for instance, by relating course concepts to their own schema or background information.

Students worked collaboratively online to design and present their lesson ideas for their case studies, even though they ultimately implemented them individually. Critical conversations that helped students to authentically reflect and evaluate their own work asynchronously through online comments and conversations fostered active learning and critical thinking. Overall, problematic areas for the course blog included students' general over-reliance on their own personal autobiographies and over-use of vignettes from their own lives; these constraints within this case study will be explored and discussed. One area of concern was that across all blog posts, few students connected their instructional decisions and thinking back to the course readings. Many of their discussions focused on connections to personal vignettes and experiences as opposed to more evidence-based practice.

Teacher Presence in the Course Blog

The teacher presence (Garrison & Arbaugh, 2007) primarily consisted of the initial course design and the creation of the blog topics and prompts. Teacher presence (e.g., design of the asynchronous discussion board and video content, guidance towards knowledge and information sharing, and resource sharing as described and defined by Garrison & Arbaugh, 2007) also guided the social construction of knowledge throughout the course. The instructor, in general, did not actively participate in the course blog and this may have hindered more in-depth cognitive problem-solving. Initially, students seemed overwhelmed with the assignment of weekly blog posting. An excerpt from a researcher memo is below and indicates this notion that there was too much instructor input in the initial blog prompts and the tasks required of students in their blog posts:

When I look back at the beginning of my first earnest attempt at designing a blog, I realize I frontloaded them with too much information. It would have been better if I had designed this so that some of this information was set up as resources. (Researcher Memo, 09/12/09)

Additionally, beyond creating the structure of the blog, I realized that I had not provided an exemplar blog posting or criteria for what constituted an effective blog post. The teacher-provided rubric for the student's blog posts was limited to the specificity of length and deadlines. An instructor memo identified this idea:

I should have provided more guidance, perhaps, in posing a scenario or question that raised the level of reflection to a more distinct cognitive goal and a shared/constructivist problem-solving scenario. However, at the beginning of a course what could a teacher assume as baseline understanding of the topic? (Researcher Memo, 09/12/09)

Overall, the teacher presence (Garrison & Arbaugh, 2007) facilitated discussion and connection of course content to the course applications, for instance, in encouraging students to share information that would help others relating to the more applied case study assignment. However, overall, as noted in the next section, students primarily focused on more "real-world" knowledge sharing as opposed to connecting their application of learning to specific course readings.

Finally, a key element of the design of the blog was that each blog prompt allowed for students to have choices as to which topics they chose to post about. The Appendix shares an example of a blog prompt that was designed by the instructor to facilitate a semi-structured online conversation by students. It was also intended to provide additional multi-media and input for students such as links to audio podcasts, links to resources on a variety of course-related topics, and more resources beyond the course readings. The intent of such multi-modality was to provide engaging yet research-based resources that would also inspire students to locate their own online resources and links to share with their peers on the blog.

Cognitive Presence in the Course: Distributed Knowledge Sharing

Five prominent sub-themes arose from analyses of the data (blog posts) in looking for cognitive presence (Garrison & Arbaugh, 2007): 1) Students applied learning and course content outside of class and reported the results of their applications on the course blog; 2) Students contextualized their understanding of course concepts to specific instances in their "real world" observations or experiences resulting in a more nuanced and complex understanding of topics 3) Students shared specific multi-modal resources such as hyperlinks and teaching resources found online; 4) Students made intertextual connections from course content to other courses, knowledge learned in class, class discussions in the face-to-face course setting, as well as their personal experiences in their blog posts and comments; and 5) Students were metacognitive (Flavell, 1976) in making sense of their understanding of course concepts, sharing thoughts, and adjusting their definitions of their emerging understanding of course content.

Applications of Learning Outside of Class

Across blog posts from the entire semester, students reported instances of trying out knowledge, or, bringing declarative knowledge into the realm of situated and applied knowledge (Snow, Griffin, & Burns, 2005). In Blog Post #7, in early March, 2009, a representative excerpt from a student's post shows a more nuanced understanding of the text reading and how it applied to their tutoring of a student:

In my volunteer work I actually had the opportunity to do what Ch.6 McKenna and Stahl is [sic] talking about….Anyways I am tutoring a first grader who is struggling with reading. In our last session I had her read over a list of 100 high frequency words.

In this way, students progressed, generally, from more textbook-centered posts in the very beginning to more complex posts where knowledge was applied, towards writing with a contextualized setting and application in mind. Students even applied the learning about strategic reading instruction to their own learning in higher education settings and reported this on the blog. Another student shared such a personalized application:

Another thing that I found interesting in this chapter; was the summary writing. Barbara Taylor's five-steps in writing coherent hierarchical summaries are most helpful….I'm applying this to my own reading comprehension strategies for my ____ class [another course]. The text is overwhelming and I think this will help me to be more successful with breaking the material down and getting the main idea. (Blog Post #7)

Overall, students were able to connect their learning to specific applications and contexts beyond the textbook readings.

Resource Sharing

Students specifically engaged in problem solving by sharing information they found that would support another student's "plea for help". Students, for instance, shared their specific case study scenarios and asked their peers directly for ideas for facilitating success in their case study assignment (tutoring a child one-on-one) for specific curricular ideas and materials, again, fostering a community of practice (Lave & Wenger, 1991). Some sub-themes of this type of problem-solving are listed below:

- Student sharing of hyperlinks (URL's) with a brief description of what resource could be found at the website. Students often provided an evaluation of what they located and how beneficial they felt it was to their application towards the case study assignment and their related tutoring experience.
- Intentional sharing of resources from other courses. Students referenced resources from another literacy course.
- Sharing and reporting of knowledge gleaned from field observations related to another course. For instance, a student shared what she was seeing in a field observation as well the link where others students could seek further information: "My mentor teacher told me that they use a Developmental Reading Assessment to determine students reading level. Each small group is done by the level of the students and she gets her books for students from: http://www.readinga-z.com" (Blog Post #3)

Interestingly, students began sharing more links to outside resources that pertained to literacy assessment and literacy teaching in early March, when the case study assignment began and the course shifted more from a "textbook" focus to more of an application focus. Overall, by sharing their resources and suggestions, students were able to provide teaching ideas collaboratively amongst themselves; some students mentioned that they would be following other's advice, thus, expanding the amount of resources that could be learned beyond the textbooks and course lecture. One student shared, "You have a great list there about some of the activities that we can use for our students in our classrooms. I know I will be utilizing most if not all of them." (Blog Post #6).

A related theme to resource-sharing was "information-seeking". For example, students posed questions to their peers where they sought out further information and looked to classmates on the blog for some type of advice, resources, or general ideas as they engaged in the practice of tutoring and assessing a student. This was especially apparent from Blog Post #7 and #8 forward to the end of the semester. Similarly, students also engaged in "advice giving" where they provided direct advice (both solicited and unsolicited) or "cautionary tales" to classmates. One student shared:

I thought that it would not really matter if I spent a lot of time organizing. WRONG! I learned from experience that taking that extra 10 or 15 minutes to get organized and plan out what I want to do in the session actually saves time in the long run. (Blog Post #10)

Contextualized Understanding to High-Interest "Real World" Topics

Students found certain course topics problematic, such as the topic of how standardized testing differed from the notion of informal assessment in the classroom. Students engaged in a nuanced online conversation about this "real world" topic in the communal blog space while also debating the complexities of the advantages and disadvantages of standardized testing. The online blog conversation was one where diverse viewpoints were shared. Another topic that generated interested in the blog and stimulated a lot of online discussion was the topic of "round-robin reading". This is a traditional teaching practice where elementary or secondary students read aloud one at a time. Students generated much dialogue in Blog Post #7 about their own experiences with round-robin reading in school and what they thought were better alternatives to this teaching practice. Discussions on both of these topics on the blog were extensions of conversations begun in the face-to-face setting. A representative quote about the round robin reading topic from Blog Post #7 follows: "I wanted to focus on our discussion last night of round-robin reading. I really enjoyed that topic because I felt like I learned a lot about why not to use the technique and alternatives to use in my classroom." (Blog Post #7)

Intertextual Connections

In their blogs posts and comments, most students made intertextual connections (as defined by Lemke, 1992) from the course to other courses, some course readings, and readings from other courses, as well as connections made to their field placements and case study. Intertextual connections can be thought of as the following, as described by Jay Lemke, "Every text, the discourse of every occasion, makes its social meanings against the background of other texts, and the discourses of other occasions." (1992, p. 257) There were several types of intertextual connections made across blog posts. Because many of the semi-structured prompts provided by the instructor (see Appendix for a representative example) encouraged or required students to draw on the textbook readings and/or the multi-media content provided in the blog prompt, nearly all students made connections to the said textbook and/or multi-media content, as required. In addition to providing their commentary on the textbook readings, students made the following intertextual connections in their posts and comments: 1) connections from course content to personal narratives or personal schema as a way to understand concepts; 2) connections to knowledge from other courses they were concurrently taking or had previously taken and 3) connections to experiences such as observations from a field experience placement where they had the chance to observe some of the ideas relating to the course topic of literacy assessment as it applied to teaching practice.

As students participated in their field observations, they shared this knowledge and wove it into their posts. In this way, they provided sense-making for their own understanding and connection to practice, but also provided insight for students who were not in that particular setting. Some examples of intertextual connections follow:

- "I have learned from last semester to find ways to keep the childrens' attention and try to make it fun." (Blog Post #1)
- "Today, as well as last week, I observed in a kindergarten classroom. It was really neat to see some of the things we have been talking about being implemented in the classrooms." (Blog Post #4)

Additionally, some intertextual posts contained multiple instances of connections made. For example, in the following quote, the student makes connections to a course from a previous semester as well as to a connection related to learning from the face-to-face setting from the course. This indicated the student was drawing on multiple sources of prior knowledge when making sense of course material:

After learning about literacy assessment last semester and discussing it in our first class I have come to realize that there are many other ways to assess and child to make sure they know how to read and write and that they actually understand the material. (Blog Post #1)

Overall, students made complex connections across blog posts and drew upon multiple sources of information, including the face-to-face settings when composing blog posts and commentary.

Metacognitive Posts: "Thinking Aloud" about Emerging Understanding

Throughout the posts, and especially at the beginning of the blogging experience, many students wrote about their emerging understanding of course content. Because the course content was largely new to many students and the class size was fairly large in the face-to-face course, the main advantage of the blog—besides resources sharing—was the chance to provide a forum where all students could participate in sharing their thoughts, beliefs and responses to the readings.

First, across the blog posts students were metacognitive, or aware of their own thinking and their sense-making (as defined by Flavell, 1976) as they attempted to make sense of concepts and what was beginning to make sense to them. Students noted when they were having difficulty understanding course content and stated this explicitly in their blog posts. They expressed when they had a limited understanding of a topic and had more to learn about a topic. They engaged in self-monitoring and self-assessment as they read the course materials. Some students posed questions about areas in which they sought further understanding. They also shared changing definitions that were transformed as they made progress in the course and especially as they made connections to their experiences in real classrooms and in their work for the case study assignment for this course where they tutored an individual student in the area of literacy instruction. In writing research memos (Miles & Huberman, 1994), I noted that by reading through student posts on the blog, I was able to use students' written blog comments and students' self-reported understanding as formative data of what course topics in the textbooks engaged them and which topics they may have found confusing. Examples of sense-making and metacognitive postings by students follow:

- "Phonemic awareness has always been a little confusing for me up until now. The book gives great examples of how to assess students." (Blog Post #3)
- "Everything we are learning in class is really starting to come together with seeing in it videos and reading about how other people have experienced it in the classrooms they are observing."(Blog Post #5)

In conclusion, regarding the cognitive presence (Garrison, Anderson, & Archer, 2001; Garrison & Arbaugh, 2007), overall, there was a variety of type of posts and comments ranging from more analytical to more emotional and affective posts and comments such as the overly personal responses and purely unsubstantiated opinion. However, overall, most students connected what they said to some type of background knowledge either grounded in experience(s), other knowledge sources, or specific texts. An emerging ability to connect theory (course content and topics) to practice was present in many of the blog posts. This provided an initial footing for students on which to connect face-to-face class discussion to the blog posts as well as extend on topics that were more nuanced and complex in scope, for instance, in the discussion and viewpoints expressed relating to the topic of standardized testing. By connecting their course topics to multi-faceted experiences and knowledge students were able to discuss topics well beyond the scope and limitations of the face-to-face setting.

Social Presence in the Course Blog

In this section, I describe the social presence that permeated some of the student blog posts. As defined by Garrison & Arbaugh (2007), the social presence is a crucial component of the computer-mediated communication. It serves to facilitate communication when engaging in the cognitive presence or problem-solving scenarios in online settings; according to Garrison & Arbaugh (2007), social presence includes the ability for students to take risks in sharing and express themselves in social capacities. The social presence as seen in the student blog posts and comments included the following key themes: 1) Students expressed appreciation and thanks for the idea sharing with each other, building a community of practice (Lave & Wenger, 1991) and a Community of Inquiry (Garrison & Arbaugh, 2007); 2) Students recognized and empathized with one another when they weren't fully understanding course ideas and had anxieties related to future teaching and understanding of course content; and 3) Students were envisioning towards their future teaching and projecting an identity of their professional self into the shared discourse about teaching and assessing that took place in the blog setting.

First, students expressed direct statements of gratitude and thanks towards their peers for sharing information, enhancing their understanding of course content and concepts, and sharing of anecdotes/narratives that related to experiences and observations of teaching-related scenarios. The following are statements that expressed this sentiment:

- "I have the same questions and concerns as you do." (Blog Post #1)
- "Thank you for the insight!" (Blog Post #1)
- "I think it's so neat that we have such a strong bond between all of us Education majors- keep posting hands-on experiences, [sic] this is great stuff! (Blog Post #3).
- "It's amazing to hear all of the different activities that can be implemented for alphabetical and phonological development. I was thinking too that you could even implement that into the other curriculum." (Blog Post #4)
- "It is comforting to know that someone else agrees with me regarding the negative aspects of Round Robin Reading." (Blog Post #7)
- "Thank you for mentioning Barbara Taylor's five steps to writing summaries for hierarchical summaries. I need to practice on doing this for our [name of another course] class also." (Blog Post #7)

Students were inspired to try out other's ideas in their case study assignment. One student shared on a blog post early in the course:

I want to be able to do what you did with the boy in your tutoring session. I want to be able to see the difference between if they are reading for meaning or for testing. This is something I cannot wait to see and try for myself. I want to encourage you to keep it up and focus because it sounds like you will be awesome at what you are doing! Thanks for sharing. (Blog Post #4).

Another student, later in the semester, also expressed that she was inspired to try out a peers' idea and was grateful to have had the shared resource:

The website you gave, http://bookwizard.scholastic.com is GREAT! I really needed some help with books that are on a certain grade level. The website can be specific or broad and it gave me 5 pages of books. I am really excited to go to the library and check some of these out to try with my first grader in my case study. Keep the websites coming! I write them down for future reference and I think many of them are very helpful. (Blog Post #8)

Second, students, especially at the beginning of the course and in their first few blog posts, expressed anxiety about understanding course concepts, about being able to properly assess students in their future classroom, and other concerns about teaching in general.

Third, most students, as novices in the field of teaching, were in the process of forming their identities as future teachers. They expressed this anticipation of having their future classrooms across many of the blog posts. Some of their posts were contextualized by a framing of their learning as it applied to them as future teachers. Examples include the following:

- "In the future classroom I will have a variety of text available because each child may be at a different level and may enjoy a variety of different books." (Blog Post #2).
- "Even so, I am beginning to feel a lot better about going into the classroom to teach, especially after observing real teaching in action." (Blog Post #5)

Essentially, students provided a great deal of peer-to-peer support regarding course topics, and, later in the semester, support to each other as both university students and as future teachers.

DISCUSSION

In using asynchronous (not taking place in real time) technologies such as blogging combined with viewing of embedded videos (via YouTube) and podcasting, students engaged in a shared "community of practice" (Lave & Wenger, 1991) centered around lesson plan design, literacy assessment topics, and teaching practices and scenarios. This community and knowledge construction was not otherwise possible when only teaching and learning in face-to-face classrooms on a university campus. The communal course blog in this literacy assessment course in a teacher education program at a large university served as a place to encourage students to pose questions to each other and to compare their prior knowledge with their ongoing and possibly emerging understandings about the complex topic of classroom literacy assessment.

This Community of Inquiry framework (Garrison & Arbaugh, 2007) seemed especially useful for noting teacher presence and social presence. The cognitive presence was trickier to examine and analyze as it was often interwoven with the social presence. The subject of this literacy assessment course posed new information and content to students, many of who had little to no experience in working with children in an applied setting as required by the nature of the class. Many of their initial posts reflected this anxiety of being responsible in the near future for a roomful of children and having to know and practice the what, why, when, and how of literacy assessment. As such, pre-service teachers benefited from a support system that offered not only declarative knowledge about literacy instruction (Snow, Griffin, & Burns, 2005) but also the social and affective components of being supportive to one another through an online social presence (as described by Garrison& Arbaugh, 2007). This communal course blog served in these capacities of social and cognitive presence; however, the cognitive presence was more limited in that students drew more on their experiences and personal narratives in seeking out resources and advice to their fellow students.

The teacher presence needed to be developed much more strongly in order to better intentionally model using research-based and evidence-based approaches towards teaching practices. Implications include further seeking ways to help scaffold these evidence-based approaches in an online forum. For instance, the instructor can provide and demonstrate concrete ways for students to "lend" this support to each other by designing specific prompts students can use to be helpful while also connecting to research and evidence-based practice. One idea might be, frontloading the students with examples and direct instruction of what it means to connect literacy assessment to research and evidence-based practice. Studnets could also self-asses their own blog posts according to a rubric that required them to connect their thinking to course readings, research, and descriptions of evidence-based practice. Because students were making intertextual connections in their blog posts, instructors in cohort-based programs should intentionally learn about the other instructors' courses who teach related content in order to foster such intertextual connections across courses and subject areas.

Academic and research implications of this study include continuing to focus on seeking ways to use asynchronous learning tools such as blogging to foster reflective thinking and knowledge sharing in both face-to-face and online courses. Research can seek students' input and feedback on the blogging experience through additional measures such as surveys and focus group interviews. The limitations of this study include the idea that data was collected only from the blog postings themselves. The instructor will continue to reflect on the ways that the Community of Inquiry Framework (Garrison & Arbaugh, 2007) provides an intentional and purposeful way to design and facilitate computer-mediated-communication to support learning in blended learning contexts.

REFERENCES

Flavell, J. H. (1976). Metacognitive aspects of problem solving. In L. B. Resnick (Ed.), *The nature of intelligence* (pp. 231–236). Hillsdale, NJ: Erlbaum.

Garrison, D., & Vaughan, N. (2008). *Blended learning in higher education*. San Francisco, CA: John Whiley & Sons.

Garrison, D. R., Anderson, T., & Archer, W. (2001). Critical thinking, cognitive presence, and computer conferencing in distance education. *American Journal of Distance Education*, *15*(1), 7–23. doi:10.1080/08923640109527071

Garrison, D. R., & Arbaugh, J. B. (2007). Researching the community of inquiry framework: Review, issues, and future directions. *The Internet and Higher Education*, *10*(3), 157–172. doi:10.1016/j.iheduc.2007.04.001

Hungerford-Kresser, H., Wiggins, J., & Amaro, C. (2011). Learning from our mistakes: what matters when incorporating blogging in the content area literacy classroom. *Journal of Adolescent & Adult Literacy*, *55*(4), 326–335. doi:10.1002/JAAL.00039

Lave, J., & Wenger, E. (1991). *Situated learning: Legitimate peripheral participation*. New York, NY: Cambridge University Press. doi:10.1017/CBO9780511815355

Lemke, J. L. (1992). Intertextuality and educational research. *Linguistics and Education*, *4*(3-4), 257–268. doi:10.1016/0898-5898(92)90003-F

Leu, D. J., Kinzer, C. K., Coiro, J. L., & Cammack, D. W. (2005). Toward a theory of.new literacies emerging from the Internet and other information and communication technologies. In R. B. Ruddell & N. Unrau (Eds.), *Theoretical models and processes of reading* (5th ed., pp. 1570–1613). Newark, DE: International Reading Association.

Miles, M. B., & Huberman, A. M. (1994). *Qualitative data Analysis: An expanded sourcebook*. Thousand Oaks, CA: Sage Publications.

Picciano, A. G. (2009). Blending with purpose: The multi-modal model. *Journal of Asynchronous Learning Networks*, *13*(1), 1–9.

Polanyi, M. (2009). *The tacit dimension*. Chicago, IL: University of Chicago Press.

Prensky, M. (2010). *Teaching digital natives: Partnering for real learning*. Thousand Oaks, CA: Corwin.

Rogoff, B. (1990). *Apprenticeship in thinking: Cognitive development in social context*. New York, NY: Oxford University Press.

Salomon, G. (1993). *Distributed cognitions: Psychological and educational considerations*. New York, NY: Cambridge University Press.

Snow, C., Griffin, P., & Burns, M. S. (2005). *Knowledge to support the teaching of reading: Preparing teachers for a changing world*. San Francisco, CA: Jossey-Bass.

So, H., & Brush, T. A. (2008). Student perceptions of collaborative learning, social presence and satisfaction in a blended learning environment: Relationships and critical factors. *Computers & Education*, *51*(1), 318–336. doi:10.1016/j.compedu.2007.05.009

Strauss, A., & Corbin, J. (1990). *Basics of qualitative research: Grounded theory, procedures, and techniques*. Newbury Park, CA: Sage.

Top, E. (2011). Blogging as a social medium in undergraduate courses: Sense of community best predictor of perceived learning. *The Internet and Higher Education*. doi:10.1016/j.iheduc.2011.02.001

Vygotsky, L. S. (1962). *Thought and language*. Cambridge, MA: MIT Press. doi:10.1037/11193-000

KEY TERMS AND DEFINITIONS

Asynchronous Learning: The type of learning that occurs in online settings whereby learners do not have to respond in real-time; learning can take place at the learner's own pace within structured parameters, for instance, deadlines and prompted online discussion.

Blended Learning: A learning context where students may participate in both on-campus (face-to-face) learning settings as well as online learning settings.

Blog: An abbreviated term to describe a weblog or an online journal that is written in reverse chronological order and allows for interactive online discussion through posting of comments.

Cognitive Presence: A focus of an online learning experience where students are engaged in problem solving and other cognitive tasks.

Communal Blog: An online weblog where participants are all posting and commenting to one centralized blog rather than their own individual blogs.

Community of Inquiry: An online learning community where learners engage socially while exploring the cognitive dimension of inquiry, for instance, by problem-solving together in an online forum.

Community of Practice: A reflective and supportive learning community where learners are working towards shared learning goals; this often involves more experienced learners assisting more novice learners in their practice.

Intertextuality: Knowledge that makes explicit connections across texts including diverse mediums such as textbooks, audio files, references to other learning contexts, and other sources of information.

Social Presence: A focus of an online learning experience that intentionally fosters social support such as building community and interpersonal interactions beyond academic learning tasks.

Teacher Presence: The intentional design of an online learning experience that fosters cognitive development of students while creating a community of supported learning.

This work was previously published in Multicultural Awareness and Technology in Higher Education edited by Tomayess Issa, Pedro Isaias, and Piet Kommers, pages 176-196, copyright year 2014 by Information Science Reference (an imprint of IGI Global).

APPENDIX: EXAMPLE OF A SEMI-STRUCTURED PROFESSOR-CREATED PROMPT TO GUIDE BLOG SHARING

Week 2: Major Concepts in Literacy Assessment

with 60 comments
The class agenda for Week 2 is here: Week 2 Agenda.
The PowerPoint for Week 2 is here: Major Concepts of Literacy Assessment PPT.

*****Please print and read the Rubric for Blogging and Service Reflections. I will go over in class.*** Click here: Rubric.

This is the blog post for Week 2. You can start posting now. The post for week one is prior to this one. Post your initial post by 11:59 p.m. on *Monday, February 2*. Comment on at least one other post by 11:59 p.m. on Wednesday, January 28. Topic 2 will be closed for posts and comments at *11:59 p.m. on Wednesday, February 3*. Please be sure your initial post is 2-3 solid paragraphs; your writing should be reflective and thoughtful, not shallow or superficial, and show a connection to the readings.

This link (click) goes to a searchable database where you can see just about every common assessment available for reading assessment. Most schools primarily use TPRI, DRA, and Flynt Cooter reading inventory to assess reading. Here is also an (optional) intriguing link about what assessments are mandatory in our surrounding states, including Texas.
The post topic is the following:

What are the major tools and domains of literacy assessment and how do you envision using them in your future classroom? How can literacy be used to inform instruction? That is, how will the day-to-day formative (ongoing) assessments you will do in the classroom help you to actually plan meaningful instruction and lesson plans that will maximize literacy learning and achievement for your students? (This question is the "big question" of the entire course!).

You can also respond or connect to both the readings and/or the links and podcast (highly relevant on his concerns for "over-testing") below.

Optional Links:
Texas Primary Reading Inventory (given to K-2 children in Texas several times a year to screen for dyslexia)
Released TAKS tests
NAEP Reading Test (national)
Podcast by Dr. Peter Afflerbach on reading assessment.

This link goes to a really great site on emergent literacy assessment, one of our course topics. It has short videos on it, as well of each type of assessment: Early assessment tools._
Written by peggys. Edit.
January 24th, 2009 at 1:51 pm

Chapter 21
Implications of Mobile Devices in a Bachelor of Education Program

Norman Vaughan
Mount Royal University, Canada

Kimberley Lawrence
University of Calgary, Canada

ABSTRACT

The purpose of this chapter is to describe a study that investigated if and how mobile devices could be used to support the required program outcomes in a blended Bachelor or Education (B.Ed.) program. All students enrolled in an educational technology course during the Fall 2011 semester were provided with a ViewSonic Tablet. Through faculty interviews, student online surveys, and a post-course focus group, the study participants indicated that mobile devices could be useful for supporting future professional responsibilities (e.g., career-long learning, collaboration) and facilitating student learning but less effective for planning, assessment, and managing the classroom environment.

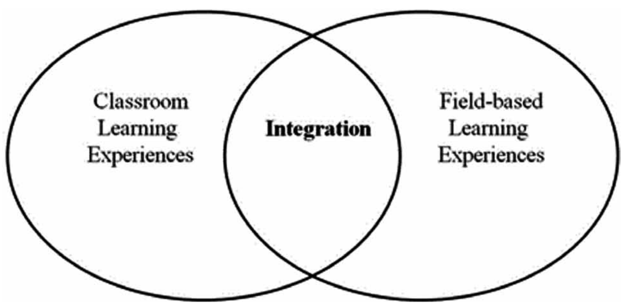
INTRODUCTION

The idea of blending different learning experiences has been in existence ever since humans started thinking about teaching (Williams, 2003). What has recently brought this term into the limelight is the infusion of web-based technologies into the learning and teaching process (Allen & Seaman, 2010; Clark, 2003). These technologies have created new opportunities for students to interact with their peers, teachers, and content.

Blended learning is often defined as the combination of face-to-face and online learning (Sharpe et al., 2006; Williams, 2002). Ron Bleed, the former Vice Chancellor of Information Technologies at Maricopa College, argues that this is not a sufficient definition for blended learning as it simply implies "bolting" technology onto a traditional course, using technology as an add-on to teach a difficult concept or adding supplemental information. He suggests that instead, blended learning should be viewed as an opportunity

DOI: 10.4018/978-1-4666-8246-7.ch021

Figure 1. Bachelor of education approach to blended learning



to redesign the way that courses are developed, scheduled, and delivered through a combination of physical and virtual instruction, "bricks and clicks" (Bleed, 2001). The goal of this redesigned approach to education should be to join the best features of in-class teaching with the best features of online learning to promote active, self-directed learning opportunities for students with added flexibility (Garnham & Kaleta, 2002; Littlejohn & Pegler, 2007; Norberg, Dziuban, Moskol, 2011). This sentiment is echoed by Garrison and Vaughan (2008) who state that "blended learning is the organic integration of thoughtfully selected and complementary face-to-face and online approaches and technologies" (p.148).

Most of the recent definitions for blended courses indicate that this approach to learning offers potential for improving the manner in which we deal with content, social interaction, reflection, higher order thinking and problem solving, collaborative learning, and more authentic assessment in higher education (Graham, 2006; Mayadas & Picciano, 2007; Norberg, Dziuban, Moskal, 2011). Dziuban and Moskal (2013) further suggest that "blended learning has become an evolving, responsive, and dynamic process that in many respects is organic, defying all attempts at universal definition" (p.16). For the purpose of this research study, blended learning is defined as the intentional integration of classroom and field-based learning experiences through the use of digital technologies such as mobile devices (Figure 1).

There have been a variety of definitions used for the concept of mobile learning. It has been suggested by Brasher and Taylor (2005) that mobile learning is "any sort of learning that happens when a learner is not at a fixed, predetermined location, or learning that happens when the learner takes advantage of the learning opportunity offered by mobile technologies" (p.33). The Mobile Learning Network (2013) in the United Kingdom states that mobile learning is ". . . the exploitation of ubiquitous handheld technologies, together with wireless and mobile phone networks, to facilitate, support, enhance and extend the reach of teaching and learning" (What is Mobile Learning? section, para 1). Ally (2009) indicates that *M-learning* focuses on the delivery of electronic learning materials, with built-in learning strategies, on mobile computing devices to allow access from anywhere and at anytimehttp://www.google.com/url?q=http%3A%2F%2Fnet.educause.edu%2Fir%2Flibrary%2Fpdf%2FELI3022.pdf&sa=D&sntz=1&usg=AFQjCNG8M8FIkAgR_Xu4g-z8sk8lIekweRQ while *E-learning* involves the delivery of electronic learning materials on desktop and notebook computers. And, the EDUCAUSE Learning Initiative (Brown & Diaz. 2010) attempts to create classifications for mobile learning based on the size of the device. For example, *highly mobile devices* are cell-phone sized devices that can fit in a pocket: feature phones (supporting cell and SMS service only), smartphones, and other devices like Flip cameras. *Very mobile devices* are slates, pads, and netbooks. *Mobile devices* are larger devices such as laptops. This classification system was utilized in this study in order to differentiate the affordances that different sizes and types of mobile devices have on supporting the required program outcomes in a blended pre-service teacher education degree.

There have been previous research studies about the use of mobile devices in higher education (Gikas & Grant, 2013; West, 2012; Zhu et al., 2012). These studies have primarily investigated the advantages and disadvantages of using these

Table 1. Bachelor of education field-based learning experiences

Volunteer Field Placements	
Year One	Fall Semester - 30 hours Winter Semester - 30 hours
Year Two	Fall Semester – 20 hours Winter Semester – 20 hours
Practicum Placements	
Year Three	5 week practicum combined with 4 program of studies courses
Year Four	9 week practicum combined with 4 program of studies courses and a capstone experience course

devices in university courses whereas this study focused on how mobile computing technologies could be used to support program learning outcomes in a Bachelor of Education program (B.Ed.).

STUDY CONTEXT

The blended pre-service teacher education program described in this study takes place at Mount Royal University, a four year undergraduate institution located in Calgary, Alberta, Canada (http://www.mtroyal.ca/). A new Bachelor of Education (B.Ed.) program was launched in the fall of 2011 (http://www.mtroyal.ca/bed/). This is a four year direct entry B.Ed. degree. The emphasis of this program is on connecting theory with practice through early, consistent, and on-going field experiences. In the first, two years of the program students have a core education course each semester that meets once a week and is linked to a twenty or thirty hour field-placement. In the third and fourth years of the program, the students have extended field placements that are connected to program of studies courses and a capstone experience that are designed to integrate theory (of the coursework) and practice (of the field experiences) (Table 1).

The purpose of this research study was to investigate if and how mobile devices could be used to support the required program outcomes in this blended pre-service teacher education degree. All students enrolled in an educational technology course during the fall 2011 semester were provided with a *ViewSonic* Tablet. Faculty interviews, student online surveys, and a post-course focus group were conducted as part of this investigation. The following two questions were used to guide this study:

1. What kind of mobile devices do students and faculty currently own and what kind of applications do they use on these devices?
2. How do students and faculty perceive that these devices can be used to support the required program outcomes in a blended pre-service teacher education degree?

Theoretical Framework

The literature on community of practice and social learning theory informed the methodology and methods of this study. The perspective of learning as increasing participation in communities of practice is embedded in a relational and situated understanding of knowledge (Lave & Wenger, 1991). This social theory of learning defines communities of practice as "a set of relations among persons, activity, and world, over time and in relation with other tangential and overlapping communities of practice" (p. 98).

Wenger (1998) links the formation of a community of practice with three participatory dimensions: engagement, accountability, and negotiation. Engagement is dependent on developing an understanding of how to interact with other people within the community such as students and faculty in pre-service teacher education program. Becoming accountable to an enterprise, for example a set of program outcomes, prompts members to consider certain possibilities that contribute to aligned perspectives of the world. Wenger refers to negotiation as the ability to interpret and make use of a repertoire of the community's practice. In the context of this study, this involved practice, discussion, and reflection on how mobile devices could be used to support the program outcomes for a B.Ed. degree.

Recognizing the connection between learning and the formation of a community of practice, an action research methodology was utilized.

Methods of Investigation

An action research (Stringer, 2007) and case-based method (Creswell, 2013) were adopted to investigate how digital technologies could support student assessment in higher education. There are various forms of action research and the framework defined by Gilmore, Krantz and Ramirez (1986) was utilized:

Action research . . . aims to contribute both to the practical concerns of people in an immediate problematic situation and to further the goals of social science simultaneously. Thus, there is a dual commitment in action research to study a system and concurrently to collaborate with members of the system in changing it in what is together regarded as a desirable direction. Accomplishing this twin goal requires the active collaboration of researcher and client, and thus it stresses the importance of co-learning as a primary aspect of the research process. (p.161)

In addition, Stringer (2007) indicates that action research is a reflective process of progressive problem solving led by individuals working with others in teams or as a part of a "community of practice" to improve the way they address issues and solve problems. This research approach should result in some practical outcome related to the lives or work of the participants, which in this case is the effective use of mobile devices in future K to 12 teaching practice. http://www.web.net/~robrien/papers/arfinal.html - _edn1

There have been concerns about the validity of this methodology as it is often carried about by individuals who are interested parties in the research (i.e., faculty members) and thus, potentially biased in the data gathering and analysis (Pine, 2009). The justification for action research counters this criticism by suggesting that it is impossible to access practice without involving the practitioner. Practice is action informed by values and aims, which are not fully accessible from the outside. The practitioner may not even be wholly aware of the meaning of his or her values until she or he tries to embody them in her action (Kemmis, 2009).

This approach consisted of a mixture of quantitative (i.e., survey) and qualitative (i.e., interviews and focus group) research methods.

Data Collection

The principal researcher for this study was also the educational technology course instructor and thus, data was collected by an undergraduate student research assistant (USRA) in order to minimize perceptions of coercion and bias. The USRA invited all students enrolled in the course to be part of this research project and a total of 14 students participated in this study (100% response rate). In addition, she invited all of the faculty members in the pre-service teacher education program to participate in a 30 minute interview on the topic of mobile learning (n=6). The project received institutional ethics approval and the students and faculty members signed an informed consent form. The consent form offered the participants confidentiality and the ability to withdraw from the study at any time.

The data collection process began with a pre-course online survey that was designed by the principal researcher and has not been validated statistically (Appendix A). The purpose of this survey was to collect base-line data about what kind of mobile devices students currently owned and what kind of applications they used on their devices. As well as determining students' initial perceptions about how these devices (tablets in particular) could be used to support the required program outcomes of the pre-service teacher education degree. The survey consisted of a mixture of Likert-scale and open-ended questions and the second version of the online *Free Assessment Survey Tool* (http://toofast.ca) was utilized.

The faculty interviews were also conducted at the beginning of the fall 2011 semester and the questions were identical to those used for the student pre-course online survey (Appendix B). These 30 minute face-to-face interviews took place in each of the faculty members' offices. Each of these interviews was facilitated, recorded, and transcribed by the USRA.

Throughout the semester the student participants engaged in a series of learning activities that required the use of their *ViewSonic Tablet*. For example, the students used their tablets to create a lesson plan, video record a group teaching demo, provide audio assessment feedback to one of their peers, and develop an online tutorial about an *Apple* or *Android App* for educational purposes. After each learning activity, the students were encouraged to post their reflections to a research wiki on mobile devices (http://tinyurl.com/mobileresearchwiki).

At the end of the semester, the students were asked to complete a post-course online survey about their perceptions of how mobile devices could support the required program outcomes in the pre-service teacher education degree as well as their recommendations and strategies for effectively using mobile devices in the program. The students were also invited to participate in a 30 minute post-course focus group with the USRA to discuss the online survey and research wiki findings. Eight students volunteered for this focus group and the session was digitally recorded and transcribed by the USRA.

Data Analysis

A constant comparative approach was used to identify patterns, themes, and categories of analysis that "emerge out of the data rather than being imposed on them prior to data collection and analysis" (Patton, 1990, p. 390). The pre- and post-course student online survey results were exported into *MS Excel* for descriptive statistical and thematic analysis by the USRA and the course instructor. The faculty interviews were transcribed in *MS Word* by the USRA. The survey data was correlated with the faculty interview responses throughout the semester. At the end of the semester, a preliminary report was compiled and emailed to each of the student participants who were then invited to participate in a post-course focus group to discuss the initial study findings. The transcript from this focus group was reviewed and compared with the student survey and faculty interview data in order to triangulate the themes and patterns.

FINDINGS

This section begins with a demographic profile of the student participants followed by a summary of the results for each of the two research questions:

1. What kind of mobile devices do students and faculty currently own and what kind of applications do they use on these devices?
2. How do students and faculty perceive that these devices can be used to support the required program outcomes in a blended pre-service teacher education degree?

Demographic Profile of Student Participants

In order to establish a context for the study findings, the pre-course survey asked a series of demographic questions. The demographic profile of the students is summarized in Table 2.

Table 2. Survey respondent demographics

Item	Percentage/ Number
Off-campus accommodation within driving distance (57% lived with their parents)	100%
24 years of age or less	100%
Employed (part-time 79%; full-time 0%)	79%
Female	86%
Second year of studies	94%
Average number of courses enrolled in/ semester	4

The majority of respondents were second-year students who were employed on a part-time basis, commuted to campus, and lived at home with their parents. Respondents were all under the age of twenty-five and approximately 86% percent were female. The demographic profile of student participants reflects that of the university as a whole with respect to age, employment status, residence, and level of course enrollment with the exception of gender (Prairie Research Associates, 2011). Approximately two-thirds of the Mount Royal University student population is female and the higher percentage of females in this study is due to a higher concentration of female students in our Bachelor of Education program.

Student and Faculty Ownership and Use of Mobile Devices

At the beginning of the fall 2011 semester, students and faculty were asked to identify what types of mobile devices they owned and what kind of applications they used on these devices. The results are highlighted in Figures 2 and 3.

In terms of mobile device ownership, all of the students and faculty who participated in this study had laptops, 92% of the students had SMART phones compared to only 33% of the faculty, and only 1 student (7%) and 2 faculty members (33%) had their own tablets. The students primarily used their mobile devices for communication and social networking while the faculty members used these devices for academic purposes and navigation. The students also used their SMART phones to capture and share digital images and videos while the faculty were not familiar with how to perform these operations. The differences in student and faculty ownership and use of mobile devices is similar to the results of a study conducted at the University of Texas, Brownsville where 94% of the students reported that they were ready for mobile learning compared to only 60% of the faculty members (Corbeil & Valdes-Corbeil, 2007).

Ability of Mobile Devices to Support Required Program Outcomes of a Pre-Service Teacher Education Program

Recently, Alberta Education has created a draft of professional practice competencies for K to 12 teachers (Government of Alberta, 2011). These competencies consist of the following five categories:

1. Planning and preparation.
2. Assessment.
3. Facilitation.
4. Classroom environment.
5. Professional responsibilities.

Students were asked in the pre- and post-study online surveys to rank and comment on how mobile devices (specifically tablets) could be used to help them achieve each of these five program outcomes. Faculty members were asked similar questions in their face-to-face interviews with the USRA. Both groups ranked professional responsibilities as the number one competency that could be supported through the use of mobile devices (Table 3). Students indicated in the post-course focus group that human contact was more important than computer-mediated communication when learning and practicing professional responsibilities such as ethical behavior. This is reflected in the post-

Figure 2. Student and faculty ownership of mobile devices

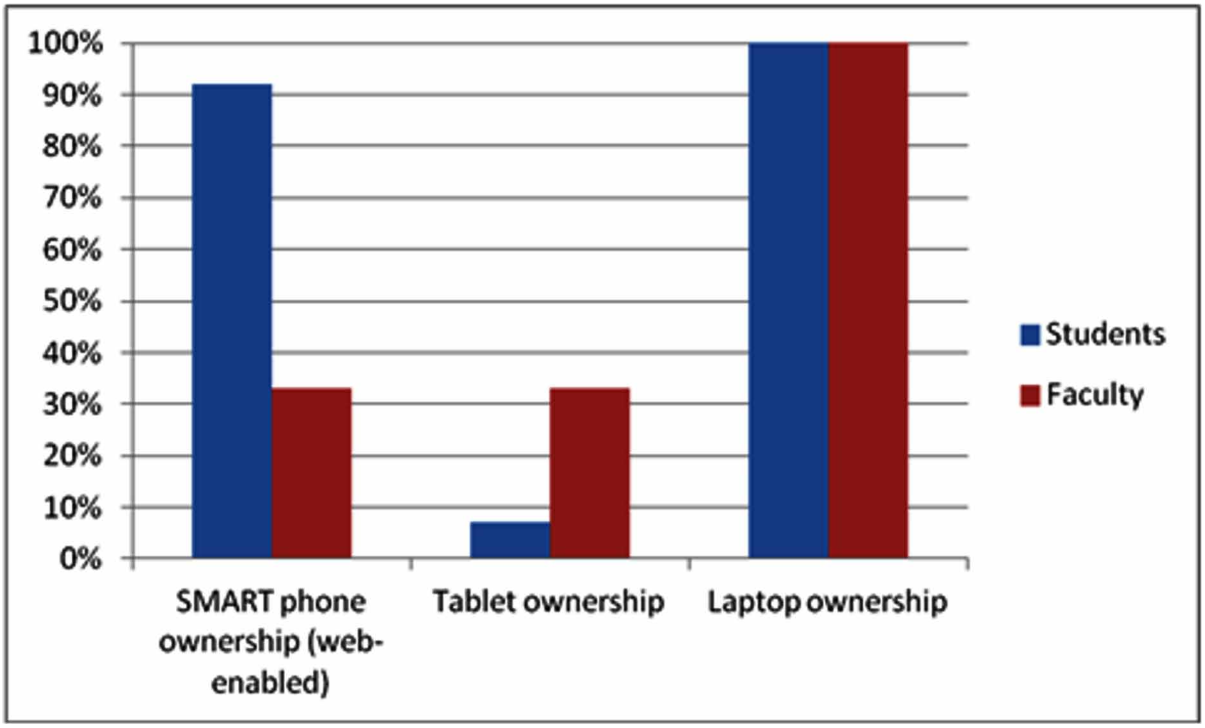


Figure 3. Student and faculty use of mobile devices

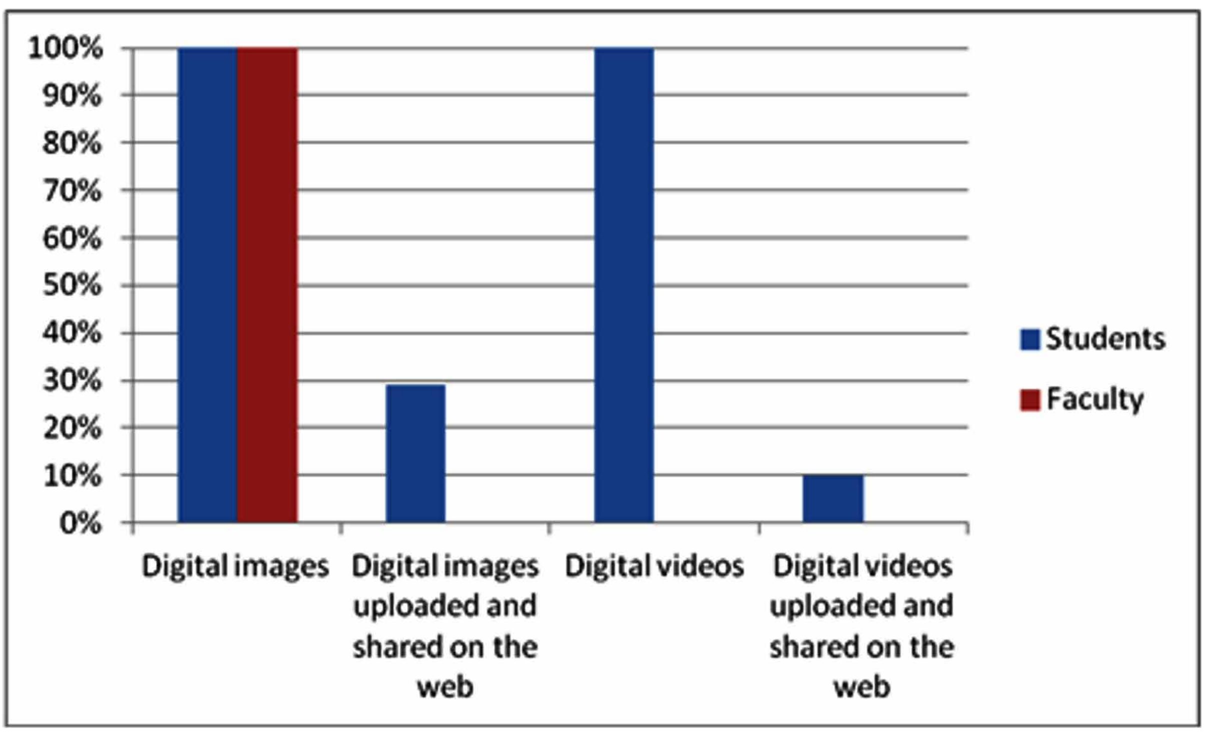


Table 3. Professional responsibilities

	Faculty	**Student Pre-Study**	**Student Post-Study**
Valuable/ Very Valuable	83%	93%	64%
Related Comments	*Tools of the trade—important to know "first hand" the pros and cons of using mobile devices in K to 12 education.*	*It keeps you updated on the current and emerging technology. As a future K to 12 teacher this is very important not only to keep you up to date but to keep your class engaged by using technology that relates to their generation.*	*While using the tablet, I found that I had full access to the internet. The internet is the key when finding information and workshops to attend.*

Table 4. Facilitating student learning

	Faculty	**Student Pre-Study**	**Student Post-Study**
Valuable/ Very Valuable	83%	86%	72%
Related Comments	*Facilitating student learning in different ways - making videos to help students (ex: philosophy, a math probe)*	*Every student has a unique way of learning and by varying the method one uses to teach, teachers can meet the needs of more students. Mobile devices give us so many different ways to facilitate student learning. There are computer games designed for students to work hands on with all different types of curriculum. They also allow students access to more sources then just their teacher.*	*Tablets have given me the opportunity to include technology in a more authentic way.* *I think we are in an age that has put an increasing emphasis on hand-held technology and it's only a matter of time before children are learning and completing homework on them.*

study survey results where only two-thirds of the students indicated that mobile devices were valuable for developing professional responsibilities.

The second highest ranked competency was facilitating student learning. Both faculty and students commented that mobile devices could be used to facilitate different authentic learning pathways for K to 12 students (Table 4). Again, the students in the post-course focus group emphasized the importance of human contact when facilitating learning and thus, the decrease in the percentage of students in the post-study survey who indicated that mobile devices are valuable for this program outcome.

Initially, students and faculty were moderately positive about the ability of mobile devices to support the planning and preparation process for learning but in the post-study survey students commented on the technical restrictions and challenges of using tablets and SMART phones to create lesson plans (Table 5).

In terms of the ability of mobile devices to be used to assess student learning, the faculty members were much more optimistic than the students. In both the pre- and the post-study surveys, students expressed concern about the emphasis on digital feedback preferring a balance with oral and hand-written forms of assessment communication (Table 6).

Finally, both faculty and students expressed concern about the impact of mobile devices on the classroom environment. Both groups commented that these types of devices could become very distracting if not properly integrated into the learning process (Table 7).

Table 5. Planning and preparing for learning

	Faculty	Student Pre-Study	Student Post-Study
Valuable/ Very Valuable	67%	64%	29%
Related Comments	*Program of Studies Guides and Resources are all web-based – just a click away Caution: just because it's on the web doesn't mean it's valuable. Need to look at and know it is well researched.*	*Mobile devices are essentially computers. They allow teachers to lesson plan anywhere in the world. Teachers can do research or search for information at any time during the day.*	*I prefer to lesson plan on a laptop, computer or netbook because I have access to a full keyboard. The tablet is helpful when needing to look over a plan that you may have forgotten at home.* *I don't feel like these devices are efficient enough to use for lesson planning...the wi-fi is difficult to connect to at times, and it's tricky to type on. I'd much prefer to do a lesson plan on a computer.* *I'm not sure that they would be ideal for 'Planning for Learning' because of the small keyboard and screen. I could see it becoming annoying.*

DISCUSSION AND RECOMMENDATIONS

The students in the post-study survey and focus group were asked to provide a series of recommendations and strategies for using mobile devices effectively in a blended pre-service teacher education program. They have been grouped into the following five categories (Table 8).

The students indicated that educational design and personal choice were key elements to the successful use of mobile devices in a blended pre-service teacher education program. They emphasized that without a specific rationale for using these devices to support the intended learning outcomes of a course assignment or field-based learning experience these digital tools could quickly become an expensive and frustrating distraction. They also recommended that institutional IT infrastructure needs to be in place in order to ensure the efficient use of mobile devices and this includes proper mobile apps, devices, and wireless internet connectivity in classrooms and laboratories.

Table 6. Assessing student learning

	Faculty	Student Pre-Study	Student Post-Study
Valuable/ Very Valuable	83%	50%	23%
Related Comments	*These devices can be used to give richer feedback- e.g., video tape the student teachers doing the teaching. And then sit down and discuss video or can review their research paper and provide audio rather than text-based feedback.* *Focus on process rather than just product. Have a video of a group working on things. Used to tape grade ones reading and let them listen to it to see what they needed to work on. Self-assessment. Watch video of self (presentation)*	*This will come in handy if instead of written comments, students can see their teacher or peers evaluating them through video for example.* *This could be a great way of inputting current grades into electronic form, especially if you are out of town (not near a computer) or if you're home computer decides to crash on you.*	*I find that hand written feedback is better when marking because it doesn't make my eyes feel as tired. I also prefer to give oral feedback. No doubt hand-held devices have a place in innovative learning, but marking homework/assignments is probably not where you'll see it.*

Table 7. Classroom environment

	Faculty	Student Pre-Study	Student Post-Study
Valuable/ Very Valuable	33%	29%	7%
Related Comments	*Distracting, kids online when should be paying attention* *Can make it more complex. Adding another diversion.* *Potentially could help manage learning environment. Have more personalized learning environment: meaningful projects, less discipline problems.*	*Could be a distraction for children* *Could be a useful tool because the students can easily stay engaged using various devices and they are many different options when using technology to control the classroom.*	*I think that managing the environment of a classroom should be done by the teacher not by a device.* *I think that some of the negative behaviour can stem from the use of devices*

Table 8. Recommendations and strategies

Recommendation	Strategy
6. Educational design	Specifically tie the use of mobile devices to course learning outcomes and assignments ● *Perhaps we could incorporate activities and assignments into the course that would force us to use our Tablet more. I found that it was not needed in the classroom therefore I did not bring it with me or use it very much at home either. We could have used the Voice Recorder for self and peer assessment feedback for each assignment.*
7. Appropriate device for the appropriate task	One size does not fit all when it comes to the appropriate use of mobile devices in a blended pre-service teacher education program ● *I personally found my phone was more useful in school placements. It fit into my pocket, was easy to use to take video, pictures, and field notes. On the other hand, I find my laptop more valuable in our university classrooms as it allows me to easily take notes and search for information.*
8. Mobile apps	Ensure that key university apps are accessible ● *It would be handy to have myUniversity as a compatible site with the tablet. From my experience, the myUniversity website doesn't work well/continues to freeze when trying to access my account.* ● *find a way to make Blackboard app available*
9. Tablet devices	Use better quality tablets or our own mobile devices ● *Upgrade the tablets, use something of better quality*
10. Wireless internet connectivity	Improve internet connectivity in the main university building ● *Make sure everyone's device be connected to the internet easily in the classroom*

In the post-study group, the student participants were also asked to comment how they plan to use mobile devices in their future teaching practice. They emphasized that mobile devices should be used as digital tools by K to 12 students for authentic, inquiry-based project work. Many of the study participants had observed these devices primarily being used as eBooks in their K to 12 school placements and they thought that this was an expensive way for students to passively absorb yet more facts and information.

CONCLUSION

This research study was informed by Wenger's (1998) community of practice framework, which emphasizes three participatory dimensions: engagement, accountability, and negotiation. Engagement is dependent on developing an understanding of how to interact with other people within the community such as students and faculty in pre-service teacher education program.

The results from this study demonstrate that students in pre-service teacher education programs potentially have more practical experience with mobile devices than faculty members. Thus, it is prudent for faculty to "listen and learn" from their students about how to use these devices effectively and efficiently.

Becoming accountable to an enterprise, for example a set of program outcomes, prompts members to consider certain possibilities that contribute to aligned perspectives of the world. With regards to the ability of mobile devices to support the learning outcomes of a B.Ed. program both faculty and student participants in this research study indicated that these digital tools could be useful for supporting future professional responsibilities (i.e., career-long learning, collaboration) and facilitating student learning but less effective for planning, assessment, and managing the classroom environment.

Wenger refers to negotiation as the ability to interpret and make use of a repertoire of the community's practice. This form of negotiation corresponds with the Māori concept of *ako* (Barlow, 2001). This term means both to teach and learn. It recognizes the knowledge that both teachers and students bring to learning interactions, and it acknowledges the way that new knowledge and understandings can grow out of shared learning experiences, especially those that are mediated through the use of mobile devices. This concept has been supported by educational research showing that when teachers facilitate reciprocal teaching and learning roles in their classrooms, students' achievement improves (Alton-Lee, 2003). In addition, Hattie (2009) suggests that *ako* is the basis of a visible teaching and learning framework where "teachers SEE learning through the eyes of their students and students SEE themselves as their own teachers" (p.238).

STUDY LIMITATIONS

The two major limitations of this study were the small sample size and the focus on self-reported data. The small sample size (n=20) meant that significance is limited for the analysis of the quantitative survey data and thus, the results cannot be readily generalized or transferred to other pre-service teacher education programs. The surveys, interviews, and focus group conducted in this study all relied on self-reported data, which was limited by the fact that it was only verified by the co-authors of this study. This data may contain several potential sources of bias such as selective memory of the student and faculty participants (i.e., remembering or not remembering experiences or events that occurred at some point in the program) and exaggeration (i.e., the act of representing outcomes or embellishing events as more significant than is actually suggested from other data) (Brutus, 2013).

FURTHER RESEARCH

The findings from this study and the associated research literature (West, 2012) suggest that student ownership of mobile devices in higher education is steadily increasing and that students are expecting to use these devices to support their course and program assignments (BYOD – bring your own device). Thus, further research needs to be conducted in order to determine how students and faculty can effectively use these devices in blended environments to support learning inside and outside of the classroom.

REFERENCES

Allen, I. E., & Seaman, J. (2010). *Class differences: Online education in the United States, 2010*, Babson Survey Research Group, The Sloan Consortium. Available online at: http://onlinelearningconsortium.org/publications/survey/class_differences

Ally, M. (Ed.). (2009). *Mobile learning transforming the delivery of education and training*. Athabasca University Press. Available online at: http://www.aupress.ca/books/120155/ebook/99Z_Mohamed_Ally_2009-MobileLearning.pdf

Alton-Lee, A. (2003). *Quality teaching for diverse students in schooling: Best evidence synthesis*. Wellington: Ministry of Education. Available online at: http://www.educationcounts.govt.nz/publications/series/2515

Arabasz, P., Boggs, R., & Baker, M. B. (2003). Highlights of E-Learning Support Practices. *Educause Center for Applied Research Bulletin*, 9

Barlow, C. (2001). *Tikanga Whakaaro: Key Concepts in Māori Culture*. Melbourne, Australia: Oxford University Press.

Bleed, R. (2001). A Hybrid Campus for a New Millennium. *EDUCAUSE Review*, *36*(1), 16–24.

Brasher, A., & Taylor, J. (2005). Development of a research plan for use of ambient technology to test mobile learning theories. In J. Attewell & C. Savill-Smith (Eds.), *Mobile learning anytime everywhere* (pp. 33–37). London: Learning and Skills Development Agency.

Brown, M., & Diaz, V. (2010). Mobile Learning: Context and Prospects: A Report on the ELI Focus Session. *EDUCAUSE Learning Initiative*. Available online at: http://net.educause.edu/ir/library/pdf/ELI3022.pdf

Brutus, S., Aguinis, H., & Wassmer, U. (2013). Self-reported limitations and future directions in scholarly reports: Analysis and recommendations. *Journal of Management*, *39*(1), 48–75. doi:10.1177/0149206312455245

Clark, D. (2003). Blend it like Beckham. *Epic Group PLC*. Retrieved from http://epiclearninggroup.com/

Corbeil, J. R., & Valdes-Corbeil, M. E. (2007). Are You Ready for Mobile Learning? *EDUCAUSE Quarterly*, *30*(2), 51–58.

Creswell, J. W. (2013). *Qualitative, quantitative, and mixed methods approaches* (4th ed.). Thousand Oaks, CA: Sage.

Dziuban, C. D., & Moskal, P. D. (2013). Blended learning: A dangerous idea? *The Internet and Higher Education*, *18*(7), 15–23.

Garnham, C., & Kaleta, R. (2002). Introduction to Hybrid Courses. *Teaching with Technology Today, 8* (6). Available online at: http://www.uwsa.edu/ttt/articles/garnham.htm

Garrison, D. R., & Vaughan, N. D. (2008). *Blended learning in higher education*. San Francisco: Jossey-Bass.

Gikas, J., & Grant, M. M. (2013). Mobile computing devices in higher education: Student perspectives on learning with cellphones, smartphones & social media. *The Internet and Higher Education*, *19*(2), 18–26. doi:10.1016/j.iheduc.2013.06.002

Gilmore, T., Krantz, J. & Ramirez, R. (1986). Action based modes of inquiry and the host- researcher relationship. *Consultation*, *5*(3), 161.

Government of Alberta. (2011). *Draft of professional practice competencies for teachers*. Unpublished.

Graham, C. R. (2006). Blended learning systems: Definitions, current trends, and future directions. In C. Bonk & C. Graham (Eds.), *The handbook of blended learning: Global perspectives, local designs* (pp. 3–21). San Francisco, CA: Pfeiffer.

Hattie, J. (2009). *Visible Learning: A Synthesis of Over 800 Meta-Analyses Relating to Achievement*. New York: Routledge.

Kemmis, S. (2009). Action research as practice-based practice. *Educational Action Research*, *17*(3), 463–474. doi:10.1080/09650790903093284

Lave, J., & Wenger, E. (1991). *Situated learning: Legitimate peripheral participation*. Cambridge: Cambridge University Press. doi:10.1017/CBO9780511815355

Littlejohn, A., & Pegler, C. (2007). *Preparing for blended e-Learning: Understanding blended and online learning (Connecting with E-learning)*. London: Routledge.

Matheos, K. (2011). *Innovative practices research project: COHERE report on blended learning*. Ottawa, Canada: Human Resources and Skills Development Canada. Available online at: http://cohere.ca/wp-content/uploads/2011/11/REPORT-ON-BLENDED-LEARNING-FINAL1.pdf

Mayadas, F. A., & Picciano, A. G. (2007). Blended learning and localness: The means and the end. *Journal of Asynchronous Learning Networks*, *11*(1), 3–7.

MoLeNET. (2013). *The Mobile Learning Network*. Available online at: http://www.molenet.org.uk/

Norberg, A., Dziuban, C. D., & Moskal, P. D. (2011). A time-based blended learning model. *Horizon*, *19*(3), 207–216. doi:10.1108/10748121111163913

Patton, M. Q. (1990). *Qualitative evaluation and research methods* (2nd ed.). Newbury Park, CA: Sage Publications.

Pine, G. J. (2008). *Teacher Action Research: Building Knowledge Democracies*. Thousand Oaks, CA: Sage Publications.

Prairie Research Associates. (2011). *Canadian university survey consortium: 2011 undergraduate university study survey results*. Available online at: http://www.cusc-ccreu.ca/publications/CUSC_2011_UG_MasterReport.pdf

Sharpe, R., Benfield, G., Roberts, G., & Francis, R. (2006). *The undergraduate experience of blended e-learning: A review of UK literature and practice*. London: Higher Education Academy. Available online at: http://www.heacademy.ac.uk/resources/detail/teachingandresearch/Undergraduate_Experience

Stringer, E. T. (2007). *Action research* (3rd ed.). Thousand Oaks, CA: Sage Publications.

Wenger, E. (1998). *Communities of practice*. Cambridge, UK: Cambridge University Press. doi:10.1017/CBO9780511803932

West, M. (2012). Mobile learning for teachers: Global Themes. *UNESCO Working Paper Series on Mobile Learning*. Paris: UNESCO. Available online at: http://unesdoc.unesco.org/images/0021/002164/216452e.pdf

Williams, C. (2002). Learning on-line: A review of recent literature in a rapidly expanding field. *Journal of Further and Higher Education*, *26*(3), 263–272. doi:10.1080/03098770220149620

Williams, J. (2003). Blending into the Background. *E-Learning Age Magazine*, 1.

Zhu, E., Kaplan, M., Dershimer, C., & Bergom, I. (2012). Using laptops in the classroom: The University of Michigan. *Seeking Evidence of Impact (SEI) Case Studies*. Boulder, CO: EDUCAUSE Learning Initiative. Available online at: http://www.educause.edu/library/resources/using-laptops-classroom-university-michigan

ADDITIONAL READING

Abilene Christian University. (2013). *Mobile learning research*. Available online at: http://www.acu.edu/technology/mobilelearning/research/

Backer, E. (2010). Using smartphones and Facebook in a major assessment: The student experience. *EJournalof Business Education & Scholarship of Teaching*, *4*(1), 19–31.

Cochrane, T., & Bateman, R. (2010). Smartphones give you wings: Pedagogical affordances of mobile web 2.0. *Australasian Journal of Educational Technology, 26*(1), 1-14. Available online at: http://www.ascilite.org.au/ajet/ajet26/cochrane.pdf

Jones, A., & Issroff, K. (2007). Motivation and mobile devices: Exploring the role of appropriation and coping strategies. *Research in Learning Technology*, *15*(3), 247–258. doi:10.1080/09687760701673675

Kadirire, J. (2009). Mobile learning demystified. In R. Guy (Ed.), *The evolution of mobile teaching and learning*. Santa Rosa, California: Informing Science Press.

Kukulska-Hulme, A., Sharples, M., Milrad, M., Arnedillo-Sánchez, I., & Vavoula, G. (2009). Innovation in Mobile Learning. *International Journal of Mobile and Blended Learning*, *1*(1), 13–35. doi:10.4018/jmbl.2009010102

Kukulska-Hulme, A., Traxler, J., & Petit, J. (2012). Designed and user-generated activity in the mobile age. *Journal of Learning Design*, *2*(1), 52–65. doi:10.5204/jld.v2i1.28

Lenhart, A., Ling, R., Campbell, S., & Purcell, K. (2010). Teens and mobile phones. *Pew Internet and American Life Project*. Available online at: http://www.pewInternet.org/Reports/2010/Teens-and-Mobile-Phones.aspx

Looi, C.-K., Seow, P., Zhang, B., So, H.-J., Chen, W., & Wong, L.-H. (2010). Leveraging mobile technology for sustainable seamless learning: A research agenda. *British Journal of Educational Technology*, *41*(2), 154–169. doi:10.1111/j.1467-8535.2008.00912.x

Motiwalla, L. F. (2007). Mobile leaning: A framework and evaluation. *Computers & Education*, *49*(3), 581–596. doi:10.1016/j.compedu.2005.10.011

Murray, O. T., & Olcese, N. R. (2011). Teaching and learning with iPads, ready or not? *TechTrends*, *55*(6), 42–48. doi:10.1007/s11528-011-0540-6

Oakley, G., Pegrum, M., Faulkner, R., & Striepe, M. (2012). *Exploring the pedagogical applications of mobile technologies for teaching literacy.* Report for the Association of Independent Schools of Western Australia. Available online at: http://www.education.uwa.edu.au/research/?a=2195652

Pachler, N., Bachmair, B., & Cook, J. (2010). *Mobile learning: Structures, agency, practices*. New York: Springer. doi:10.1007/978-1-4419-0585-7

Pegrum, M., Oakley, G., & Faulkner, R. (2013). Schools going mobile: A study of the adoption of mobile handheld technologies in Western Australian independent schools. *Australasian Journal of Educational Technology 29*(1), 66-81. Available online at: http://ascilite.org.au/ajet/submission/index.php/AJET/article/view/64/25

Rogers, Y., Connelly, K., Hazlewood, W., & Tedesco, L. (2010). Enhancing learning: A study of how mobile devices can facilitate sense making. *Personal and Ubiquitous Computing*, *14*(2), 111–124. doi:10.1007/s00779-009-0250-7

Shih, K., Chen, H., Chang, C., & Kao, T. (2010). The development and implementation of scaffolding-based self-regulated learning system for e/m-Learning. *Journal of Educational Technology & Society*, *13*(1), 80–93.

Straub, E. (2009). Understanding technology adoption: Theory and future directions for informal learning. *Review of Educational Research*, *79*(2), 625–649. doi:10.3102/0034654308325896

Traxler, J. (2007). Defining, discussing and evaluating mobile learning: The moving finger writes and having written. *International Review of Research in Open and Distance Learning*, *8*(2). Available online at http://www.irrodl.org/index.php/irrodl/article/viewArticle/346/875Gode

Uzunboylu, H., Cavus, N., & Ercag, E. (2009). Using mobile learning to increase environmental awareness. *Computers & Education*, *52*(2), 381–389. doi:10.1016/j.compedu.2008.09.008

Vaataja, H., Mannisto, A., Vainio, T., & Jokela, T. (2009). Understanding user experience to support learning for mobile journalist's work. In R. Guy (Ed.), *The Evolution of Mobile Teaching and Learning*. Santa Rosa, CA: Informing Science Press.

Wang, M., Shen, R., Novak, D., & Pan, X. (2009). The Impact of Mobile Learning on Students' Learning Behaviours and Performance: Report from a Large Blended Classroom. *British Journal of Educational Technology*, *40*(4), 673–695. doi:10.1111/j.1467-8535.2008.00846.x

KEY TERMS AND DEFINITIONS

Action Research: A reflective process of problem solving led by individuals working with others in teams or as a part of a "community of practice" to improve the way they address issues and solve problems.

Blended Learning: Integration of face-to-face and online learning methods and technologies.

Bring Your Own Device (BYOD): Policies that permit students to bring personally owned mobile devices (laptops, tablets, and smart phones) to their schools or institutions.

Community of Practice: A group of people who share a common interest and collaboratively work together to learn more about this common interest.

Mobile Apps: A software application specifically designed to run on smartphones, tablet computers and other mobile devices.

Mobile Learning: Learning methods and materials that involve the use of mobile phones or handheld computers.

Tablet Devices: A handheld computer contained in a single panel, which is operated as a touch screen.

This work was previously published in Promoting Active Learning through the Integration of Mobile and Ubiquitous Technologies edited by Jared Keengwe, pages 98-115, copyright year 2015 by Information Science Reference (an imprint of IGI Global).

APPENDIX A: PRE-COURSE STUDENT ONLINE SURVEY QUESTIONS

Important Note: The purpose of this survey is to gather student responses that will help inform the use of mobile devices in the Mount Royal University Education Program. Participation in this survey is voluntary and your responses will be kept confidential. Non-participation in this study will not jeopardize student progress in this EDUC2325: Understanding Current and Emerging Pedagogical Technologies course or the Education Program. Completion of the questionnaire below will constitute informed consent in this *Role of Mobile Devices in a Blended Pre-Service Teacher Education Program?* study. This study has been approved by the Mount Royal Human Research Ethics Board (HREB).

Name: ______________________________

Devices

1. Do you own a mobile "hand held" device (e.g. iPhone, iTouch, Blackberry, Nokia, Motorola, LE, Samsung) that is web-enabled (e.g., can access web sites)?
2. If so, what kind of web sites do you utilize?
3. Do you own a mobile "hand held" device that can take digital pictures?
4. If so, what kind of pictures do you take and what do you do with these pictures?
5. Do you own a mobile "hand held" device that can take digital movies?
6. If so, what kind of videos do you take and what do you do with these videos?
7. What kind of mobile "hand held" device do you own (e.g. iPhone, iTouch, Blackberry, Nokia, Motorola, LE, Samsung)?

Applications

1. Do you have a Google Docs account?
2. Do you have a YouTube account?
3. Do you have a Blog account?
4. Do you have a Flickr account?
5. Do you have a Twitter account?
6. Do you have a Diigo account?
7. Do you have your own personal web site?

B.Ed. Elementary Program

1. How do you think mobile "hand held" devices could be used to support your learning in the B.Ed. Elementary program?
2. What do you think will be the educational advantages of using mobile "hand held" devices in this program?
3. What do you think will be the educational disadvantages of using mobile "hand held" devices in this program?
4. Any other comments or suggestions about using mobile "hand held" devices in this program?

For your future K to 12 teaching career how valuable to do you think mobile "hand held" devices will be for performing the following tasks:

Task	Really not valuable	Not valuable	Not sure	Valuable	Really valuable
6. Planning for learning (e.g. lesson planning)					
7. Facilitating student learning (e.g., different approaches to teaching)					
8. Assessing and evaluating student learning (e.g., marking)					
9. Managing the learning environment (e.g., classroom management)					
10. Working as a professional educator (e.g., career-long learning)					

APPENDIX B: FACULTY INTERVIEW QUESTIONS

Important Note: The purpose of this interview is to gather faculty responses that will help inform the use of mobile devices in the Mount Royal University Education Program. Participation in this interview is voluntary and your responses will be kept confidential. Non-participation in this study will not jeopardize your employment at Mount Royal University. Please sign the informed consent form if you would like to participate in this *Role of Mobile Devices in a Blended Pre-Service Teacher Education Program?* study. You may withdraw from this study at any time and your data will be destroyed. This study has been approved by the Mount Royal Human Research Ethics Board (HREB).

Name: ______________________________

Devices

1. Do you own a mobile "hand held" device (e.g. iPhone, iTouch, Blackberry, Nokia, Motorola, LE, Samsung) that is web-enabled (e.g., can access web sites)?
2. If so, what kind of web sites do you utilize?
3. Do you own a mobile "hand held" device that can take digital pictures?
4. If so, what kind of pictures do you take and what do you do with these pictures?
5. Do you own a mobile "hand held" device that can take digital movies?
6. If so, what kind of videos do you take and what do you do with these videos?
7. What kind of mobile "hand held" device do you own (e.g. iPhone, iTouch, Blackberry, Nokia, Motorola, LE, Samsung)?

B.Ed. Elementary Program

1. How do you think mobile devices could be used to support student learning in our MRU B.Ed. Elementary Program?

2. What do you think could be the educational advantages of using mobile devices in our MRU B.Ed. Elementary Program?
3. What do you think could be the educational disadvantages of using mobile devices in our MRU B.Ed. Elementary Program?
4. For our students future K to 12 teaching careers how valuable to do you think mobile "hand held" devices will be for performing the following tasks:

Task	Really not valuable	Not valuable	Not sure	Valuable	Really valuable
b. Planning for learning (e.g. lesson planning)					
Please explain:					
f. Facilitating student learning (e.g., different approaches to teaching)					
Please explain:					
g. Assessing and evaluating student learning (e.g., marking)					
Please explain:					
h. Managing the learning environment (e.g., classroom management)					
Please explain:					
i. Working as a professional educator (e.g., career-long learning)					
Please explain:					

5. Any other comments or suggestions about using mobile devices in our MRU B.Ed. Elementary Program?

Chapter 22
Soft and Hard Technologies in Technology Education

Kin Wai Michael Siu
The Hong Kong Polytechnic University, Hong Kong & Massachusetts Institute of Technology, USA

Yi Lin Wong
The Hong Kong Polytechnic University, Hong Kong

ABSTRACT

There is a common misconception that technology is limited to physical devices (i.e., hard technology). However, technology also includes soft technology, which is concerned with human and social factors. The emphasis on hard technology has prevented technology education from widening its scope and thus catering to the needs of a changing society. This chapter first briefly identifies the common definitions of soft and hard technologies. It then argues that technology education should emphasize both hard and soft technologies. Through a case study of Hong Kong, the chapter identifies the issues surrounding the inclusion of soft technology in the technology curriculum. The issues comprise the outdated perceptions of the government and schools with respect to technology, teachers' backgrounds, and students' abilities. The chapter then proposes recommendations and suggestions for resolving these issues. The future trend of an all-round and balanced approach toward hard and soft technology in technology education is discussed.

INTRODUCTION

The development of technology education has progressed in line with technological and industrial development over the past few decades (Siu & Wong, 2011). For example, in Hong Kong, plastics and rubber materials have been widely adopted in technology education since the rapid development of the plastics industry in the 1960s. Computers have been widely used in technology lessons since their popularization in the 1980s. In recent years, researchers have begun to understand technology better and their discussions of the topic adopt a wider scope. However, in education, the concept of technology is still often limited to the manipulation of physical devices to solve problems, i.e. hard technology. According to Jin (2011), hard technology is "the technology of controlling the

DOI: 10.4018/978-1-4666-8246-7.ch022

'object'" (p. 25), for example, tools and machines. The limited scope of technology education hinders the potential for further development that might cover technology in its broadest sense.

Technology education should emphasize both hard and soft technologies. Soft technology refers to the technologies that involve human factors (Jin, 2011) and that facilitate human flexibility and initiatives (Norman, 2003). Soft technology emphasizes human needs rather than objects. It is essential to include soft technology in technology education, as students need a wider knowledge of technology to face the technological society of today. The current emphasis on hard technology in technology education may be unable to cater to the needs of a changing society. It is important to educate the next generation with the necessary knowledge and skills of soft technology for a future technological world.

This chapter, which is based on the definition of hard and soft technology provided by Jin (2011), discusses the limitations of the emphasis placed on hard technology in current technology education, and hence argues that there must be a paradigm shift moving away from hard technology toward soft technology. The issue is discussed using the case of Hong Kong. The aims of this chapter are to (1) define soft and hard technologies in the context of technology education, (2) identify the issues through a case study of Hong Kong, (3) identify the needs of soft technology in technology education, and (4) provide suggestions for stakeholders in promoting soft technology to develop a balanced secondary school curriculum.

BACKGROUND

The English word "technology" originated from the Greek word "*tekhnologia,*" meaning "systematic treatment" (Oxford Dictionaries, 2013). It is derived from the ancient Greek notion of "*techne*" (craft) (Reydon, 2012). Technology was associated with any man-made artifacts that were different from natural products. Ancient Greek philosophers believed that there was a fundamental distinction between natural products and artifacts, and that "technology learns from or imitates nature" (Franssen, Lokhorst, & van de Poel, 2009).In this view, artifacts are unable to reproduce themselves whereas natural products are able to reproduce, grow, and change. Obviously, the understanding of technology in ancient Greece focused on artifacts that were distinct from nature, and the purpose of these artifacts was generated to fulfill certain needs. Jin (2011) posited that in primitive times, technology was "the making and use of tools and the utilization of fire and language" (p. 22), which we would regard as hard technology.

In the twenty-first century, the definition of technology has become broader, and is no longer limited to the making and using of tools. The rapid advancement of technology and society has changed how we perceive technology. McNeil (2002) claimed that technology "seeks to find practical ways to use scientific discoveries profitably, ways of turning scientific knowledge into utilitarian processes and devices" (p. 3). Grady (2010) believed that technology is "a way of thinking about a problem, and a way of putting thought into practice" (p. 13). Koelega (1995) claimed that technology "is not only machines or procedures to perform a special task, but also the social and cultural context within which technics are being developed and applied" (Notes section, para. 2). As with our ancestors' perceptions, technology today is still driven by external needs. However, the emphasis on "tools" in primitive times has shifted toward a focus on the ways in which technology is used to tackle problems and produce useful outcomes. The emphasis is no longer on tangible substances, but on ways of thinking and how technology interacts with human minds and knowledge.

The shift in our perception of technology suggests that there may be two kinds of technology: hard and soft technologies. Jin (2011), as mentioned in the previous section, distinguished the two technologies by the object-human dimension. Jin (2011) is not the only researcher to have addressed the issue of the two technologies. Like Jin, Werner, and Bower (2012) also pointed out the different foci of the two technologies in their health guides for health workers in villages. They suggested that hard technology is the technology of things, including "tools, instruments, or machines – that people can make, use, and repair themselves using local resources" (p.15-1).Soft technology, in contrast, is the technology of methods that include "ways of doing, learning, and problem solving that are adapted to people's needs, customs, and abilities" (p. 15-1). Norman (1993) distinguished the two technologies by identifying the different roles of the human. He believed that hard technology "refers to those systems that put technology first, with inflexible, hard, rigid requirements for the human" (p. 232), whereas soft technology is human-oriented, referring to "compliant, yielding systems that informate[1], that provide a richer set of information and options than would otherwise be available, and most important of all, that acknowledge the initiative and flexibility of the person" (p. 232).

Examples of soft technology are plentiful nowadays. The simplest of all is computer software technology. The concept of software is soft technology designed to facilitate communication between the hardware (i.e., the hard technology) and the user. The software interface helps us to operate the hardware so that we are not required to study and understand computer languages. People no longer need to understand such languages to work with computers. Software has also advanced in a way that allows users to choose their preferred interfaces. The flexibility provided by the software enhances the efficiency of the communication between the computer and the user. Software has also combined with other hardware technology to optimize the user experience. For example, some smart phones are able to detect the user's eye motion and pause a video when the user's eyes move away from the screen. This feature integrates hard technology (the eye sensor) and soft technology (the idea of pausing the video) to address human needs.

From the example of human interface design, it is clear that hard technology has been "softening" to cater for human needs, as it seems that hard technology may in itself be insufficient to optimize our lives nowadays. More human factors are involved in technology, and thus there is a shift toward soft technology and away from hard technology (Jin, 2011). However, technology education has been unable to catch up with this trend. The scope of technology in technology education does not currently cover soft technology. This limitation means that students do not have a mindset that favors soft technology. Moreover, some curricular stakeholders may not have sufficient insight to include soft technology in their curriculum planning.

CASE STUDY: TECHNOLOGY EDUCATION AT THE SECONDARY SCHOOL LEVEL IN HONG KONG

In this chapter, the case of Hong Kong is used to examine the inclusion of soft technology in secondary school technology education. Hong Kong has a well-established tradition of technology education at the secondary school level, which can be traced back to the 1920s (Siu, 2008).Design and Technology (D&T) was introduced in 1983 and is the subject most equated with technology education. The D&T curriculum has been revised several times. In the last few decades, it has developed into a subject that requires students to solve the problems of daily life through the creative use of different design skills and workshop techniques. D&T enables students to learn about materials, tools, and machines, and the design, manufacturing, and fabrication processes of products through a number of problem-solving activities (Siu, 2008). Most D&T teachers previously taught woodwork and metalwork in industrial or vocational schools.

The long history and the rich background of technology education in Hong Kong should be able to provide a robust case study.

Hong Kong has a six-year secondary school program. Secondary 1 to 3 is referred to as *junior level* and 4 to 6 as *senior level*. This academic structure was implemented in 2006, and the first cohort left secondary school education in 2012. At junior level, the school subject covering technology education is D&T, and at senior level, it is Design and Applied Technology (DAT). Neither are compulsory school subjects and schools can choose whether to offer the subjects at junior or senior level.

Junior Level

The aim of D&T at junior level is to "develop the technological awareness, literacy, capability and lifelong learning patterns" of the students (Curriculum Development Council, 2000, p.5). Four areas of learning are included in the curriculum: "the nature and impact of technology for yesterday, today and tomorrow," "design and communication," "the tools and machines of technology," and "resources of technology."However, in practice, teachers often place greater emphasis on "the tools and machines of technology."This topic also receives the largest time allocation in the suggested timetable.

A project-based learning approach is often adopted by D&T teachers. Teachers teach the necessary drawing and technical skills through the design process. Wong and Siu (2012), in their study on creativity in D&T projects in Hong Kong, found that the project briefs given to students are often closed and unconnected to the social and cultural background. Students are asked to design and make a defined object or device, such as a stationery stand. Very few human or social factors are considered in the design process and teachers do not expect students to be concerned with human factors at the junior secondary school level. Teachers often focus on the functionality of the artifact. Junior secondary school D&T is limited to learning basic technical skills. Very few teachers emphasize teaching knowledge related to technological literacy and soft technology. This may be due to the perception of D&T as a technical subject in Hong Kong, and because teachers do not want to overload students with too many ideas. Hands-on activities account for most of the curriculum time. This arrangement is also welcomed by most of the students because they can move around in a workshop instead of sitting still in a classroom, which is comparatively more disciplined. In addition, there may not be enough time to allow the students to work on human factors, as the curriculum time for D&T is always shared with other technical subjects such as Home Economics. Volk, Yip, and Lo (2003) also addressed this issue and claimed that the limited curriculum time provides rather superficial coverage of D&T to students.

The practice discussed above implies that D&T at junior secondary school level ignores soft technology. In fact, although the curriculum does include soft technology in topics such as "the nature and impact of technology for yesterday, today & tomorrow," teachers may not be capable of teaching such topics because most of them trained as woodwork or metalwork teachers rather than as D&T teachers when they entered the profession. Teachers are also under great pressure to boost their students' performance in various design and technology competitions to gain recognition from their principals and colleagues. Those students who are able to participate in D&T competitions may have opportunities to explore knowledge beyond their lessons; however, the majority of students does not have this kind of opportunity and may miss out on this opportunity for further learning. In other words, D&T at junior secondary level places less emphasis on thinking, intellectual knowledge, and social awareness.

Senior Level

The DAT curriculum was implemented in 2009.Students are required to study the topics of technology, design, and society in three core strands: technological principles, design and innovation, and value and impact, and to choose another two from the five elective technology studies modules: electronics, automation, creative digital media, visualization and CAD modeling, and design implementation and material process. Schools offer the elective modules according to the availability of school facilities and their teachers' capabilities. The aim of DAT is to "provide students with fundamental knowledge and skills in technology and design, and to cultivate in them the attributes of innovation and entrepreneurship necessary to face the rapid social, economic and technological changes in a knowledge-based economy" (Curriculum Development Council & Hong Kong Examinations and Assessment Authority, 2007a, p. 3). The curriculum and assessment guide for DAT also stated that innovation and entrepreneurship are the two major concepts intended for development.

Social issues and human factors are covered in DAT. An objective of the DAT curriculum is to enable students to become "discriminating, informed and responsible users of products, and develop their awareness of the interplay between technology and aesthetic, enterprise, social, cultural and ethical issues" (Curriculum Development Council & Hong Kong Examinations and Assessment Authority, 2007a, p. 3). The third strand, value and impact, fulfills this objective by focusing on awareness of technological development and its impact on society. In addition, human and environmental factors are included in the first strand, i.e. design and innovation. From the point of view of the curriculum, human factors are covered. However, as suggested by the curriculum document, the compulsory strands only occupy between a third and a half of the curriculum time. The actual time spent on social issues and human factors may not be adequate. Nevertheless, DAT is a new senior secondary school subject and teachers are still exploring better ways of teaching the new material.

At the end of the senior secondary school level, students have to sit a public exam for the Hong Kong Diploma of Secondary Education (HKDSE). A design project accounts for 40% of the total marks in DAT (Curriculum Development Council & Hong Kong Examinations and Assessment Authority, 2007a). As a school-based assessment (SBA), the students have to choose and work on a design project from a project list. The SBA is divided into two parts: Part 1, which comprises research, investigation and data collection (10% out of 40%), and Part 2, which covers the design and making of the project (30% out of 40%). Students must demonstrate their design process, technological understanding, and social and entrepreneurial awareness in their project. In 2013, four projects were offered to students in the SBA project list (see Table 1).

Table 1. Project list of DAT SBA in 2013 (Hong Kong Examinations and Assessment Authority, 2013)

Project	Project Topic	Background Description
1	A flying machine/ system	Energy conservation can help to reduce a future shortage of oil in the world.
2	Furniture with special features	Furniture can be designed specifically for people with individual needs by adding special features.
3	Strategic landfills	Every day, thousands of tons of garbage from businesses, industry, and households need to be disposed of.
4	A topic of your choice	This topic requires the approval of your school teacher.

Projects 1 and 3 are related to energy conservation and garbage disposal. Project 2 is related to individual needs. It is obvious that the design projects in the SBA project list are related to human or social factors. However, in project 4, the extent to which students consider human factors in their design greatly depends on the nature of the topic they have chosen.

Teachers and students at senior secondary school level are under great pressure due to the public examination, which directly affects their future prospects. Thus, it is unsurprising that learning and teaching activities are based on the examination. If the projects suggested in the SBA project list involved human and social factors, teachers would undoubtedly encourage students to learn more about this aspect of technology.

THE INCLUSION OF SOFT TECHNOLOGIES IN TECHNOLOGY EDUCATION

The development of technology started when humans first made and used artificial tools to optimize their lives (Jin, 2011). Technology in primitive times focused on tools to effectively help humans to solve daily problems. As civilization and the economy progressed, technology became a tool to increase efficiency and maximize profits. However, although investment in technology benefits the economy, it also creates problems for humans. Bill Joy, the cofounder and chief scientist of Sun Microsystems, has claimed that some of the most powerful technologies threaten human lives and even our existence, and that scientists and technologists sometimes fail to understand the consequences of their inventions in the process of discovery and innovation (Joy, 2000).It can be argued that the emphasis of technology development has been placed solely on hard technology and that inventors have been less concerned with human and social factors. This attitude may be practical and applicable for a society experiencing rapid industrial development but it is not suitable for a world that is dominated by post-industrial societies. People today care more about quality of life, and therefore, technology should focus on the improvement of our living experience and not just efficiency and profits.

Particular technologists and technology companies may be aware of this issue and gradually shift their emphasis from hard to soft technology. The inclusion of soft technology in technology education has become an essential task if educators desire to educate the next generation for the world of the future. However, technology education does not currently include adequate knowledge of soft technology in the curriculum. Wicklein (1997), in his review of the focus of the curriculum for technology education, has also addressed this issue and has pointed out that educators are primarily concerned with the technical procedures for making artifacts instead of the human and social factors involved in technology. Using the case study of D&T in Hong Kong, we identify several potential issues at different levels of curriculum planning and implementation.

Government

Stakeholders in curriculum planning at the government level may not have the insight to realize the importance of soft technology in technology education, because technology education is derived from traditional woodwork and metalwork, which focus on skill training. Zuga (1997) analyzed technology education in the United States based on a historical review and found that historical factors may limit the further development of technology education. The situation in Hong Kong is similar, and this limitation may prevent technology education from widening its scope to soft technology. Curriculum development officers in the state's education department should break the traditional boundaries and introduce more soft technology alongside the existing hard technology. However, this would not be a trivial task. For example, in

Hong Kong, curriculum development officers are often experienced D&T teachers and most of them have already formed their ideas of what D&T is. As long as there are no young scholars or other parties contributing to the team, it will not be easy to introduce new ideas to the curriculum. All of this may be reflected in the current junior secondary school curriculum. However, for the new senior secondary school DAT curriculum, the Education Bureau (EDB) of Hong Kong has invited the Institute of Professional Education and Knowledge (PEAK) of the Vocational Training Council (VTC) to develop the DAT resource materials (see Curriculum Development Institute, 2009). It is clear that the new senior secondary school curriculum will make greater reference to human and social factors.

In fact, in the Hong Kong curriculum, soft technology is referred to not only in technology education but also in other school subjects. The curriculum development officers of liberal studies were aware of the importance of soft technology and included knowledge of soft technology in liberal studies. Liberal Studies in Hong Kong is a cross-disciplinary subject that comprises three areas of study: self- and personal development, society and culture, and science, technology, and the environment (Curriculum Development Council& Hong Kong Examinations and Assessment Authority, 2007b). Most of the knowledge of soft technology is in the area of science, technology, and the environment. Although this arrangement allows students to acquire the necessary knowledge, it would still be better to situate this knowledge in the context of technology education so that students can understand its content in the real-life practical context of DAT.

Schools

The school principal and other administrative personnel in a school may not have up-to-date knowledge of technology. Wright, Washer, Watkins, and Scott (2008) conducted a survey with the stakeholders of technology education in the United States and found that nearly half of the surveyed stakeholders, including school principals, teacher educators, and technology teachers, believed that career and technical education is the primary purpose of technology education. Principals may still view technology education as a craft-based or skill-based subject. While they are planning the school curriculum, their perceptions may affect decisions on the curriculum time allocated for technology education. They may limit the curriculum time to the minimum, as it is generally accepted that craft skills are less important in a knowledge-based economy and society. In fact, Herschbach (1995) cited Frey's (1989) belief that craft skill is the lowest level of technological knowledge. If principals consider technology education to be solely related to craft skills, it is unsurprising to find that technology education does not occupy much curriculum time in the school timetable. For instance, in Hong Kong schools, time limitations mean that students are often unable to study D&T for an entire academic year at a time.

Because of the time constraints, teachers cannot teach technology in depth. Schools do not employ large numbers of D&T teachers to cover the subject. Thus, there is virtually no support for D&T teachers. For schools that only offer D&T at junior secondary school level, it is questionable whether they can provide adequate support for teachers and students to learn about soft technology. However, schools that offer DAT have a better teaching environment, as DAT is one of the examination subjects in DSE. Schools need to give support to teachers and students so that students can excel in the public examination.

Technology Teachers

As mentioned in the previous section, most teachers may not be capable of teaching soft technology because of their traditional training. They are skilled in hands-on work but may not be equipped to teach about social issues. Moreover, some may not have the vision to realize the importance of soft technology. In fact, the teaching strategies used to teach practical skills, hard technological knowledge, and human issues are different. Hill (2006) pointed out that technology education is "action-based" and always has "hands-on instructional activities" (p. 55). The same strategies may not be applicable in teaching human and social issues. Johnson (2010) addressed a similar issue by arguing that teaching ethics in science may need a different and specific teaching strategy. It is thus not easy for these in-service teachers to learn new teaching strategies or even to adopt another teaching style to teach related human issues effectively. It is demanding to require technology teachers to be knowledgeable about science and technology and also social science, if soft technology is taken into account in the curriculum.

The demands of technology teachers have been reflected in Hong Kong DAT. DAT teachers are required to teach technology, design, and entrepreneurial knowledge so that the students can finish their projects. Although the students are told to research and develop their designs by themselves, the teachers also need to possess the knowledge to guide the students through the process of designing and making.

Students

Although knowledge of soft technology is best situated in technology education, it is questionable whether students are capable of learning and applying soft technology in a real-life context. Some students may be unable to acquire knowledge of both hard and soft technology, as the scope is much wider compared with hard technology alone. Therefore, it can be argued that technology education with both hard and soft technology favors students with higher academic ability. Students with lower academic ability may not be able to master such knowledge thoroughly. In Hong Kong, because of the history and the image of D&T in society, students with higher academic ability tend not to take the subject at senior secondary level. Yau and Ong (2008) reported a similar situation in Singapore, where the subject is not popular among academically inclined students, who are generally encouraged to take academic subjects that are better received by the various departments and faculties of universities. In contrast, students with lower academic ability are encouraged to take DAT because it seems that the subject does not require high language ability. In this regard, the inclusion of soft technology in DAT may be too broad for DAT students in Hong Kong.

SUGGESTIONS AND RECOMMENDATIONS

In consideration of these issues, some suggestions and recommendations at the different levels of curriculum planning and implementation are proposed, primarily based on the context of Hong Kong. Some of these suggestions and recommendations are also applicable in other contexts, as they not only tackle the specific problems and issues in Hong Kong, but could also optimize any technology education curriculum.

It is noted that the suggestions and recommendations proposed for the government, schools, and technology teachers in this section may not correspond to the sub-sections with the same title in the previous section because some of the issues addressed in the previous sub-sections may be solved or settled by other parties in the education system. Therefore, the subsequent suggestions and recommendations may be placed under sub-sections with a different title.

Government

In view of the inadequacy of the inclusion of soft technology in the technology education curriculum, especially at the junior secondary level, and the traditional educational background of curriculum development officers, school principals and teachers, curriculum development officers should first update their understanding of technology so that they can reflect the needs of professional development officers and thus provide adequate training and education, e.g. advertisement, to in-service teachers and the public. Curriculum development officers must lead the curriculum, especially the junior secondary school curriculum, to a new way of thinking that includes knowledge of soft technology. Nkosana (2008) believed that curriculum officers are important, as they provide leadership to teachers and supervise the development of the curriculum. The success of the implementation greatly depends on the attitude and perceptions of the officers. Therefore, it is important for them to be inspired and to be aware of the importance of soft technology. They may need to refer to the technology education curriculum in other countries so that the depth and breadth of the Hong Kong curriculum can be accurately assessed.

The government should then provide adequate training courses for in-service teachers to update their knowledge of and perspectives on technology education. Fraser, Kennedy, and Reid (2007) also affirmed the importance of teachers' continuing professional development around the world. In Hong Kong, providing diploma courses for teachers would also be feasible, as the current teacher training model does not include any further enrichment courses for technology teachers. Optimizing the education of technology teachers is essential for ensuring that teachers have more opportunities to get equipped for teaching new contents.

Furthermore, the government may also publish advertisements for the new technology curriculum so that stakeholders can understand more about the shift of the technology curriculum and soft technology. As Morris (1996) stated, "the government has the ultimate responsibility for all aspects of schooling" (p. 110), so it is important for the government to take control of this issue.

School

Because knowledge of soft technology exists not only in technology but also in other school subjects, as mentioned in the previous section, a school can encourage teachers to work in collaboration with other teachers in the same school or even other schools in the same district. Schools could support teachers and provide opportunities and resources to help teachers to collaborate between different subjects. School subjects such as science, mathematics, and liberal studies can cooperate with D&T and DAT so that students' school time can be used more effectively and more support can be given to D&T or DAT teachers. In this way, the subject boundaries can be blurred and students can acquire knowledge that is transferable and applicable to different contexts. Wicklein and Schell (1995) also advocated the integration of mathematics, science, and technology education so that students need not be forced to reconnect knowledge learned outside the classroom. Wraga (2009) also stated that an interdisciplinary approach or the integration of curriculum could create "the cumulative impact of all learning experiences" (p. 92), help students to understand the complex interrelation between these experiences, and relate and apply subject knowledge to social issues. Collaboration between subjects is surely beneficial to technology education, particularly if soft technology is included. Soft technology is a form of cross-disciplinary knowledge that may also include, but not limited to, human behavior, psychology, and social issues.

In addition, the schools within a district can form a network for exchanging teaching resources. Wheeler (2001), in his study of the role of the teacher in information and communication technologies, also advised teachers from different schools to work together and to share resources to maximize their value. Teachers may then be able to save time for preparatory work and to lighten their workload. The resources should not be limited to teaching materials but should also include human resources. Teachers from different schools can form co-teaching groups so that students can benefit not only from teachers in their own schools but also those from neighboring schools. DAT follows this practice in some districts in Hong Kong. However, this involves many problems in cooperation and administration.

Technology Teachers

Technology teachers should take the initiative and optimize the curriculum by providing feedback to schools and the government. In the teaching profession, teachers tend to follow instructions from the education department and seldom have a role to play in curriculum planning at the governmental level. Teachers are rather passive in this regard. Ingersoll (2003) also addressed the passiveness of teachers and pointed out that "teachers in American schools had far less input into how their schools operated and what their jobs were to be" (p. 2). Perhaps teachers' heavy workloads do not leave them with the necessary time to rethink the curriculum. Furthermore, Esteve (2000) addressed the issue of teachers' excessive workloads, which mean they can only put limited effort into their tasks. The inadequacy of school support also causes teachers to contribute extra time to their teaching tasks. This lack of time and support reduces their initiative to add new teaching components and corresponding teaching methods to the curriculum.

However, to optimize the curriculum, teachers must take the initiative and spend time on rethinking and optimizing the curriculum, because they are the experts who implement the curriculum and the group that understands their own and their students' immediate needs. Subsequently, in the dilemma between the lack of spare time and taking the initiative, teachers and the technology teacher union should speak out and explain the situation to their schools and the government to make space for them to facilitate the optimization of the curriculum.

FUTURE TRENDS

Technology has advanced to such a stage that we no longer ask how technology works but why it was invented and what are the consequences of using it. Focusing on hard technology in technology education may not be appropriate. The inclusion of soft technology in the curriculum has become essential, and the current focus on hard technology may is unable to provide a broad perspective for students in the changing technological world. In addition, technology education should include the teaching of morality and values. Without this responsibility, technology education is degraded to a kind of craft-based training.

However, this does not imply that the emphasis should solely be on soft technology and that hard technology should be omitted. A balanced approach should be promoted so that students can understand and articulate both hard and soft technologies. Students should not only master the skills of technology but should also understand the values behind the technology. This kind of all-round and balanced approach should be sought, and represents the aim of technology education in the future.

Soft technology is an important component in technology education. Learning and teaching technology should not be limited to the functionality and feasibility of technology but should also include human and social factors. The curricula of school subjects such as D&T or DAT should respond to this necessity. Yet technology education that includes the consideration of these factors is not intended to replace humanities subjects. In any event, it is not possible to take over the role of humanities subjects, as these subjects have a wider coverage related to social issues. Similar to the collaboration between science, mathematics, and technology, technology should also cooperate with other humanities subjects such as liberal studies so that knowledge can be transferred to students effectively without overlapping. More important is the depth and breadth of the knowledge of soft technology and its cooperation with other humanities subjects.

Conducting research is essential to developing an all-round and balanced approach to technology education. However, educators and researcher soften focus on learning and teaching hard technology instead of soft technology. There is an urgent need for related research on soft technology. For instance, the performance, motivation, and perceptions of students toward learning soft technology need to be explored as these topics are essential to the development of the curriculum. The results of such studies will enable educators to fine-tune the direction of the learning and teaching of soft technology.

CONCLUSION

In primitive times, technology was involved making and using tools (Jin, 2011). As technology advances, technology is no longer limited to tangible tools. Nowadays technology focuses on the way of thinking and how it interacts with the human (Grady, 2010; Koelega, 1995). Human and social factors are becoming more important in technology, as an over-emphasis on hard technology may cause problems. The importance of soft technology is highlighted by the changing technological world and there is an urgent need for technology education to include knowledge of soft technology in its curriculum, as the current emphasis on hard technology lags behind the change.

However, it is questionable whether technology education currently includes soft technology in its curriculum. Our case study of Hong Kong revealed that knowledge of soft technology is only included in DAT, i.e., at senior secondary school level. There is only minimal coverage of soft technology in D&T at junior secondary school level, primarily because of the government's and schools' outdated perceptions of technology, the teachers' backgrounds, and the students' abilities. Encouragement from the government and cooperation between schools, technology teachers, and teachers of different school subjects is suggested so that the inclusion of soft technology can be made possible.

The inclusion of soft technology is a future trend in technology education. Technology educators should ask for an all-round and balanced approach that includes both hard and soft technology in the curriculum to develop students' technology literacy. Soft technology is not only a form of knowledge but also a kind of mindset that facilitates the use of hard technology. However, it is recognized that the recommendations and suggestions proposed in this chapter are challenging. Different parties involved in the curriculum development of technology education need to compromise before a consensus on the issue can be achieved. Nevertheless, it is hoped that soft technology can be promoted and that the next generation may use technology more wisely to benefit society and the world of the future.

ACKNOWLEDGMENT

We would like to acknowledge the project funding for the study and preparation of this chapter supported by The Hong Kong Polytechnic University. We also thank the visiting research fund of Massachusetts Institute of Technology for supporting the preparation of this chapter.

REFERENCES

Curriculum Development Council. (2000). Syllabuses for secondary schools: Design & technology (Secondary 1-3). Hong Kong, China: Education Department.

Curriculum Development Council, & Hong Kong Examinations and Assessment Authority. (2007a). *Technology education key learning area: Design and applied technology curriculum and assessment guide* (Secondary 4-6). Hong Kong, China: Education Bureau, Government Printer.

Curriculum Development Council, & Hong Kong Examinations and Assessment Authority. (2007b). *Liberal Studies:* C*urriculum and assessment guide* (Secondary 4-6). Hong Kong, China: Education Bureau, Government Printer.

Curriculum Development Institute. (2009). Design and applied technology (secondary 4-6) compulsory strand 1 design and innovation: Learning resource materials. Hong Kong, China: Curriculum Development Institute, Education Bureau, Government Printer.

Esteve, J. M. (2000). The transformation for the teachers' role at the end of the twentieth century: New challenges for the future. *Educational Review*, *52*(2), 197–207. doi:10.1080/713664040

Franssen, M., Lokhorst, G., & van de Poel, I. (2009). Philosophy of technology. In E. N. Zalta (Ed.), *The Stanford encyclopedia of philosophy.* Retrieved from http://plato.stanford.edu/

Fraser, C., Kennedy, A., & Reid, L. (2007). Teachers' continuing professional development: Contested concepts, understandings and models. *Journal of In-service Education*, *33*(2), 153–169. doi:10.1080/13674580701292913

Frey, R. E. (1989). A philosophical framework for understanding technology. *Journal of Industrial Teacher Education*, *27*(1), 23–35.

Grady, W. (2010). *Technology*. Berkeley, CA: Groundwood Books/House of Anansi Press.

Herschbach, D. R. (1995). Technology as knowledge: Implication for instruction. *Journal of Technology Education*, *7*(1), 31–42.

Hill, R. B. (2006). New perspectives: Technology teacher education and engineering design. *Journal of Industrial Teacher Education*, *43*(3), 45–63.

Hong Kong Examinations and Assessment Authority. (2013). *Hong Kong diploma of secondary education examination 2013: Design and applied technology SBA project list*. Hong Kong, China: Hong Kong Examinations and Assessment Authority.

Ingersoll, R. M. (2003). *Who controls teachers' work? Power and accountability in America's schools*. Cambridge, MA: Harvard University Press.

Jin, Z. (2011). *Global technological change from hard technology to soft technology*. Bristol, UK: Intellect.

Johnson, J. (2010). Teaching ethics to science students: Challenges and a strategy. In B. Rappert (Ed.), *Education and ethics in the life sciences: Strengthening the prohibition of biological weapons* (pp. 197–213). ANU E Press.

Joy, B. (2000). Why the future doesn't need us. *Wired, 8*(4).

Koelega, D. G. A. (1995). Technology, ecology, autonomy, and the state. Society for Philosophy and Technology, 1(1-2).

McNeil, I. (2002). *An encyclopedia of the history of technology*. London, UK: Routledge.

Morris, P. (1996). *The Hong Kong school curriculum: Development, issues and policies* (2nd ed.). Hong Kong, China: Hong Kong University Press.

Nkosana, L. B. M. (2008). Importance of education officers' attitudes and perceptions in curriculum and assessment reform. *Electronic Journal of Foreign Language Teaching*, *5*(1), 41–67.

Norman, D. A. (1993). *Things that make us smart: Defending human attributes in the age of the machine*. Cambridge, MA: Perseus.

Oxford English Dictionaries. (2013). *Oxford dictionaries: The world's most trusted dictionaries*. Retrieved from http://oxforddictionaries.com/

Reydon, T. A. C. (2012). Philosophy of technology. In J. Fieser, & B. Dowden (Eds.), *Internet encyclopedia of philosophy: A peer-reviewed academic resource.* Retrieved from http://www.iep.utm.edu/technolo/

Siu, K. W. M. (2008). Review on the development of design education in Hong Kong: The need to nurture the problem finding capability of design students. *Educational Research Journal*, *23*(2), 179–201.

Siu, K. W. M., & Wong, Y. L. (2011). Changes in the Technological Aspects and Facilities of Design Education: A Case Study of Hong Kong. *International Journal of Information and Communication Technology Education*, *7*(4), 47–59. doi:10.4018/jicte.2011100105

Volk, K., Yip, W. M., & Lo, T. K. (2003). Hong Kong pupils' attitudes towards technology: The impact of design and technology programs. *Journal of Technology Education*, *15*(1), 48–63.

Werner, D., & Bower, B. (2012). *Helping health workers learn: A book of methods, aids and ideas for instructors at the village level*. Berkeley, CA: Hesperian.

Wheeler, S. (2001). Information and communication technologies and the changing role of the teacher. *Journal of Educational Media*, *26*(1), 7–17. doi:10.1080/1358165010260102

Wicklein, R. C. (1997). Curriculum focus for technology education. *Journal of Technology Education*, *8*(2), 71–78.

Wicklein, R. C., & Schell, J. W. (1995). Case studies of multidisciplinary approaches to integrating mathematics, science and technology education. *Journal of Technology Education*, *6*(2), 59–76.

Wong, Y. L., & Siu, K. W. M. (2012). Is there Creativity in Design? From a Perspective of School Design and Technology in Hong Kong. *Asia Pacific Education Review*, *13*(3), 465–474. doi:10.1007/s12564-012-9208-y

Wraga, W. G. (2009). Toward a connected core curriculum. *Educational Horizons*, *87*(2), 88–96.

Wright, M. D., Washer, B. A., Watkins, L., & Scott, D. G. (2008). Have we made progress? Stakeholder perceptions of technology education in public secondary education in the United States. *Journal of Technology Education*, *20*(1), 78–93.

Yau, C. M., & Ong, C. C. (2008). Pupils' views towards design and technology in Singapore. *Design and Technology Education: An International Journal*, *10*(3), 37–49.

Zuga, K. F. (1997). An analysis of technology education in the United States based upon an historical overview and review of contemporary curriculum research. *International Journal of Technology and Design Education*, *7*(3), 203–217. doi:10.1023/A:1008856517112

KEY TERMS AND DEFINITIONS

All-Round and Balanced Approach: All-round and balanced approach is the suggested approach that includes both hard and soft technologies as appropriate in the technology curriculum.

Curriculum: The curriculum includes the aims, objectives, teaching content, teaching strategies, assessment methods, and other components of learning and teaching in classrooms.

Design and Applied Technology (DAT): DAT is the senior secondary school subject of technology education in Hong Kong. It is an extension of D&T. It enables students to learn innovation and entrepreneurship in a knowledge-based economy through a number of problem-solving activities.

Design and Technology (D&T): D&T is the junior secondary school subject of technology education in Hong Kong. It enables students to learn about materials, tools, machines, and the design, manufacturing, and fabrication processes of products through a number of problem-solving activities.

Hard Technology: Hard technology refers to the technological knowledge related to technical devices and procedures and the controlling of technological devices.

Soft Technology: Soft technology refers to the area of knowledge that concerns human and social factors in a technological context.

Technology Education: Technology education is the study of technology. Students learn technological and design knowledge and processes in technology education.

ENDNOTES

1. According to Norman (1993), the word "informate" was invented by Sushana Zuboff in *In the Age of the Smart Machine*. It is used to "describe the potential of new technologies to inform, to provide people with rich access to a variety of information that would not be available without technology" (p. 226).

This work was previously published in a Handbook of Research on Education and Technology in a Changing Society edited by Victor C. X. Wang, pages 625-638, copyright year 2014 by Information Science Reference (an imprint of IGI Global).

Chapter 23
Use of Tablet Computers and Mobile Apps to Support 21st Century Learning Skills

Michael Reichert
University of Delaware, USA

Chrystalla Mouza
University of Delaware, USA

ABSTRACT

In this chapter, the authors provide examples that illustrate ways in which educators can use tablets and mobile apps to redesign school experience in order to support individualized instruction, development of 21st century skills, and anytime anyplace learning. These examples are generated from a two-year examination of a tablet initiative in a private all-boys school. Using insights from human-centered views of mobile learning, the authors highlight interactions among mobile apps, learners, and peers, while examining issues of pedagogy associated with the implementation of mobile learning. They conclude with implications for researchers, educators, and practitioners involved in the implementation of mobile initiatives.

INTRODUCTION

Andrew, a 13-year old 8th grader, walks into his social studies class. Upon entering, he unlocks his iPad, opens up *Edmodo* and begins his warm-up as he does each day the class meets. For today's warm-up, the teacher is asking students to consider the major reason U.S. President Kennedy did not get along with U.S.S.R. Premier Khrushchev, a lesson covered in the previous night's online lecture delivered by the teacher through *Voicethread,* consistent with a flipped classroom approach. To help form his response, Andrew is able to cue up a Cold War video the teacher linked from the *History Channel* app to the warm-up post. "Three minutes left on the warm-up," the teacher says as he walks around the room monitoring student work. Andrew takes the teacher's cue, as it is time to write his response in *Edmodo*. As students enter their posts in *Edmodo*, the teacher updates the responses and makes note of those students who are able to respond accurately and those who appear

DOI: 10.4018/978-1-4666-8246-7.ch023

to struggle. The teacher uses this information as a form of formative assessments to better gauge which students need extra support and differentiate his instruction accordingly.

Andrew's story described above illustrates a way of embracing mobile learning and opening up new learning opportunities that prepare students for 21st century skills required to work and function in an increasingly mobile and information rich society. According to the latest issue of the New Media Consortium Horizon Report (Johnson, Becker, Cummins, Estrada, Freeman, & Ludgate, 2013), mobile learning is rapidly becoming a key component of K-12 education with the potential of near-term adoption. Mobile learning has been initially defined as learning where the dominant technologies used are handheld or palmtop devises (Trexler, 2005). In recent years, however, scholars have moved from *device-oriented* to *human-centered* definitions of mobile learning where the focus is primarily on learners and context (Koole, 2009; Laouris & Eteokleous, 2005; Sharples, Taylor & Vavoula, 2007). Koole (2009), in particular, proposed the Framework for the Rational Analysis of Mobile Education (FRAME), which includes a combination of the interactions between learners, their devices, and other people. In this framework, mobile learning provides increased access to information, enhanced collaboration among learners, and a deeper contextualization of learning (Koole, 2009). According to van't Hooft (2012), this model is valuable in K-12 education because it allows us to consider mobile learning devices, pedagogy, and curriculum in a holistic way.

The introduction and wide adoption of mainstream tablet computers in the last three years has re-energized and extended inquiry into the affordances of mobile learning in education (Brand & Kinash, 2010). More specifically, the introduction of the Apple iPad in 2010 as well as the dramatic growth of mobile educational applications (apps), software programs that run on mobile devices, have redefined what we mean by mobile computing and expanded the capabilities of mobile devices enormously (Johnson et al., 2013). In order to take advantage of the affordances and capabilities of mobile devices and mobile apps, however, educators need to redesign school experiences in order to support: (a) individualized instruction (Squire, 2012); (b) development of 21st century skills - the ability to access and evaluate information, create and innovate, communicate in new ways, and collaborate effectively (Partnership for 21st Century Skills, 2009); and (c) anytime anyplace learning through multiplicity of space (Squire, 2012).

In this chapter we provide examples that illustrate how educators can use iPads and mobile apps to support such learning experiences. The examples are generated from an examination of an iPad initiative in a private school in a Mid-Atlantic State launched in 2011. Specifically, the examples are generated from the first author's classroom (Michael), who has served as a social studies teacher at the school since the inception of the initiative. Using insights from *human-centered* views of mobile learning, we analyze these examples paying close attention to the interactions between learners, iPads and other people as suggested by Koole (2009). We also examine issues of pedagogy associated with the implementation of mobile learning and its potential to support the development of 21st century skills. Finally, we discuss implications of our work for researchers, educators, and practitioners involved in the implementation of iPad initiatives.

BACKGROUND

There is no doubt that the emergence of tablet devices such as the iPad has taken the educational community by storm. The Los Angeles school system, for instance, has recently approved the purchase of $30 million worth of iPads, while districts from Texas to Chicago and Florida are instituting iPad initiatives worth millions of dollars. Further, current estimates indicate 70 billion app downloads in 2013, with educational apps being the second most downloaded in iTunes of all categories (Johnson et al., 2013). Despite the wide adoption of tablets and mobile apps, there is scarcity of research that examines the use of these technologies in teaching and learning, particularly the ways in which they are used to transform the quality of teaching and learning and blend face-to-face with virtual space (Brand & Kinash, 2010).

iPads and Mobile Apps to Support Teaching and Learning

Although empirical literature examining the use and outcomes of iPads and mobile apps in K-12 settings is still scarce, some evidence has begun to emerge on their potential to enhance teaching and learning. Using the camera app available on most mobile devices, for example, White and Martin (2014) and Ekanaykae and Wishart (2011) examined the role of photographic images taken by students to mathematize commonplace objects and capture authentic materials related to scientific experimentation. Findings indicated that photographic images captured on mobile devices enabled teacher planning and supported student learning by promoting their observation skills and creating opportunities for collaborative discussion.

Hutchison, Beschorner, and Schmidt-Crawford (2012) examined the viability of iPads and mobile apps to support and enhance literacy instruction and foster the acquisition of skills required to read and write in digital environments. Examining the work of an elementary literacy teacher over a period of three weeks, Hutchison et al. (2012) found that the use of iPads not only helped the teacher meet her print-based literacy goals but it simultaneously introduced students to new literacy skills associated with 21st century technologies including the ability to communicate and visualize information using apps such as *iBooks*, an app for downloading and organizing books and *Doodle Buddy*, a drawing and doodling app.

Looking at the integration of iPads specifically for social studies, Berson, Berson and McGlinn Manfra (2012), described the practice of a third grade teacher who used iPads to facilitate students' discovery of cultural differences and similarities between the lives of children in Florida and Haiti. The authors noted that the use of iPads in conjunction with apps that supported creativity, collaboration, and communication not only captured student voices but it also promoted increased excitement and engagement among students, served as a means for furthering classroom community building, and promoted social studies learning goals.

In one of the most comprehensive efforts to review the impact of iPads on teaching and learning, Heinrich (2012) examined the implementation and outcomes of a one-to-one iPad initiative at a non-selective secondary school in England for students ages 11-18. Findings indicated that the iPads were well received and used increasingly within the curriculum reflecting pedagogical changes and new ways of learning that took advantage of anytime anyplace access. Further, the iPads had a positive impact on student motivation and ability to communicate, collaborate, and conduct research. Heinrich argues that their outcomes clearly demonstrate the value of the iPad as an educational tool.

These examples demonstrate ways in which mobile devices and educational apps can support teaching and learning. The use of the camera app allowed students to personalize their learning and situate it within real world examples. Similarly, the use of content focused and communication apps supported the development of traditional and 21st century learning skills while promoting collaboration and social interaction. Nevertheless, these examples also demonstrate the role of the teacher in orchestrating the use of mobile devices and educational apps. Murray and Olcese (2011), for example, found that the majority of the apps currently available are not consistent with modern theories of learning and skills needed to compete in a 21st century economy. Further, the majority of educators continue to rely on behavioral models of teaching rather than collaboration and knowledge construction in a social context as advocated by human-centered views of mobile learning. As a result, teacher preparation and willingness to design experiences that capitalize on the affordances of mobile devices is critical (Kukulska-Hulme, Sharples, Milrad, Arnedillo-Sanchez, & Vavoula, 2009).

iPads and Mobile Apps to Blend Face-to-Face with Virtual Space

Recent data from the Pew Research Center indicate that mobile access to the Internet among teens is pervasive (Madden, Lenhart, Duggan, Cortesi, & Gasser, 2013). Specifically, 47% of teens have a smartphone while 23% have a tablet computer, a level comparable to the general adult population. Further, one in four teens access the Internet mostly using their phone. With students increasingly spending more time on the Internet through the use of mobile devices, schools are beginning to embrace hybrid-learning models that have the potential to blend face-to-face with virtual space and leverage the online skills students already develop outside of school. Such efforts are supported by the increased availability of open content on the Internet – educational materials that are "freely copiable, freely remixable, and free of barriers to access, sharing, and educational use" (Johnson et al., 2013, p.7).

One particular approach garnering increased attention for helping learners blend face-to-face with virtual space using mobile devices and open content is the flipped classroom. The flipped classroom uses educational materials on the Internet, including audio and video often delivered by experts and teachers, as a primary content strategy. In the flipped classroom model what is typically done in class and what is typically done as homework is inverted or flipped. As a result, students can use their mobile devices at home to read relevant materials, listen to an audio or video lecture, or work on a set of problems before coming to class and then use class time in active learning such as labs, games, simulations or other discussion oriented activities (Freeman Herreid & Schiller, 2013).

As Bergmann and Sams (2012) describe, the flipped classroom model speaks the language of today's students who grew up with access to the Internet, YouTube and other digital resources. The use of the flipped classroom in conjunction with mobile devices helps students move at their own pace and use technology in flexible ways consistent with 21st century learning. While students watch a flipped lesson at home, for example, they now have the ability to pause, write down important information, and rewind when they need to review the content again (Bergmann & Sams, 2012). In essence, through the flipped classroom approach, students actively differentiate lessons to allow for deeper understanding of the materials. Indeed, teachers using this method reported seeing increased levels of student achievement, interest, and engagement (Fulton, 2012). Further, along with acquiring deeper understanding, students working in flipped classrooms can develop the ability to problem solve by collaborating on authentic learning tasks with their peers (Hoy & Hoy, 2013)

MAIN FOCUS OF THE CHAPTER

Context of this Work

In this chapter we provide examples of how access to networked tablet devices and mobile apps can help create new models of teaching and learning in K-12 settings that support the development of 21st century skills. These examples are drawn from a one-to-one iPad initiative initiated in 2011 in a private school in a Mid-Atlantic state. The school includes only boys in grades PreK-8. The initiative was instituted at the middle school level, which enrolls boys in grades 6-8. At the onset of the initiative, the school enrolled 101 middle school boys: 6th grade (n=40), 7th grade (n=28), and 8th grade (n=33). The school purchased iPads from Apple and students then purchased their device from the school. Each student was responsible for covering the cost of the iPad, which was built into the school's tuition cost, and was allowed to carry the iPad to school and at home. Students created their own iTunes account and were provided with iTunes purchasing cards for fee-based apps. All students reported having wireless Internet access at home, which was important given that iPads were only equipped with wifi.

Technology has always been an important part of the school's curriculum beginning in kindergarten. Students in grades K-4 have access to a computer lab and desktop computers in the classroom and those students are expected to acquire basic technology literacy skills (e.g., saving documents, navigating online resources, etc.). Prior to the iPad initiative technology was fully integrated in grades 4-8 primarily through access to laptop carts. Students in upper grades learned to utilize Web 2.0 tools to communicate through podcasting, wikis, and blogs and other types of digital tools.

As the laptop carts aged, administration decided to move into a one-to-one tablet direction based on a cost analysis as well as similar initiatives instituted to private area high schools in which most boys graduated to after their middle school years. Further, middle school teachers expressed interest in utilizing tablet devices for instructional purposes.

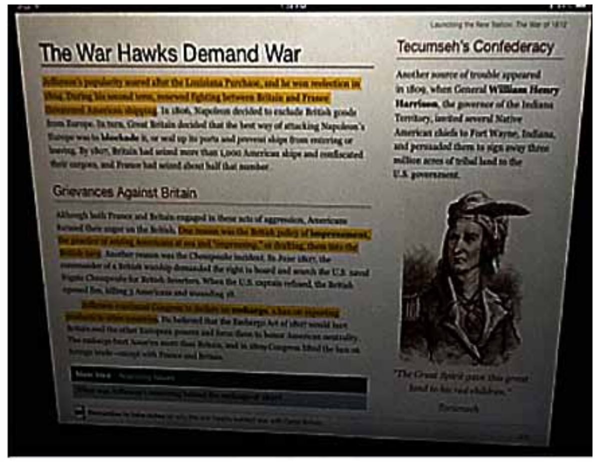
The initiative was rolled out during the summer when all middle grade teachers received their own iPads and participated in professional development offered by Apple. This initial exposure was followed by weekly faculty iPad meetings at the school throughout the school year often attended by two University faculty who assisted the administration and the teachers work out pedagogical strategies associated with effective use of networked mobile devices. To further familiarize teachers with resources and strategies for effective use of iPads a second full-day of professional development was offered during a designated in-service day where a University professor helped teachers through topics such as collecting and organizing content on the iPad, digital storytelling, multitasking and productivity, lesson planning, and authoring.

At the initial stages of the initiative, administrators and teachers identified a range of versatile apps that could be used across content areas. A concerted effort was made to identify apps free of charge whenever possible. The initial set of apps included among others: (a) *iHomework* for helping students keep up with their homework, grades and other school related information; (b) *Camera Roll* for managing photos and images; (c) *iBooks* and *Kindle* for reading materials on the iPad; (d) *Evernote* for note-taking; (e) *Pages* for word-processing; (f) *Keynote*, *ShowMe* and *Doodle Buddy* for presentation purposes; (g) *Dropbox* for managing documents; and (h) *Edmodo* for learning management and classroom networking. This decision intended to familiarize all teachers and students with a common set of apps that could be used in a variety of contexts prior to moving to more specialized, content-specific apps. At the end of each year, teachers met to reassess the effectiveness of the apps, updating the list yearly based on their implementation experiences.

Over time, and multiple trials, the school settled on a framework for reviewing additional apps, which emphasizes productivity and communication. Specifically, a set of themes that cut across selected apps characterize the framework including: (a) ability to individualize student learning; (b) support for multiple media such as audio, video, and text; (c) ability to foster communication and interaction; (d) minimal or no cost; and (e) availability as both a stand-alone app and on the Internet.

In this chapter we present examples from Michael's class over a 2-year period, which illustrate the ways in which iPads and mobile apps can be used to individualize instruction, support 21st century learning skills, and promote anytime anyplace learning.

Figure 1.



Use of iPads and Mobile Apps to Individualize Instruction

In today's classrooms there is an increased demand for education that is customized to students' diverse needs, allowing learner choice, control and differentiation (Johnson et al., 2013). In this section we provide two examples of how mobile media can individualize students' learning experiences. In particular, we discuss the use of *iBooks* and *iBooks Author* apps as well as *ShowMe* app.

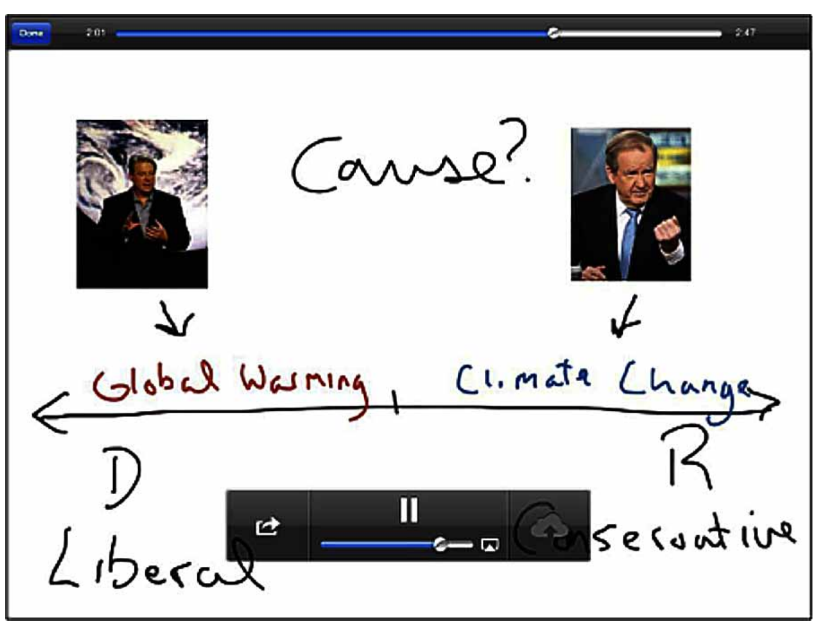
During the 2012-2013 year, the school purchased a U.S. History *iBook* for students in seventh and eighth grade (see Figure 1). Signaling a shift from traditional print-based textbooks, the use of *iBooks* enabled students to personalize their reading experience and make text "come alive". Often typical of high quality electronic textbooks, the U.S. History *iBook* included a range of interactive features. Each chapter began with a video and audio summary both of which introduced the topic and the essential questions. Following the introduction, the *iBook* included an interactive timeline that helped students visualize where the particular topic fit in the big scheme of American History. The timeline visualization helped students situate the particular topic in context. Further, each section included an audio summary of key issues as well as a five-question assessment embedded into each chapter that helped students gauge their understanding of what they had just read.

In addition to those built-in features, by using their iPads students were able to take advantage of features generic to the *iBooks* app to physically interact and manipulate the text, personalizing their reading experience. For instance, students could tap specific words with their fingers to get definitions and instant access to a dictionary, as well as interactive images such as maps that zoomed in to further explain important areas. Further, students could physically highlight text with their fingers and type notes, which were automatically cataloged by page number and section then stored within the framework of the *iBook*. The use of such features, available at the students' fingertips made the reading experience more individualized, interactive, and engaging (Larson, 2010).

In 2012, Apple also rolled out an Application for the MacBook, called *iBooks Author*. *iBooks Author* allows users to publish their own books complete with interactive features such as those listed above. Using *iBooks Author*, Michael was able to "package" social studies units and notes, and is planning on using them during the current academic year. Essentially, the use of *iBooks Author*, allows instructors to individualize reading materials for their own students and context rather than rely on print-based textbooks or notes. Similarly, *ShowMe* app (see Figure 2) allows the teacher to individualize not just reading materials but a range of instructional materials for students by turning the iPad into a personal interactive whiteboard. *ShowMe* app allows users to record voice-over, add pictures or draw their own images, and explain a range of topics through tutorials or personalized messages and commentary. *ShowMe* products can subsequently be shared online and can be accessed by members of the *ShowMe* community. *ShowMe* provides a useful companion to flipping the classroom by allowing teachers to share their own interactive materials with students. For example, Michael used *ShowMe* to record a video describing a simple political spectrum. Consistent with the flipped classroom model, his students watched the video as homework. Although there is a range of apps that use similar features, Michael chose *ShowMe* because he found it easy to use and enjoyed having access to the recordings from any mobile device or on the Internet.

In Michael's class students used the *ShowMe* app both within the classroom and as a home exercise. Since *ShowMe* products can be accessed by users through a unique URL, Michael was able to embed his *ShowMe* materials into social networking spaces created specifically for students in his class. Michael, in particular, used *ShowMe* to explain content specific vocabulary, present new materials, and discuss charts or graphic essentials. For example, rather than spending multiple class periods reviewing map skills with students such as latitude, longitude, Prime Meridian, Equator and the hemispheres, Michael recorded a short lecture using *ShowMe*. For this particular lesson, *ShowMe* enabled Michael to condense a 45-60 minute teacher-centered lecture into a 5-10 minute *ShowMe* presentation specifically for students in his own class. Students reviewed and interacted with the *ShowMe* at home, using a flipped classroom approach. Subsequently, students spent the class time freed up drawing maps of various locations, therefore applying their new skills into practice and illustrating whether they have truly learned the concept. By having students review

Figure 2.



the materials at home or on the go on their iPads, Michael takes advantage of his freed class time to meet with students individually or in small groups, assess whether they have mastered the task and provide personalized remediation when appropriate.

In addition to Michael using *ShowMe*, students themselves also use *ShowMe* to create their own presentations and materials for selected topics. In turn, Michael uses *ShowMe* products as informal assessments because they allow him to visually see which students have mastered a concept and are ready to progress to the next.

Use of iPads and Mobile Apps to Support 21st Century Skills

In this section, we present examples of pedagogical practices that utilized iPads and mobile apps to support the ability to access and evaluate information, create and innovate, communicate in new ways, and collaborate effectively.

Mobile Apps to Support Access to Information

One of the great benefits of networked mobile devices is their ability to empower users with instantaneous access to information serving as amplification devices (Squire, 2012). It was not difficult to witness that in Michael's class. When student received their iPads they found great joy in trying to confirm factual information included in Michael's presentations by researching the topic on the Internet. If they ever appeared to find something that did not seem entirely accurate to them, they proudly pointed their finding to Michael. It did not take long for Michael to realize that the students enjoyed this game – not because they were able to point out to the teacher potential errors, but because they enjoyed their newfound power of having a wealth of information literally at their fingertips. This power seemed to level the playing field providing both the students and the teacher with equal access to information.

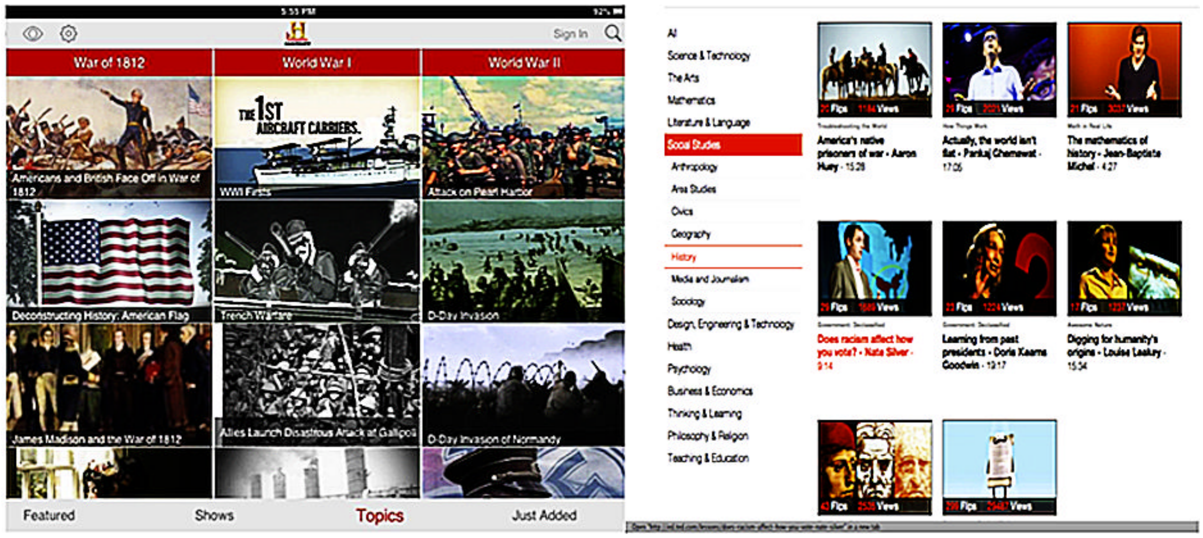
In this one-to-one networked environment, Michael found that his role shifted to that of information dispenser to a curator of web content. Instead of simply providing historical facts to his students, Michael pointed his students to appropriate online resources, allowing them to learn about a topic in a more personalized way. The *History Channel* app (see Figure 3), for example, provides students with short 3-5 minute video clips on many topics in both American and World history. Michael frequently asked students to view those clips for homework or to live up a warm-up activity by giving students a break from listening to the teacher. Further, the *History Channel* app provided students with access to authentic data through interviews with historians or other experts on a topic.

Similarly, *Discovery Education* app as well as Ted Talks (see Figure 3) available through *TedEd* (http://ed.ted.com) allowed Michael to empower students with access to both information provided by experts in the field as well as formative assessments through complete inquiry-oriented online activities. Rather than discussing the Electoral College with students in class, for example, Michael created a module using the *TedEd* platform that allowed students to work on the materials at home on their own pace. The lesson not only included materials from *TedEd* talks but also included multiple choice "dig deeper" questions written by Michael to help students parse out the important information from the *TedEd* video talks. The *TedEd* platform allows teachers to "flip" their classroom by building online activities using *TedEd's* library of talks as well as videos found on portals such as Youtube.

Authoring Apps to Support Knowledge Construction and Creativity

Authoring apps such as *ShowMe* and *iMovie* have the potential to encourage student expression and creativity, promote knowledge construction, and empower students to share their own creative interpretations of learning. In Michael's class students

Figure 3.



use both apps in a variety of ways. Regarding *ShowMe*, Michael frequently asks students who are ahead of their peers and understand a concept well to record and share *ShowMe* presentations explaining the concept to their peers. This approach not only empowers the students who have mastered the materials but it also allows them to illustrate their understanding in creative ways and take on the role of teachers. Michael frequently noted that students enjoyed using *ShowMe* not only because of its interactive features but also because of its ability to provide students with a teaching role in the classroom, thereby breaking down traditional teacher-student dynamics.

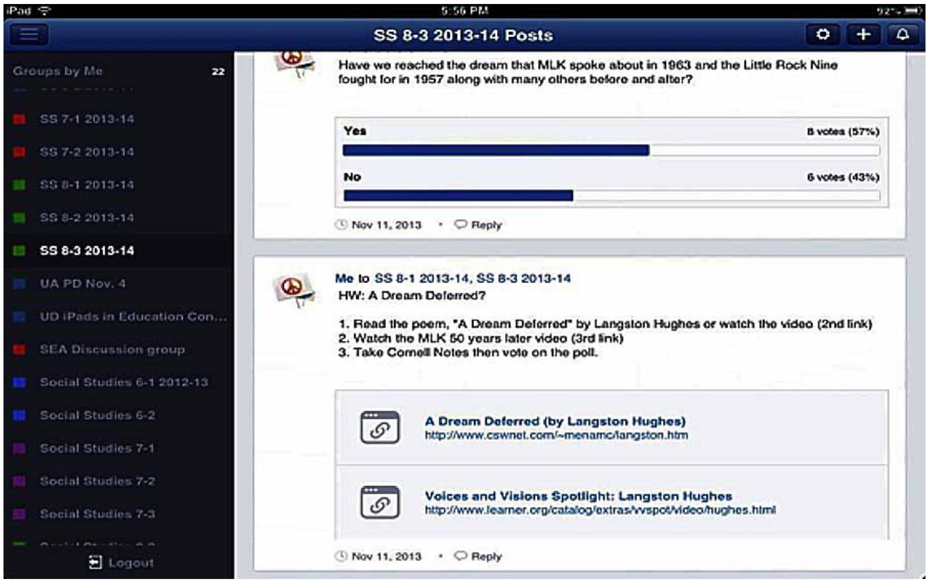
Similarly, *iMovie* app allows students to create digital stories or movies that are as close to a Hollywood production as it can get. Choosing between trailers or personalized projects options, students can create multimedia presentations complete with text, images, audio, video, background music, transitions and other interactive features. The most popular use for *iMovie* in Michael's classroom is for student-created presentations. Students enjoy being the producer, director and writer of their presentations while Michael appreciates the versatile nature of the app, which could be applied on any social studies topic. Besides demonstrating their learning and understanding of a topic, use of *iMovie* enables students to cultivate higher-order thinking skills by focusing on the main points and important features of the topic at hand and the ways in which multimedia can be used to support the delivery of the main idea.

Mobile Apps to Support Communication, Collaboration, and Social Interaction

One of the most widely touted benefits of mobile learning is in its ability to support communication, collaboration and social interaction. There are currently a number of apps that support these processes. In fact, such apps capitalize on human-centered views of mobile learning because they highlight the affordances of mobile devices to support interactions with peers in a variety of settings. In this section we focus on two apps used in Michael's classroom namely *Edmodo* and *Voicethread*.

Edmodo bills itself as the place "where learning happens." A safe social networking site for teachers and students, "Edmodo helps connect all learn-

Figure 4.



ers to the people and resources needed to reach their full potential." A key feature of *Edmodo* is its Facebook look-alike interface. Michael chose *Edmodo* particularly because of its Facebook look-alike interface which gave it added buy-in value for his middle school students who are typically either begging parents for Facebook accounts or are in their infancy using such platforms (see Figure 4). As one student in Michael's class put it, "it's like Facebook for Education". By bringing *Edmodo* into the classroom Michael takes steps into his students' world while still controlling who they can friend.

Michael's use of *Edmodo* in the classroom takes many forms including its use as a social network, a learning and content management system, and an assessment portal (see Figure 4). Michael routinely uses *Edmodo* to engage students with warm-up exercises polls and quizzes. Further, *Edmodo* serves as a classroom portal where *ShowMe* presentations and other materials are shared with the classroom community. By embedding the links directly into *Edmodo*, Michael turns it into a one-stop shop for his students – a place where they can access materials, ask questions, give and receive feedback and share their work with their peers and the teacher. While initially Michael found that students tend to respond to his own postings, as they grow more familiar with the app, they begin posting on their own. Further, students' postings reveal that they are careful of what they say online and how they say it. As a result, *Edmodo* not only gives students a voice within and outside the classroom but it also teaches them digital citizenship skills in an engaging and interactive way within a safe social network site.

While *Edmodo* is used to support collaboration and social interaction, *Voicethread* app is primarily used to support "conversations on the cloud." Simply put, teachers and students can use *Voicethread* to have conversations about a topic that is stored within *Voicethread* and is accessible both online and using the *Voicethread* app on the iPad. The *VoiceThread* creation tool allows users to upload many types of files including PDFs, Powerpoint/Keynote slideshows, pictures and video from both the website and from the app. Once uploaded, *VoiceThread* allows users to narrate any of the above media types and push them out to an audience through a unique link.

The materials can be publicly accessible or can be restricted to students within a class. Subsequently, students can comment on the materials using text, audio or voice comments, thereby allowing for rich discussions to take place both inside and outside of the classroom around the clock. Michael used the *Voicethread* app extensively in his class to support conversations on the cloud or "connect all of our iPads together" as one student put it.

During the unit on the Civil Rights Movement, for example, Michael aimed at helping students learn about the movement's origins, its evolution in the 1960s, and the court cases that shaped the book students were reading as a class, called *Warriors Don't Cry*. The particular book depicted the Little Rock Nine's struggle to integrate Central High School of Little Rock, Arkansas. Previously done through a classroom lecture over a 45-minute classroom period, Michael decided to use *Voicethread* in conjunction with a flipped classroom approach to expose students to the materials in a more engaging way. Initially, Michael uploaded a PowerPoint presentation he had created as the basis for his lecture notes and ordered the slides so they would appear in his preferred order. After the initial set up, Michael narrated the presentation in *Voicethread*. By using the sharing feature of *Voicethread*, Michael generated a unique link, which he posted within *Edmodo* along with a set of instructions for students. Embedded within *Voicethread* were specific question prompts that asked students to record their own ideas on the materials at hand. According to Michael, students' comments were fascinating; often making connections to the relevant portions of the memoir they were reading, asking questions and answering other students' questions. By using *Voicethread*, Michael took a one-way lecture presentation and turned it into a rich, interactive discussion. By flipping the classroom using *Voicethread*, students were able to review the materials at their own pace, pause, rewind and fast forward threads and even use the doodling tools available in *Voicethread* to draw and point out features on the screen while recording their comments.

In addition to using *Voicethread* in conjunction with a flipped classroom approach, Michael also used *Voicethread* to facilitate collaboration across classrooms. During the year, Michael's students hosted a group of third graders from the school who wanted to attend a class debate, as they too were learning the skills of debate. Following that face-to-face visit, the third grade teacher wanted to host the seventh graders to attend the third grade debate. Scheduling conflicts, however, rendered it impossible for the seventh graders to attend the debate. As a result, the third grade teacher taped the students' debate, which was subsequently uploaded into *Voicethread* and posted as a web link within *Edmodo*. Students accessed *Voicethread* on their iPads and provided feedback to the third graders' debate using the commenting features available in *Voicethread*. As a result, *VoiceThread* not only allowed the third and seventh grade classes to "meet" a second time but it also enabled the younger students to hear the thoughtful comments made by seventh grade students, some of whom were their older siblings.

Use of Mobile Apps to Support Anytime Anyplace Learning

In the quantum perspective of learning, Janzen, Perry & Edwards (2012), assert that learning is multi-dimensional and occurs in various places simultaneously. Yet, many classrooms continue to look the same, often banning mobile devices such as smartphones that allow students to break down school with out of school barriers. The use of iPads enabled students in Michael's class to work in multiple places both within and outside classroom walls. On many occasions Michael observed students working on classroom materials in the hallways, at a meeting table between classrooms or in the vestibule to allow for a quieter space. Students welcomed this independence to not only complete their coursework but to do so on their own terms in ways in which they chose. Students also reported using their iPads while mobile – such as checking their homework before dismissal and then logging again on the homework portal upon arrival at home. Others spoke about using their iPads in the car, bus or before and after sports events to read materials using the *Kindle* app or *iBooks* while on the go.

More importantly, use of iPads created a multiplicity of physical and virtual space where students accessed instructional materials and completed schoolwork. Students, for example, noted how they used their iPads at school to take notes, write their homework, and later access these materials at home while completing homework. At the same time they reported being relaxed about it because even if they forgot to write things down, the virtual space available through the *iHomework* app allows them to log on and check their homework. Further, the availability of various social media features allows them to ask other peers questions and clarifications virtually.

DISCUSSION AND FUTURE RESEARCH DIRECTIONS

In this chapter we provided examples illustrating the ways in which use of tablets and mobile apps can support individualized instruction, the development of 21st century skills, and anytime anyplace learning. More importantly, these examples illustrate a model for mobile learning which utilizes mobile devices to support "conversations across multiple contexts amongst people and personal interactive technologies" (Sharples et al., 2007, p.224). Obviously, the examples we provided are limited in scope as they only provide a portrait of one social studies teacher in a privileged and supportive school setting. Nevertheless, they illustrate the ways in which practitioners like Michael who are willing to take risks can utilize mobile devices to support new models of teaching and learning advocated in the mobile learning literature. As similar initiatives are growing around the country and the world, it is critical that we understand more about the ways in which teachers across content areas are adopting and adapting mobile devices for learning in a variety of settings, particularly in light of what we know about how people learn.

In fact, as with previous forms of technology, the success of tablets and mobile apps largely depends on teachers' abilities to create learning experiences that capitalize on the affordances of these tools. In a recent review of 112 apps, for example, Murray and Olcese (2011) found few examples of iPad applications that support truly innovative teaching and learning. Rather, many apps represented materials similar to digital flashcards, focusing on quizzes and recall of factual information rather than the development of 21st century skills. During the course of this study and extensive research and experimentation with new apps, Michael and his colleagues realized first hand the important role of teachers in selecting apps that can support the learning experiences of their students. Despite reviewing numerous "essential apps for educators" and "best apps for teaching" recommended in the practitioner literature, Michael noted the importance of first hand experience in looking at the capabilities and functions of apps in relation to his students' needs, his pedagogy and his curriculum.

The above findings squarely emphasize the important role of teachers in selecting apps and orchestrating learning experiences that help students evaluate and synthesize information, share and report back through personal and collaborative spaces, pursue their own interests, and become creators of new media. As a result, to help teachers accomplish these goals, it is important that schools continue to offer professional development experiences as well as support mechanisms that facilitate the transition to mobile learning. At Michael's school, teachers met once a week to share implementation ideas and experiences as well as give and receive support on how to use and identify apps. Similar support efforts were also utilized at the student level through a weekly morning meeting where students learned how to navigate commonly used apps in school and received face-to-face and online support from a "tech-squad" peer group. Further, the school provided on-site technological support through a full time staff member, created acceptable-use policies, highlighted safe and responsible use of mobile devices, and communicated regularly with parents to establish clear guidelines on iPad use at school and at home. These activities required careful planning and collaboration among teachers, administrators, parents and students. We recommend that researchers, administrators and practitioners interested in the implementation of mobile initiatives consider these issues ahead of time. At the same time we hope that the examples provided in this chapter serve as a guide to practitioners interested in leveraging the unique capabilities of tablets and mobile apps to create learning environments that are responsive to the needs of the Net Generation.

CONCLUSION

In the opening segment of this chapter we described the case of Andrew, a middle school student using an iPad and a selection of mobile apps to engage in a warm-up social studies activity. The activity provided a glimpse of how mobile devices allow students to access information instantaneously both at school and at home, make meaning of the information gathered, communicate ideas in a virtual space, and gain access to an online community of peers. The case of Andrew and the subsequent examples provided in this chapter highlighted the ways in which use of tablets and mobile apps can signal a pedagogical shift in classroom practice in order to support individualized instruction, the development of 21^{st} century skills, and anytime anyplace learning.

REFERENCES

Bergmann, J., & Sams, A. (2012). *Flip your classroom: Reach every student In every class every day*. Washington, DC: International Society for Technology in Education.

Berson, I., Berson, M., & Manfra, M. (2012). Touch, type, and transform: iPads in the social studies classroom. *Social Education*, *76*(2), 88–91.

Brand, J., & Kinash, S. (2010). *Pad-agogy: A quasi-experimental and ethnographic pilot test of the iPad in a blended mobile learning environment*. Paper presented at the 27th Annual Conference of the Australian Society for Computers in Learning in Tertiary Education (ASCILITE). Sydney, Australia. Retrieved November 5, 2013 from http://epublications.bond.edu.au/16

Ekanayake, S., & Wishart, J. (2011). Identifying the Potential of Mobile Phone Cameras in Science Teaching and Learning: A Case Study Undertaken in Sri Lanka. *International Journal of Mobile and Blended Learning*, *3*(2), 16–30. doi:10.4018/jmbl.2011040102

Freeman Herreid, C., & Schiller, N. A. (2013). Case studies and the flipped classroom. *Journal of College Science Teaching*, *42*(5), 62–66.

Fulton, K. (2012). Upside down and inside out: flip your classroom to improve student learning. *Learning and Leading with Technology*, *39*(8), 12–17.

Heinrich, P. (2012). *The iPad as a tool for education: A study of the introduction of iPads at Longfield Academy, Kent*. Retrieved November 5, 2013 from http://www.naace.co.uk/publications/longfieldipadresearch

Hoy, A. W., & Hoy, W. K. (2013). *Instructional leadership: A research-based guide to learning in schools*. Boston, MA: Pearson.

Hutchison, A., Beschorner, B., & Schmidt-Crawford, D. (2012). Exploring the use of the iPad for literacy learning. *The Reading Teacher*, *66*(1), 15–23. doi:10.1002/TRTR.01090

Janzen, K. J., Perry, B., & Edwards, M. (2012). Viewing learning through a new lens: The quantum perspective of learning. *Creative Education*, *3*(6), 712–720. doi:10.4236/ce.2012.36106

Johnson, L., Adams Becker, S., Cummins, M., Estrada, V., Freeman, A., & Ludgate, H. (2013). *NMC Horizon Report: 2013 K-12 edition*. Austin, TX: The New Media Consortium.

Koole, M. (2009). A model for framing mobile learning. In M. Ally (Ed.), *Mobile learning: Transforming the delivery of education and training* (pp. 25–44). Edmonton, Canada: Athabasca University Press.

Kukulska-Hulme, A., Sharples, M., Milrad, M., Arnedillo-Sanchez, I., & Vavoula, G. (2009). Innovation in Mobile learning: A European perspective. *International Journal of Mobile and Blended Learning*, *1*(1), 13–35. doi:10.4018/jmbl.2009010102

Laouris, Y., & Eteokleous, N. (2005). *We need an educationally relevant definition of mobile learning*. Paper presented at the 4th World conference on mobile learning. Cape Town, South Africa. Retrieved November 5, 2013 from http://www.mlearn.org.za/CD/papers/Laouris%20&%20Eteokleous.pdf

Larson, L. C. (2010). Digital readers: The next chapter in e-book reading and response. *The Reading Teacher*, *64*(1), 15–22. doi:10.1598/RT.64.1.2

Madden, M., Lenhart, A., Duggan, M., Cortesi, S., & Gasser, U. (2013). *Teens and technology 2013*. Washington, DC: Pew Research Center's Internet & Amrican Life Project. Retrieved November 5, 2013 from http://www.pewinternet.org/Reports/2013/Teens-and-Tech.aspx

Murray, O. T., & Ocese, N. R. (2011). Teaching and learning with iPads, ready or not? *TechTrends*, *55*(6), 42–48. doi:10.1007/s11528-011-0540-6

Partnership for 21st Century Skills. (2009). *The MILE Guide: Milestones for improving learning and education.* Retrieved November 5, 2013 from http://www.p21.org/storage/documents/MILE_Guide_091101.pdf

Sharples, M., Taylor, J., & Vavoula, G. (2007). A theory of learning for the mobile age. In R. Andrews & C. Haythornwaite (Eds.), *The SAGE handbook of e-learning research* (pp. 221–247). London, UK: Sage Publications.

Squire, K. D. (2012). Mobile media learning: Ubiquitous computing environments for the mobile generation. In C. Mouza & N. Lavigne (Eds.), *Emerging technologies for the classroom: A learning sciences perspectives* (pp. 187–204). New York: Springer. doi:10.1007/978-1-4614-4696-5_13

Traxler, J. (2005). Defining mobile learning. In P. Isaías, C. Borg, P. Kommers, & P. Bonanno (Eds.), *Proceedings of the 2005 IADIS international conference on mobile learning* (pp. 261–266). Qawra, Malta: IADIS Press.

van't Hooft, M. (2012). The potential of mobile technologies to connect teaching and learning inside and outside of the classroom. In C. Mouza & N. Lavigne (Eds.), *Emerging technologies for the classroom: A learning sciences perspectives* (pp. 175–186). New York: Springer.

White, T., & Martin, L. (2014). Mathematics and mobile learning. *TechTrends*, *58*(1), 64–70. doi:10.1007/s11528-013-0722-5

KEY TERMS AND DEFINITIONS

21st Century Skills: 21st Century skills include the ability to access and evaluate information, create and innovate, communicate in new ways, and collaborate effectively.

Anytime Anyplace Learning: Ability to access educational materials independent of physical and time constraints.

Educational Application (App): A software program that runs on a mobile device.

Flipped Classroom: A blended classroom model in which what is typically done in class and what is typically done as homework is inverted or flipped using technology.

Individualized Learning: A method of instruction in which educational materials are tailored to the needs and interests of individual students.

Mobile Learning: Learning where the dominant technologies used are mobile devises.

Smartphone: A mobile phone with computing capabilities.

This work was previously published in Tablets in K-12 Education edited by Heejung An, Sandra Alon, and David Fuentes, pages 113-127, copyright year 2015 by Information Science Reference (an imprint of IGI Global).

Chapter 24
Increasing Research Students' Engagement through Virtual Communities

Maria Limniou
University of Liverpool, UK

Clare Holdcroft
Manchester Metropolitan University, UK

Paul S. Holmes
Manchester Metropolitan University, UK

ABSTRACT

This chapter describes important issues regarding research students' participation in a virtual community. Within a virtual community, university staff can communicate with research students without geographical/space constraints, and research students can exchange views, materials, and experience with their peers and/or academics in a flexible learning environment. Students' participation in virtual communities is mainly based on socio-emotional and informational motivations. Initially, this chapter describes the conditions of research in a traditional environment and the role of students and academics in it, along with the role of pedagogical and psychological aspects in virtual communities. Examples from a university virtual community developed in a Virtual Learning Environment and a Facebook™ closed group are presented. Apart from discussion forums, blended learning activities also increase students' engagement in virtual communities. Technical issues and difficulties based on different learning environments and university members' experience and familiarity with technology are highlighted and discussed.

INTRODUCTION

The word *research* can take on a variety of different meanings. For many students and academic staff, the term can have different implications depending on their research discipline. The term research evokes a number of connotations: the reading and gathering of information from books, journals, or other printed resources; the undertaking of experiments in a laboratory environment;

DOI: 10.4018/978-1-4666-8246-7.ch024

and the analysis, collection and interpretation of data. Research encompasses all of the above as a process of systematic investigation with the objective of creating new knowledge. According to the Research Excellence Framework (2011; p. 48), research "is defined as a process of investigation leading to new insights, effectively shared," which may include a definite set of procedures and steps, such as problem identification, data gathering and interpretation, action on evidence and result evaluation. The majority of researchers work independently in one or more of the traditional environments, gathering, interpreting and evaluating experimental data in order to complete their research project to create new knowledge. The interaction between students and academics (supervisors) is mainly based on a face-to-face communication. The frequency of communication is dependent, in part, on students' and academics' workload, styles, and requirements in relation to the disciplinary practice. For example, in a Science and Engineering faculty, students and academics may have multiple and frequent informal interactions since research projects may be conducted in laboratory settings, which may require close supervision of specialist techniques. In a Humanities and Social Science faculty, however, student-academic interactions may be less regular and communication usually takes place in formal meetings (Heath, 2002). Research students, during their studies, may also interact with other academics, such as librarians and technicians, in addition to their supervisory team. By developing contacts and interacting with other staff and students, a research student may save time involved in independent research. University personnel who are experts in a scientific topic or a field are often willing to provide research students with relevant information but, in most cases information holders do not meet with the research students who are in need of the information. Part-time research students are faced with their own unique situations, and are often struggling to balance careers and personal responsibilities alongside their research. Thus, they may not visit the University as frequently to develop their contacts and to determine who is an appropriate expert (academic or not) to assist them (Watts, 2008).

Moreover, although research students need to follow a specific research model that is different for each discipline, they should develop and use a range of transferable skills to achieve their aims, such as careful planning, observation, evaluation and critical reflection, along with presentation and publication skills. For that purpose, the UK organization Vitae, which supports the personal, professional and career development of researchers, has designed a Researcher Development Framework by providing guidance to research students and staff to develop knowledge and skills (Vitae, 2013). The Framework is informed by consultation within academia and industry, and identifies the characteristics that typify an excellent researcher. These characteristics are clustered within four domains:

- Knowledge and intellectual abilities;
- Personal effectiveness;
- Research governance and organization; and
- Engagement, influence and impact.

The aim of the Framework is to encourage "researchers to plan their personal and career development through achievable goals within an action plan; identifying their strengths and developing those areas deemed weaker or important to their career progression to enable them to realize their potential" (Vitae, 2013). Most UK universities have engaged with the principles of the Researcher Development Framework and have organized and delivered workshops in order to assist their research students to obtain the necessary skills.

In a traditional research environment, research students typically learn to conduct research by working closely with their faculty, following a specific research model well supported by their supervisory team; and they often attend face-to-face workshops in order to develop skills and attitudes valuable for their research project. According to Protivnak and Foss (2009), collaboration between students and faculty members is an important factor for successful completion of research studies; and the relationships between students and university staff and the attendance of events and workshops enhance the sense of belonging to a research community. Generally, any group of people who share a physical location, and/or share a common interest or characteristic such as research, belong to a community (Blanchard, 2004). However, according to a recent Postgraduate Research Experience Survey in the UK for research studies, only 54% of respondents expressed that they felt integrated within the Department's research community and 65% considered that their department provided limited opportunities for sharing "campus space" with others and opportunities for interactions with the University staff (supervisors, other academic staff, non-academic staff) and with their peers (Hodsdon & Buckley, 2011). Therefore, it seems that the social ties of a research community are not strong enough, as researchers feel isolated inside the traditional research environment and research students seldom interact with their peers or with University staff. Moreover, they do not seem to have strong relationships before, during, or after their participation in face-to-face workshops with their peers and the workshop tutors. According to Ali (2006), the independent nature of undertaking research and the feelings of isolation have often been associated with higher levels of non-completion.

In order to enhance the sense of belonging to a community, Universities have adopted other modes of communication supported by the extent of technology mediation of interaction (computer-mediated communication). Specifically, the development of the Internet and the World Wide Web (WWW or the Web) gave to the world several advantages over the communication media, including interactivity, user-involvement, time-independence and worldwide access. Through the first-generation of web technologies (Web 1.0), a web server could only deliver information to users. However, the second generation of Web technologies (Web 2.0) supports two-way communication, as users can create and easily upload new information to the Web server. Therefore, the users are not only information consumers, but also information contributors. Web 2.0 technologies allow users to collaborate with others, to share ideas and documents, to create online collaborative documents and to socialize with others (Collis & Moonen, 2008). Collaborative wikis, blogs, photo and slide sharing, and online social networks are used by millions of people in everyday life either for personal/social or professional/organizational purposes (Ponte & Simon, 2011; Shang, Li, Wu & Hou, 2011). These collaborative platforms have many common features, such as content creation and sharing (images, files), provision for discussions related to the content (comments, online posts and forums), user-to-user connections (private messaging) and networks of users based on common interests (Kolbitsch & Maurer, 2006). An example of an online social networking platform is Facebook™, that launched in 2004; it enables users to keep in touch with their (old) friends, classmates, relatives and new friends, whilst sharing resources such as photos, videos and news. Facebook™ also provides layers of common identities via groups that are designed to connect users with a common interest. That specific "group function" of Facebook™ can support and facilitate virtual communities. Overall, Web 2.0 technologies give users the opportunity to engage virtually with a group of people with common interests in order to perform activities in a common cyberspace such as the sharing of ideas, photos, documents and online chat (Beye, Jeckmans, Erkin, Hartel, Lagendijk & Tang, 2010). Any group of people who may or may not meet one another face-to-face, but who have similar interests and try to achieve similar goals by exchanging ideas, views, documents, experience, etc. through online web networks belong to a virtual community (De Moor & Weigand, 2007). Usually, a virtual community-based approach facilitates informal sharing of knowledge available from experienced and skilled people and virtual communities are characterized as unique, addressing issues such as communities of practice, virtual collaboration and knowledge management with different ways, depending on people, shared purposes, policies, and computer systems (Koh & Kim, 2004). The four characteristics (Lee, Vogel & Limayem, 2002) that define a "virtual community are:

- A virtual community is built on a computer-mediated space (cyberspace);
- Activities in the virtual community are enabled by Information and Communication Technology;
- The contents or topics of the virtual community are driven by its participants; and
- The virtual community relationship evolves through communication among members." (p. 2)

However, it is a challenge for people who develop and/or facilitate a virtual community to build a commitment from all the members, as even the most successful online communities fail to engage all the members and to encourage active participation in it. For example, in Wikipedia, 60% of the users never return the benefits that they gain from the community (Panciera, Halfaker & Terveen, 2009). Some members in a virtual community feel greater commitment and they provide content, enforce norms of appropriate behavior, and perform behind-the-scenes work to keep the community going (Farzan, Dabbish, Kraut & Postmes, 2011).

The aim of this chapter is to review important issues regarding the research students' participation in a virtual community. The authors have chosen to provide different examples from a virtual research community under the perspectives of building up a new one. The role of technological resources, the student-teacher interaction, the role of communication, and the enhancement of the sense of community among the University members through the interactions between academic, students and non-academic staff are discussed.

BACKGROUND THEORY

Students who were born after 1980 belong to the Net Generation and have a fundamentally different way of processing information and ways of communicating compared to generations before. These students feel comfortable with technology and the way that they learn is task-oriented and experiential. Thus, they prefer to receive information quickly and use multiple/multi-modal communication channels to access information and to e-communicate with friends, peers, and teachers (Oblinger & Oblinger, 2005). Many universities have adopted Information and Communication Technology (ICT)-enhanced environments in order to support the teaching that they offer. Virtual Learning Environments (VLEs), such as WebCT©, BlackBoard® and Moodle™ ©, give University staff the opportunity to deliver online courses or to create virtual communities (Blas & Serrano-Fernández, 2009; Limniou, Papadopoulos & Kozaris., 2009; Ngai, Poon & Chan, 2007). VLE systems support teaching and learning by offering tools which enable teachers to embed audios, videos, animations, PowerPoint presentations and/or simulations to the taught courses. In addition VLE systems allow teachers to interact synchronously and/or asynchronously with their students through collaboration tools such as chat rooms and/or discussion boards. Management tools, such as the selective release of the learning material, the students groups' creation and the tracking of students who participate in Virtual Space, offer academic staff extra possibilities to supervise their courses and engage students in teaching and learning. From a pedagogical point of view, by integrating VLEs into the teaching approach, academic staff can engage students in the process of learning through discussions, individual feedback based on students' actions and/or performance and their awareness of their knowledge and areas of weaknesses. Learning activities through discussion boards allow students to exchange views on difficult topics and allow academic staff to create a flexible teaching approach enhancing their communication with their students. Additionally, students can be connected to a community at anytime, anywhere, without being time- or place-constrained (Limniou, 2012). By integrating the technological developments into courses/workshops teachers have the opportunity to design different teaching strategies (Limniou & Papadopoulos, 2011). Generally, the combination of pedagogical approaches, such as behaviorism, socio-constructivism, and cognitivism, with or without instructional technology, can produce an optimal learning outcome (blended learning) (Bliuc, Goodyear & Ellis, 2007; Driscoll, 2002).

Pedagogical and Psychological Aspects Related to Research Studies

Behaviorism is based on the assumption that teachers are able to transfer knowledge to students' minds. Specifically, this model defines learning as a change in observable behaviors due to environmental stimuli, where learners are essentially regarded as passive and shape their behavior through positive or negative reinforcement and punishment (Slavin, 2006). This style promotes a clientele or patronage type of supervision, where supervisors act more as "sage on the stage" rather than a facilitator of learning and research. Thus, the feedback that the supervision team provides to research students is based on the concept of rewards and reinforcements, which are more focused on the technical aspects of the research and the thesis production rather than on how the students are shaped (Zuber-Skerritt & Roche, 2004). However, the supervised student should have the opportunity to receive not only information on correct formats of presenting a thesis, but also information on what to research, how to argue and arrive at the conclusions, and how to develop critical thinking skills (Deuchar, 2008).

We argue that pedagogical theories other than behaviorism might be more suitable to better assist academics to help their students to process and obtain knowledge and skills. For example, constructivism provides an account of how individual learners obtain knowledge through their interaction with the world. Constructivism advocates that learners learn better when given the opportunity to actively process their own knowledge through feedback by working in a more student-centered learning environment. The constructivism model comprises "cognitive constructivism" and "socio-cultural constructivism". According to cognitive learning theories, the amount of supervision depends both on how academics present materials to students and on how the student processes the material (Quan-Baffour & Vambe, 2008). However, it seems that cognitive learning theories, in the cases of supervision and research, cannot fill the gap, which is coming from the social interactions and stressful situations (Mearns, 2009). In a socio-constructivism approach, learners share experiences and one helps the other to learn, so knowledge is essentially developed through social interactions. Collaborative Learning, which is a framework of constructivism, involves the mutual engagement of learners in a coordinated effort to solve a problem or to examine an issue all together. Thus, through the socio-constructivism process, teachers should treat students as learners capable of critically questioning dominant beliefs and mainly the teacher should focus on students' empowerment (Schulze, 2012). According to Biggs (1999), teaching and learning activities based on constructivism can be categorized as teacher-directed (e.g. by ensuring that a presentation is clear), peer-directed, and/or self-directed. Features for peer-directed teaching are:

- "Learning takes place in an active mode;
- The teacher is more a facilitator than "sage on the stage";
- Teaching and learning are shared experiences between teacher and student;
- Students participate in small-group activities;
- Students must take responsibility for learning;
- Discussing and articulating one's ideas enhances the ability to reflect on one's own assumptions and thought processes;
- Students develop social and team skills through the give-and-take of consensus-building; and
- Students experience diversity, which is essential in multicultural democracy". (Kirschner, 2001, pp. 4-5)

Community and Social Learning

Community-based learning is founded on socio-cultural and constructivist learning theories and is focused on the concept of communities such as communities of practice, communities of interest, learning communities and knowledge-building communities (Fischer, Rohde & Wulf, 2007). A community of practice has been defined as a "network of people who share a common interest in a specific area of knowledge and are willing to work and learn together over a period of time to develop and share knowledge" (Sobrero & Craycraft, 2008). A member of a community can act as a knowledge provider to others who act as knowledge recipients. (Kim, Song, and Jones, 2011). Knowledge could be transferred directly by communication between individuals or indirectly from a knowledge archive. Specifically, the way that the members of a community acquire knowledge and information can be through reading, sharing, observing, and experiencing. In addition community members should invest the optimal effort and time in order to obtain the specialized knowledge related to their task and/or performance. According to social cognitive theories, there are natural tendencies of individuals to alter personal behaviors based on the observed behavior of others. Learners' behavior is determined by the continuous, reciprocal interaction among behavioral, cognitive, and environmental factors (Bandura, 1986). Specifically, learners play a proactive role in a behavioral adaptation, rather than simply undergoing experiences in which environmental stressors act on their personal vulnerabilities (Bandura, 2001). The three models for learning through observation identified by Bandura are:

- A live model, which involves an actual individual demonstrating or acting out a behavior;
- A verbal instructional model, which involves descriptions and explanations of a behavior; and
- A symbolic model, which involves real or fictional characters displaying behaviors in books, films, television programs, or online media.

Following Bandura's model (2001), the four key elements, which play a significant role in whether social learning is successful or not, are:

- **Attention:** Anything that distracts learners' attention has negative effects on observational learning including distinctiveness, complexity, functional values and one's characteristics such as sensory capacities, perceptual set and past reinforcement;
- **Retention:** The ability to store information and to recall it later that includes symbolic coding, mental images, cognitive organization, symbolic rehearsal, motor rehearsal;
- **Reproduction:** When learners pay attention and retain the information, then they will perform the behavior that they observed, including physical capabilities and self-observation of reproduction; and

- **Motivation:** When learners have a good reason to imitate, including motives such as traditional behaviorism, imagined incentives, seeing, and recalling the reinforced model. Bandura (1995) identified the significant role that the internal reinforcements play in learning along with external reinforcement.

Virtual Community and Social Learning

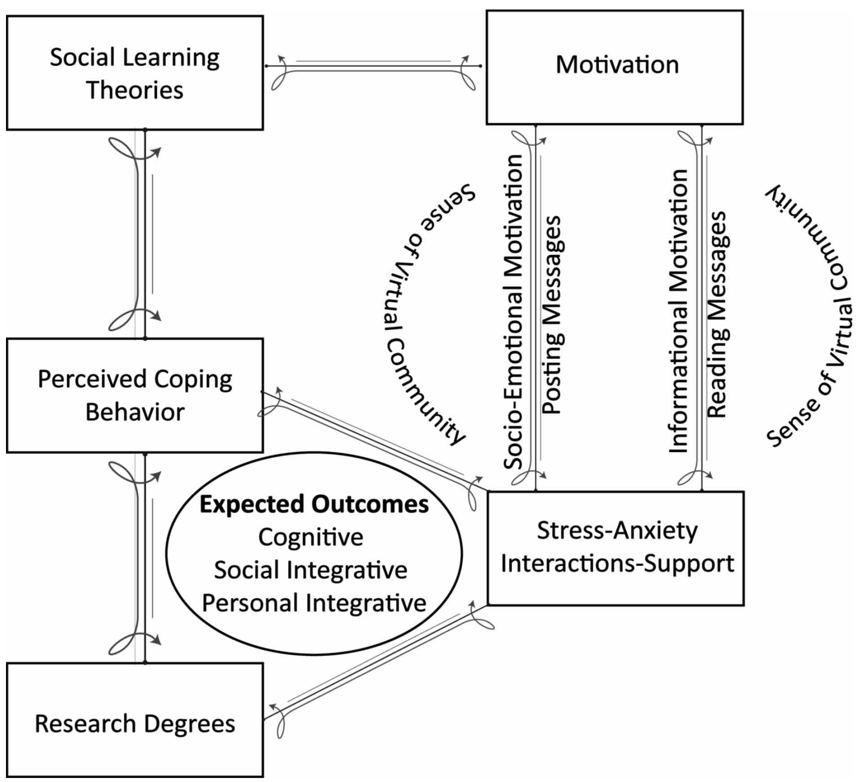
Bandura has identified the outcome expectation and the self-efficacy as the major cognitive forces guiding behavior. For example, if individuals are not confident in their ability to share knowledge, then they are unlikely to perform the expected behavior, especially when knowledge sharing is voluntary (Bandura, 1982). In the case of virtual communities, the previous two cognitive forces, along with the key element of motivation, influence the members' behavior. Specifically, members of virtual communities differ from common Internet users, as these members are brought together by shared interests, goals, needs, or practices; therefore, the barriers of complex knowledge sharing process and extrinsic reward are overcome (Chiu, Hsu & Wang, 2006). Thus, their motivation in learning through Computer-Mediated Communication (CMC) is influenced by the flexible learning environments, learning resources, and active participation in the learning process. Technology can enable and facilitate the communication and transmission of information to the students by providing them with the opportunity to exchange knowledge and resources and to develop mutual understandings. Authentic learning resources can bring reality into the learning environment assisting the students to prepare themselves for real-life situations (Limniou et al., 2009). Additionally, a member's decision in a virtual community to either read or post messages is dependent on whether (s) he believes the benefits of such action outweigh the costs (Ren & Kraut, 2009).

Online support behaviors are associated with a greater Sense of Virtual Community and social connectivity that is related to the reduction of stress (McKenna & Green, 2002). Specifically, informational and socio-emotional support play a significant role for members of a community and are directly related to the motivations that users have in order to actively participate in a virtual community. Socio-emotional motivation refers to comfort, relationship with others, and/or other relationship benefits from online interactions, whilst informational motivation refers to advice, suggestions, and/or recommendations (Welbourne, Blanchard & Wadsworth, 2013). Overall, the Sense of Virtual Community reflects the feeling that individual members have of belonging to an online social group where the members will gain valuable knowledge and improve learning opportunities (cognitive expectations). Although members of virtual community have common interests in the content and the motivation for activity, negative rumors or messages are not easily replaced with positive messages, information, or rewards (Silius, Miilumaki, Huhtamaki, Tebest, Merilainen & Pohjolainen, 2010). Figure 1 illustrates a schematic virtual community Model of Research presenting a connection between social learning theories along with motivations. Through this model, research students could perceive a specific behavior or obtain skills under stressful situations or through interaction with others.

MAIN EMPHASIS OF THE CHAPTER

By following the above model, the authors will describe how a virtual community can be built up based on members' characteristics, technology choices, and University facilities. Additionally, they will provide examples from online discussions, identifying the benefits and the difficulties for the members.

Figure 1. Schematic of the virtual community model



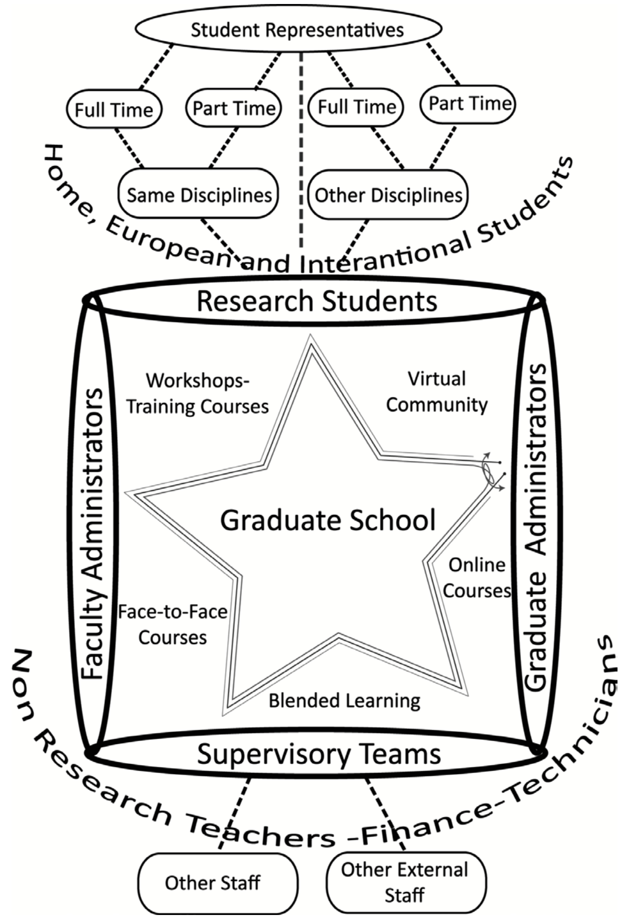
Members' Characteristics

In order to build up a virtual community for Research, we should study the potential members' background, experience and needs. In our case the potential members are university research students and staff. As in any United Kingdom University, Manchester Metropolitan University (MMU) has home (UK), European Union (EU) and overseas students who can follow a part- or full-time research degree course through either face-to-face or distance learning. In all cases, research students work closely with an appointed supervisory team that assists them to formulate their research topic and ensure that students are making progress towards completing the research on time. In each faculty, there are research administrators who provide advice and support to academics, students and applicants and help to organize events such as research symposiums/events for all the research staff and students. The Graduate School manages, monitors, and evaluates the research degrees across the University. It collaborates with research administrators, staff (internal and external), other offices/units that facilitate students' progress, enrolment, admissions, etc. and it is in a close collaboration with research students who are the key stakeholders. Additionally, during their studies, research students have access to a wide range of personal advisers, guidance, and support, including financial and careers advice, disability and counseling support. For example, librarians, technicians, and the international office all need to be in collaboration with the Graduate School in order to ensure that they provide focused and dedicated support to postgraduate research students.

One difficulty that MMU research students usually face in their research projects is the lack of communication between themselves and university staff. In addition, research students need to develop transferable skills such as time management, managing a research project, etc. during their studies. The social interactions between research students and University staff can be enhanced through virtual communities where, through virtual discussions (synchronous and/or asynchronous), research students could discuss issues related to their research with their peers and university research staff such as progression enquiries and research methodologies. In addition, students can find related documents, learning material, and useful external web links related to the research environment. Students could get information and feedback not only from their supervisory teams, but also from other non-academic staff, such as librarians, technicians, research administrators and their peers.

In order to assist research students to develop academic and vocational skills and lead on the governance of postgraduate research degrees in the University, the Graduate School delivers workshops following the Vitae's Researcher Development Framework. The student development program has been created to ensure that postgraduate research students gain transferable skills in addition to all the skills required to successfully manage their research. Some of the workshops that are offered to research students are related to the management of a research project, networking skills, thesis and publication formatting, Cite Rite™ with EndNote™, presentation skills, and qualitative and quantitative research methods. Due to the fact that by following the traditional way of teaching little motivation is given to students in order to solve problems or to collaborate with their peers during the workshop. Vitae recommends the adoption of blended learning activities in order to engage students in the learning process (Vitae, 2013). In this way, students' motivation is enhanced, allowing teachers to meet students' needs. The activities could support either face-to-face and/or online modes. Figure 2 illustrates the role of the MMU Graduate School in Research.

Figure 2. Schematic model for the role of the graduate school in research



Developing a Virtual Community

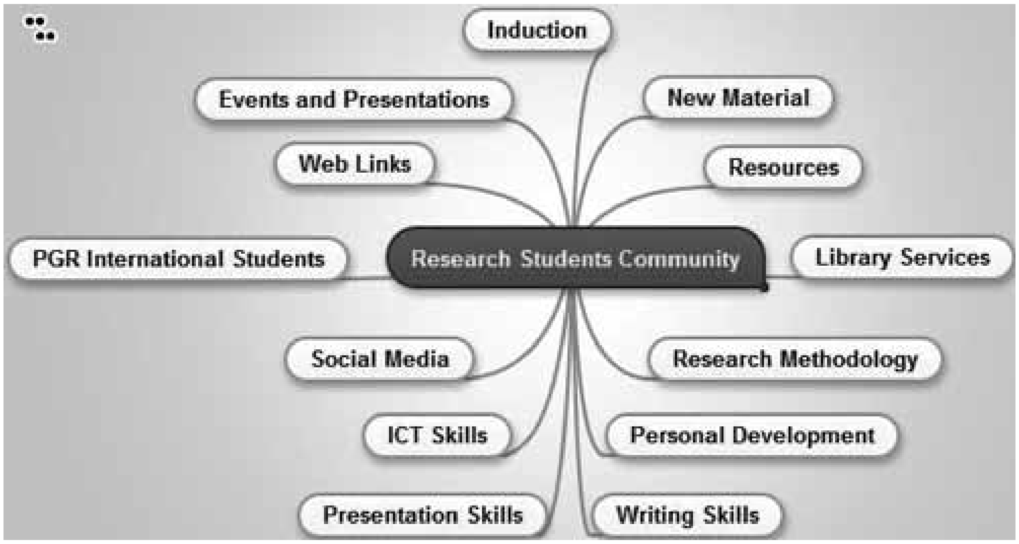
In order to build up a virtual community, key issues such as users' familiarity with ICT, University facilities and technological developments should be taken into account. MMU has recently adopted Moodle™ as a Virtual Learning Environment, and the university policy is that all courses/workshops should have a relevant virtual space. Thus, it is compulsory for university staff to embed Moodle™ into university activities. In each faculty, there is at least one assigned e-learning technologist in order to support teachers to use VLEs and other technologies in their teaching and to verify their content quality. Other Universities often provide similar e-learning support (Limniou & Smith, 2010). Overall, the majority of the university staff has some level of support on the use of VLEs in their teaching. The reasons that Universities follow the above strategy, i.e. to support the teaching staff via e-learning technologists, is because of university staff's lack of familiarity with the use of ICT, their individual workloads, the limitations of the technology in relation to particular tasks, the different way of communications (electronic medium communication vs face-to-face), the limited training, and the lack of a reliable infrastructure (Heaton-Shrestha, Edirisingha, Burke & Linsey, 2005). Even though not all university staff are ultimately persuaded that VLEs could enhance their teaching approach, the majority of research students have previous experience on different VLE platforms and/or on social media. Specifically, regarding their familiarity with new technologies and the use of social media, 85% of research students (strongly) agreed that they have familiarity with new technologies and approximately 72% of them use social media in their everyday life. Taking into account university staff and research students' previous experiences of new educational technologies, the use of social media and the facilities and support that the University offers, the Graduate School has built up a virtual community on Moodle™ and supplements it with a closed Facebook™ group and a Twitter™ account. Some of Moodle™ 's benefits, for educational purposes, are the low cost of ownership, the high level of security, technical support, constant updates, and plug-ins. Also, the source code is available along with the ability for customization.

In the Moodle™ Research Students Community, all the members can discuss issues related to research and workshops. Students and staff with a Facebook™ account can also participate in open discussion related to research and/or to post messages, web links, files, etc. to a closed Facebook™ group through a flexible social network system. Apart from online discussions, workshops are supported by e-assignments, where research students can upload their workshop activities and the tutors can provide them with online feedback. Additionally, by creating a Twitter™ account for Postgraduate Students, the MMU research community can communicate with other intuitions, organizations, and individual Twitter™ users by disseminating information to internal or external researchers on MMU research projects and events, recruiting people for research projects, re-tweeting interesting tweets from other users, and creating a Twitter™ *#hashtag* to provide a means of grouping messages and discussions.

Structure and Promotion of Virtual Community across the University

Initially, all the university staff who participated in the virtual community were informed of the strategy of this initiative and were asked to contribute with relevant research material that they usually used in their workshops or in their supervision. Before launching the virtual community for Research to all the members, key stakeholders (such as librarians, research administrators, research staff and a few of our research students) provided feedback. One major difficulty that the developers had was to design and build a virtual Research Students Community to cover the needs and expectations of all the stakeholders. This virtual group was a heterogeneous mix of people, with mixed familiarity with educational technology and different ages, ethnicities, etc. An additional difficulty was that Moodle™ might be challenging for some users, although it provides an easy way for academics to present the materials to students, the material can be displayed on the page either as individual items or as items bundled together inside folders. As a result, the entire Moodle™ page can be quite long and course instructors need to spend some time in creating a more user-friendly learning environment. Thus, in order to make the Moodle™ virtual community more

Figure 3. A representation of the sections in the Moodle™ virtual community



user-friendly, the developers created an interactive image in which each section was illustrated. When members of the community enter the Research Students Community, an interactive image was the first item of the virtual community (Figure 3). The users could then click on the circle near to each section and be re-directed to the appropriate section quickly.

In the Induction section of the Moodle™ area, the members of the community could find information for the Induction Day, the only workshop that is compulsory for all the first year research students. Under this section, the virtual members had the opportunity to participate in discussion forums. There was general discussion forum, where all the participants of the Moodle™ space could post messages and discussion forums for specific target groups, for example, forums for faculty, forum for research administrators only, and forum only for student representatives. The Graduate School's policy was for the recently uploaded material to stay in the section entitled *New Material* for one month and then to be placed in the appropriate section. All the information and material regarding the University regulations, student handbook, student journeys, documents for Ethical approval and articles for research such as the role of supervisor, literature review for a thesis, etc. were placed under the section *Resources*. All the relevant information for the University Library (facilities, services and staff) and material for the workshops, such as Cite Right™ with EndNote™, Cited Reference Searching on the Web Science and Scopus™, which librarians delivered to research students, were under the section *Library Services*. A discussion forum was available in this section providing an opportunity for research students and staff to clarify any issues related to Library services. Under the *section Research Methodology* virtual members could find information regarding a commitment to good research conduct and the relevant workshops which were delivered by the Graduate School such as Quantitative and Qualitative Research Methods. Information about relevant workshops such as Time Management, Team Work, Manage Your Research Project and Critical, Thinking, Reading and Writing, along with group discussions and assignments for research students could be found under the section *Personal Development*. The MMU Research Students Community also contained sections on:

- Writing Skills, where information could be found for plagiarism and copyright issues along with workshop material for writing skills and writing proposals;
- Presentation Skills, where material for the workshop on how research students could improve their presentation skills;
- ICT Skills, where students could find material for specific software such as advanced Microsoft Word, SPSS, etc. along with online assignments and discussion forums; and
- Social Media, discussions and workshops for making research available to other researchers inside and outside the University, for exploring online social media and research networking platforms in order for research students to interact and communicate with other researchers developing networking skills.

Under the section *PGR International Students*, information provided by the International Office were delivered to our international research students along with an appropriate discussion forum for them. Finally, the last sections were designed in order to provide recommended external links to virtual members for further considerations/reading (Web Links) and to encourage research students' efforts to organize events and actions across the University (Events and Presentations).

In our closed Facebook™ group for researchers, virtual members could upload external web links, documents, and files related to research and invite other members to share their views on the specific digital element that they uploaded. This process was equivalent to asking for an opinion in a face-to-face meeting and it was also an ideal mechanism for promoting internal and external events to the student community. The open discussion that then took place was very useful for educational purposes, as just-in-time information was crucial in the learning process. The other use of the closed Facebook™ group was to take external links that research students and staff thought were valuable for their study and put them in the Moodle™ virtual community, as not all the members wished to be part of the Facebook™ group. In a closed Facebook™ group, anyone could see the members of the group, but only members could see posts, which provided more privacy. In addition, in order to confirm that the Facebook™ user who wanted to join our group was an MMU research student, we checked the Student Record system of the University. In the case that a Facebook™ user had a fake account, the group administrator sent him/her a personal message through Facebook™ asking for more details (his/her name and in which Faculty (s) he is studying for, etc.) to confirm his/her details with the Student Record system.

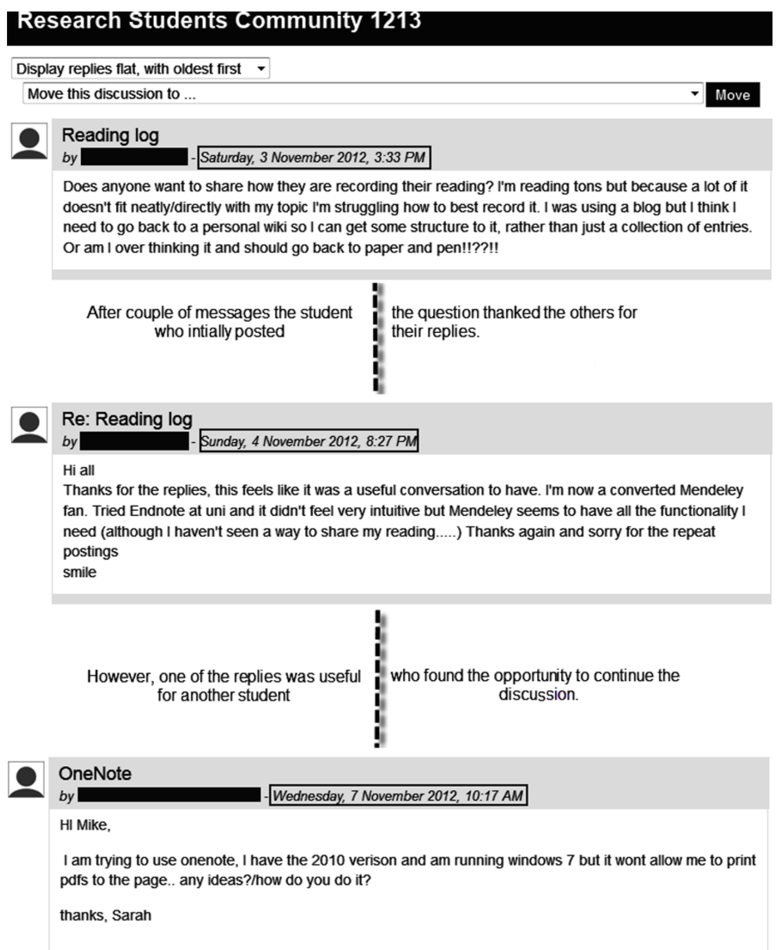
In order to promote the virtual community across the University, the capabilities of the Moodle™ space, the closed Facebook™ group, and Twitter™ account were presented to first year postgraduate students during the compulsory Induction workshop. In addition, information was circulated through printed brochures, the Graduate School website, training courses (dedicated mainly for second-, third- and fourth-year research students and university staff) and via personal contact with all the potential virtual members.

Discussions in Virtual Communities

In a comparison to a face-to-face classroom contact, virtual interactions lack the social cues such as eye contact, gesture and other expressions. This can be viewed either positively or negatively. For example, females tend to use more emotions than males in a face-to-face interaction (Wolf, 2000), which through virtual discussions, is translated through the use of emotional icons and capital letters. On the other hand, through virtual communications social pressures are reduced, as the participants feel more comfortable (Gilmore & Warren, 2007). Additionally, through asynchronous communication every research student and/

or staff member in the virtual community could potentially read and respond to other messages instantly, if these posts were relevant to their interest and/or research. Figure 4 illustrates an example from a research student who posted a message (asking for help) on a Saturday evening, and in a couple of hours other members of the community had sent other messages trying to assist her to resolve the problem. Specifically, they posted fifteen messages in less than 24 hours providing feedback to the initial question. One of the replies on the initial question recommended to the student to use EndNote. While this recommendation did not apply to the student that started the discussion it seemed to apply to another student who was trying to use EndNote but did not know how. Thus, the discussion continued based on one reply that was provided and so there were more than five messages under the same category *Reading log*. The point of this example was that, even if a research student did not start a discussion, (s)he could find the opportunity to ask other questions based on a given response. Overall, they exchanged twenty-two (22) messages on that particular question. The conclusion of the presented example is that an asynchronous discussion within virtual groups can enable multiple people to respond to a message thus increasing research students' motivation not only from an informational point of view but also from a social-emotional one as well.

Figure 4. Example for an asynchronous discussion with the Moodle™ community



We have observed that research students who were familiar with social media usually preferred to post messages via Facebook™ rather than via the Moodle™ Community. Figure 5 illustrates an example of an online discussion related to ethics. In the case of Facebook™, there were more posts than to Moodle™ Community; and as Facebook™ had the functionality of "Like", this acted as a sort of ranking system for the usefulness and/or the agreement with the specific post by other members. This capability is also present in Moodle™, in which course leaders have a tracking system, but they cannot tell if a specific post, document, resource is valuable for the members of the community. For that purpose, the Facebook™ group acted as a supplementary platform, in order to track posts and responses, and to meet the needs that the members had and what they expected from the community.

Generally, asynchronous communication allows research students to prepare their messages more carefully than in a face-to-face communication. Very often in synchronous communication, research students do not formulate their thoughts well enough through questions and answers, as they try to follow a conversation, which is relatively quick. An international research student, for example, who might struggle due to language barriers on a face-to-face discussion, by participating in an asynchronous virtual communication, might have a better chance of actively contributing in the discussion and might have a better understanding of the message by re-reading it.

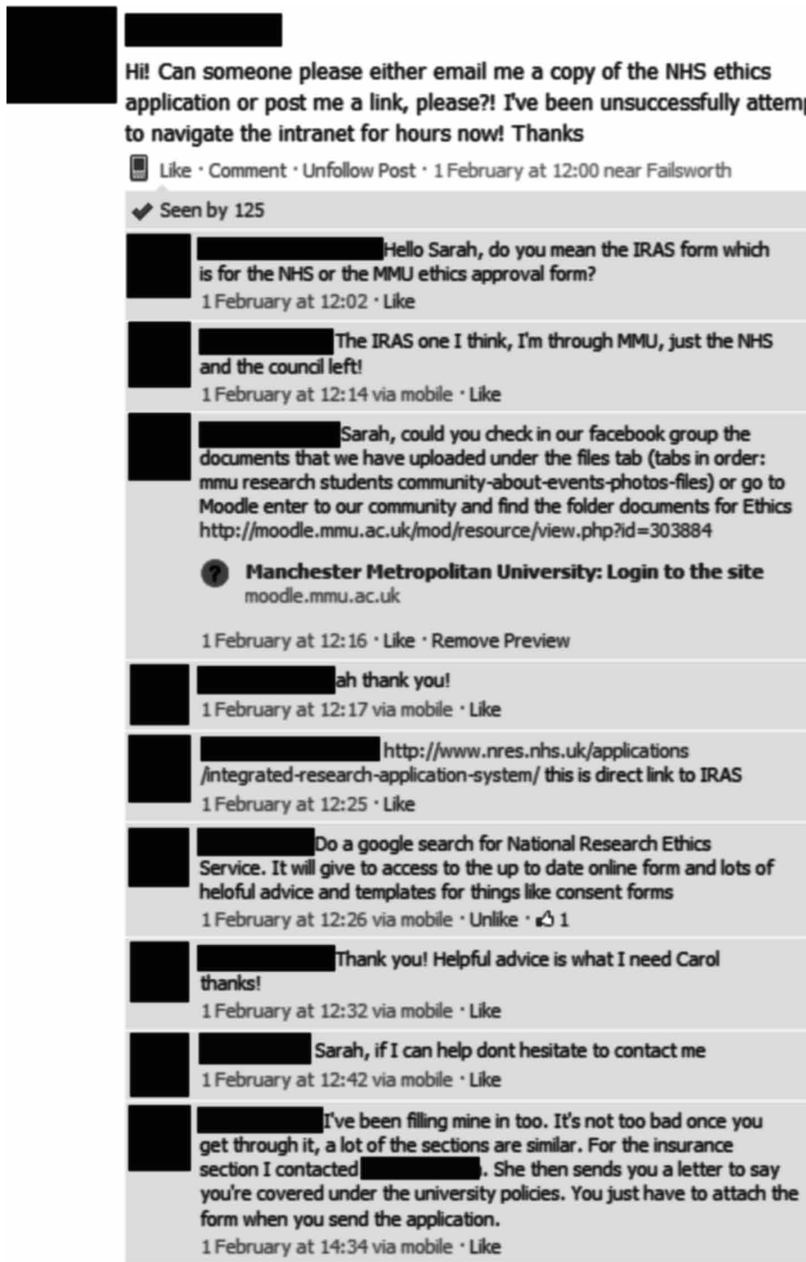
Another issue regarding the virtual community was that occasionally members complained about posts because they did not think that were relevant to their interest. On several occasions, disapproving posts discouraged other members of the community from participating in that particular discussion. For example, as briefly illustrated in Figure 6 below, a member of the Facebook™ group posted an external link that he found useful for his research. However, another member stated that (s)he found the topic and/or the discussions boring or annoying. In this particular occasion, a student replied and, in effect, isolated the negative comment, and the members continued to post messages, external files, and websites. Negative comments such as the one below might discourage students from continuing posting on the topic and, thus, a potentially constructive discussion might end prematurely.

On the other hand, in the Moodle™ community, when a member did not think that (s)he could contribute more to the discussion or did not wish to follow the discussion anymore, (s)he sent a direct message to the course leader or to the member that initially started the discussion asking to be unsubscribed from the specific discussion. These two different behaviors were mainly because of the difference between social media and Moodle™. In Facebook™ the users knew that they could put items on the Group wall, which is common practice in Facebook™, and also there was no reason to complain as it was their choice to be a member of the Facebook™ group. In the Moodle™, all research students and staff were provided with access to the Research Students Community following the University policy. They were given the opportunity to unsubscribe themselves in the case that they wished to leave a discussion. In addition, in the Moodle™ community, the members could configure their profile settings and they had three options: (a) to receive e-mails for each discussion post; (b) to receive only one e-mail at the end of the day which would include a digest of all the posts; or (c). to receive a daily e-mail per specific discussion topic.

Engagement in Virtual Community

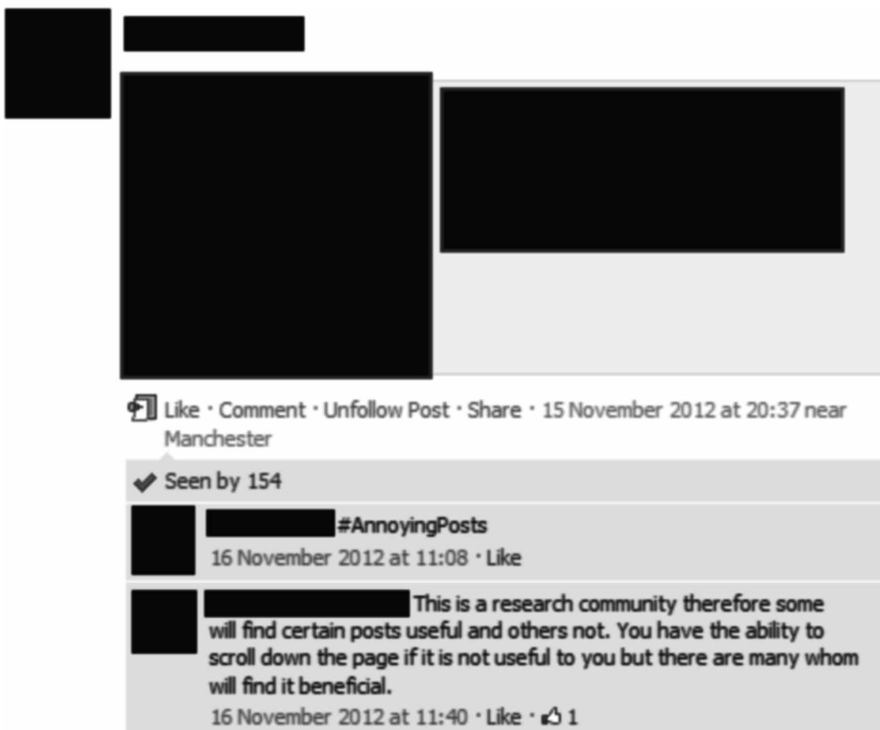
Apart from uploading e-material for the workshops through the research community, students had the opportunity to facilitate their learning process based on their learning style, characteristics, and the nature of the cognitive topic by participating in online activities and receiving feedback based on their discussion posts and/or formative assign-

Figure 5. Example for an asynchronous discussion in the virtual community's closed Facebook™ group



ments. The degree of integration of conventional (face-to-face) teaching with computer-based activities (blended learning) varied between the workshops. Figure 7 demonstrates an example of blended learning for the workshop entitled *Thesis and Publication Formatting* which combines online activities along with activities in a computer cluster. Initially, students should have read the handouts and participated in a couple of activities. Through the online discussion forum, the students received feedback by their peers/tutors based on these initial online activities. By using the online assignment tool, the research students could upload the activities before the face-to-face

Figure 6. Someone posted an external link, someone else complained and another replied



workshop. Thus, the teachers could easily discover their students' backgrounds; they could make the appropriate changes to e-material and/or change the way that they delivered their workshop. A self-paced online session, in which the research students were able to review concepts and fill the gaps between theory and practical work, built up their confidence before they entered the face-to-face session, strengthening their motivation for learning. The workshops also provided students with the opportunity to meet other research students and academic and administrative staff from across the University, thus enhancing the sense of community.

In addition, in order to increase their sense of belonging in the community, students were provided with the opportunity to be involved in teaching a part of the workshop to their peers, thus they shared their experience and skills of a specific area with their peers. This policy aimed to encourage students to actively participate in the teaching and learning process and to develop skills such as presentation and writing skills. Overall, the research students produced high quality material, had a good attitude towards being of service to the University, and had the desire to learn and share with others. By involving them in the teaching process, they remained motivated and they exhibited self-confidence. Students became engaged; and they reflected learning by real world examples through their participation, while at the same time their peers had examples from other research students who had faced similar issues and difficulties. By following this process, the workshops were conducted in a collaborative environment. In addition, the research students that participated actively in the workshops gained experience as presenters, which will be valuable for them in the future. Some of students' feedback for the workshop *Thesis and Publication Formatting* is the following:

Student 1: I thought I knew quite a lot about Word, but this course has shown me some very useful techniques that will enhance my finished thesis and making [sig.] formatting the document soooooo much easier. A very well presented and run course, that takes into account those students who work full time and have a busy young family life. I have been able, easily, to fit this around my other commitments! Very forward thinking, please please please more like this, well done!!!

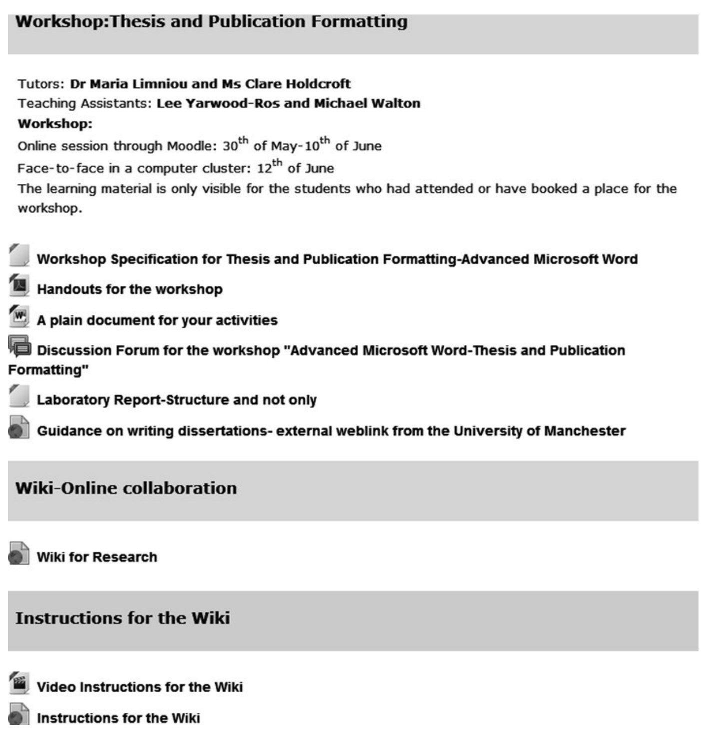
Student 2: Thank you very much you and your colleague. Really it was very interesting workshop I wish we could get some of them in near future. Personally I got lot of things I did not know it [sig.] before it really helps me to organise some of my work. Thank you once again.

Student 3: I thought workshop worked well and liked the individual and group balance. One thing I really liked was the content of the session, the Moodle™ information and the practical work. The administration of the workshop was very professional but very warm and friendly simultaneously.

Student 4: It was really useful - a whole new world of what Word can do!

One challenge that the Graduate School faced was that some of the research students believed that they knew the topics and that the workshops did not have something new to offer them. The reality, however, was far different, as the workshops were very in-depth and offered students a wide variety of skills and competencies, which might not have been evident simply from the workshop title. In order to overcome this difficulty, and to engage students with the learning process, the Graduate School created a standard template for the workshop specification in which the research students could be informed in more detail of the learning outcomes, the activities, and the aim

Figure 7. A blended learning example of research students community in Moodle™



and the objectives of the workshops. By creating such a template, the student could make a more informed decision as to whether or not to attend the workshop and if (s)he would gain new knowledge and experience from it.

Solutions and Recommendations

It is likely that many research students have had user experiences in other Virtual Learning Environments (VLEs), such as BlackBoard®, BlackBoard Vista® and WebCT®, gained during their undergraduate studies or while earning their master's degree. The interface and the way that students participate in a discussion on the aforementioned VLE are slightly different from that of Moodle™. For example, in BlackBoard®, the users need to check the posts without receiving e-mails, but they should enter the online module and search under the module's discussion forums. In the case of Moodle™, the default option is for users to receive e-mail alerts for each post. Therefore, research students, who are unfamiliar with the Moodle™ environment, might complain about the vast number of e-mails that they receive and are, overall, reluctant to use it. In order to tackle this issue, the course leader needs to provide students with a step-by-step instruction booklet where some useful tips on how to configure Moodle™ will be illustrated.

Another issue that needed careful consideration was the university staff's familiarity with the Virtual Learning Environment. In our case, the Graduate School informed the university staff that their role in the Virtual Community would be that of a non-editing teacher. However, later throughout the academic year, many University staff started to complain that they received e-mails from the discussion posts even if they were not in the discussion group. That meant that they did not have a clear idea as to what the role of non-editing teacher entailed in Moodle™. Thus, although the role of the course leaders was not to support the university staff with tutorials and advice as to the role of non-editing teacher, they had to organize dedicated training courses and create supporting documentation to bring the university staff up to speed with the functionalities in Moodle™ that staff should have already been aware of. Another issue related to teachers was that some of them had the misunderstanding that their role in regards to the online course finished upon uploading the learning material. However, the role of teachers in facilitating discussion forums should be more than that of a mere provider of materials. The problem with this simplistic approach was that the teacher lost the continuous communication with students who eventually felt frustrated by the learning process. For that purpose, the course leaders checked regularly the discussion forums in Moodle™ and/or Facebook™ and if they could not respond directly to students' questions, they forwarded it to the appropriate person and/or encouraged other academics to provide an answer within the discussion forum. University staff are not always aware of technical and pedagogical issues related to virtual communities, the benefits of synchronous and asynchronous communication, and students' preferences for the new technological developments. Thus, apart from the existence of support via e-learning teams, universities are usually training new incoming academics on designing online courses and/or adopting blended learning. In our case, academics worked together in order to enhance teaching with the opportunities of blended learning, the new staff being more familiar with computer information technologies, whereas the senior staff had more experience on research related issues.

Another issue that the authors would like to mention is that some members of the community felt uncomfortable to post messages. There were a few examples where research students, despite the fact that they had access to Moodle™, were afraid to ask a question and they approached their Faculty administrator in order for them to post a question on their behalf. We assumed that the reason for this attitude was mainly that these students were afraid that their question would be deemed to be too simple and as such they would appear ignorant on the subject to their peers. As an example, this question was posted by a research administrator instead of the research student:

There is a question from a research student and we are wondering if you have similar issues or if you have any possible reply. The question: I'm planning a survey for part of my research and wondered if I could have access to a survey tool for collecting data online- does the university subscribe to Survey Monkey or anything similar and how would I get access to it?

In order to enhance the sense of community, and the relationships between university staff and research students, the Graduate School is organizing periodic face-to-face meetings and events in addition to workshops in order to keep the community focused and productive.

FUTURE RESEARCH DIRECTIONS

As the extensive use of ICT in Higher Education has changed the way that students, teachers, and other university staff communicate, one future step is for research students to create their own e-portfolio through their studies. By following this approach, supervision teams, along with research administrators, will have a complete view of the student's progress; individual feedback could be provided on students' projects and their personal development. E-portfolios could initially be restricted to private view and only university staff or other students would have access; but, after finishing their studies; the research students may make them available for public view. Overall, the e-portfolios could enhance the digital demands of research and they could be created by using platforms such as WordPress™ and/or Blogger™.

CONCLUSION

Over the last decades, the rapid growth of Internet access and Computer-Mediated Communication has created new possibilities for researchers to engage in supportive communication with a network of individuals coping with similar issues and challenges. The ability of Computer-Mediated Communication to transcend geographical and temporal constraints, the access to diverse sources, and the facilitation of more heterogeneous supportive relationships are possible through a virtual Research Students Community. University staff can collaborate with students in a flexible digital environment and consciously empower them. Research students could also exchange views and resources with their peers obtaining skills and knowledge and developing attitudes through collaboration. Research students will have a stronger sense of community compared with a traditional research environment, as they:

- Know who is the most appropriate person to assist them;
- Share their experience with other members of the community and are informed about other's views; and
- Are better supported in order to overcome their research project difficulties.

The Internet, as a medium for social activities, opens up entirely new features in academic society. However, academics should understand how people learn and how people can be facilitated to learn through ICT in order to create a pedagogically worthwhile virtual course/community. Socio-emotional and informational motivations mainly lead research students to be involved in a virtual community in order to discuss with others and/or collect information about common interests. The research students can discuss with the University staff and their peers, theory related to their research project through online discussion forums; or they can collect information independently by reading the uploaded material and others' messages to discussion forums or by searching on the uploaded web links available to them. Thus, research students do not have their supervisory teams as the only resource for collecting information. One issue for course leaders, however, is to keep students engaged in the process and to continue to pose questions, exchange views and ideas with the members of the community. The university staff have a significant role for students' involvement in a virtual community. They trigger a discussion, adopting an active and stimulating role by posing questions without being the direct provider for the research students' learning, or by posting external web links and/or documents. In a collaborative learning environment, the teaching style is changing from a directive and task-oriented (power-centered) supervision to a more non-directive and process-oriented (facilitation-centered) supervision. However, staff's beliefs, attitudes, and skills are potential points for a successful integration of virtual communities into research degree programs. University members have their own personal style regarding the way that they handle problem identification and solving, feedback, and support given to students, the way that they act as subject experts, and the way that they evaluate and respond to the students' work. The transition from traditional teaching to ICT-enhanced environments is not obvious and many staff are still hesitant or reluctant to adopt technology as part of their teaching. Thus, the participation of new staff along with senior lecturers would be beneficial for their active contribution to discussion forums, the enhancement of teaching with blended learning principles and their experience to overcome course difficulties.

REFERENCES

Ali, A., & Kohun, F. (2006). Dealing with isolation feelings in IS doctoral programs. *International Journal of Doctoral Studies*, *1*, 21–33.

Bandura, A. (1982). Self-efficacy mechanism in human agency. *The American Psychologist*, *37*(2), 122–147. doi:10.1037/0003-066X.37.2.122

Bandura, A. (1986). *Social foundations of thought and action: A social cognitive theory*. Englewood, NJ: Prentice-Hall.

Bandura, A. (1995). Comments on the crusade against the causal efficacy of human thought. *Journal of Behavior Therapy and Experimental Psychiatry*, *26*(3), 179–190. doi:10.1016/0005-7916(95)00034-W PMID:8576397

Bandura, A. (2001). Social cognitive theory: An agentic perspective. *Annual Review of Psychology*, *52*(1), 1–26. doi:10.1146/annurev.psych.52.1.1 PMID:11148297

Beye, M., Jeckmans, A., Erkin, Z., Hartel, P., Lagendijk, R., & Tang, Q. (2010). *Literature overview privacy in online social networks* (Technical Report TR-CTIT-10-36). Centre for Telematics and Information Technology University of Twente, Enschede. Retrieved from http://eprints.eemcs.utwente.nl/18648/

Biggs, J. (1999). *Teaching for quality learning at university*. Buckingham, UK: SRHE and Open University Press.

Blanchard, A. (2004). Virtual behavior settings: An application of behavior setting theories to virtual communities. *Journal of Computer-Mediated Communication*, *9*(2). Retrieved from http://jcmc.indiana.edu/vol9/issue2/blanchard.html

Blas, T. M., & Serrano-Fernández, A. (2009). The role of new technologies in the learning process: Moodle™ as a teaching tool in Physics. *Computers & Education*, *55*(1), 35–44. doi:10.1016/j.compedu.2008.06.005

Bliuc, A. M., Goodyear, P., & Ellis, R. (2007). Research focus and methodological choices in studies into students' experiences of blended learning in higher education. *The Internet and Higher Education*, *10*(4), 231–244. doi:10.1016/j.iheduc.2007.08.001

Chiu, C. M., Hsu, M. H., & Wang, E. T. G. (2006). Understanding knowledge sharing in virtual communities: An integration of social capital and social cognitive theories. *Decision Support Systems*, *42*(3), 1872–1888. doi:10.1016/j.dss.2006.04.001

Collis, B., & Moonen, J. (2008). Web 2.0 tools and processes in higher education: Quality perspectives. *Educational Media International*, *45*(2), 93–106. doi:10.1080/09523980802107179

De Moor, A., & Weigand, H. (2007). Formalizing the evolution of virtual communities. *Information Systems*, *32*(2), 223–247. doi:10.1016/j.is.2005.09.002

Deuchar, R. (2008). Facilitator, director or critical friend? Contradiction and congruence in doctoral supervision styles. *Teaching in Higher Education*, *13*(4), 489–500. doi:10.1080/13562510802193905

Driscoll, M. (2002). Blended Learning: let's get beyond the hype. *E-learning*. Retrieved from http://elerningmag.com/Itimagazine

Farzan, R., Dabbish, L. A., Kraut, R. E., & Postmes, T. (2011). Increasing commitment to online communities by designing for social presence. In *Proceedings of the ACM 2011 Conference on Computer Supported Cooperative Work*. New York, NY: Association for Computing Machinery. doi:10.1145/1958824.1958874

Fischer, G., Rohde, M., & Wulf, V. (2007). Community-based learning: The core competency of residential, research-based universities. *Computer-Supported Collaborative Learning*, *2*(1), 9–40.

Gilmore, S., & Warren, S. (2007). Themed article: Emotion online: Experiences of teaching in a virtual learning environment. *Human Relations*, *60*(4), 581–608. doi:10.1177/0018726707078351

Heath, T. (2002). A quantitative analysis of PhD students' views of supervision. *Higher Education Research & Development*, *21*(1), 41–53. doi:10.1080/07294360220124648

Heaton-Shrestha, C., Edirisingha, P., Burke, L., & Linsey, T. (2005). Introducing a VLE into campus-based undergraduate teaching: Staff perspectives on its impact on teaching. *International Journal of Educational Research*, *43*(6), 370–386. doi:10.1016/j.ijer.2006.07.001

Hodsdon, L., & Buckley, A. (2011). *Postgraduate research and experience survey. The Higher Education Academy*.

Kim, J., Song, J., & Jones, D. R. (2011). The cognitive selection framework for knowledge acquisition strategies in virtual communities. *International Journal of Information Management*, *31*(2), 111–120. doi:10.1016/j.ijinfomgt.2010.05.011

Kirschner, P. A. (2001). Using integrated electronic environments for collaborative teaching/learning. *Research Dialogue in Learning and Instruction*, *2*, 1–9. doi:10.1016/S0959-4752(00)00021-9

Koh, J., & Kim, Y.-G. (2004). Knowledge sharing in virtual communities: An e-business perspective. *Expert Systems with Applications*, *26*(2), 155–166. doi:10.1016/S0957-4174(03)00116-7

Kolbitsch, J., & Maurer, H. (2006). The transformation of the web: How emerging communities shape the information we consume. *Journal of Universal Computer Science*, *12*(2), 187–213.

Lee, S. L., Vogel, D., & Limayem, M. (2002). Virtual community informatics: what we know and what we need to know? In R. H. Sprague (Ed.), In *Proceedings of the 35th Hawaii International Conference on System Sciences*. Los Alamitos, CA: Institute of Electrical and Electronics Engineers Computer Society Press. doi:10.1109/HICSS.2002.994248

Limniou, M. (2012). From present to virtual classroom: A review of the influence of ICT on education. In S. Abramovich (Ed.), *Computers in Education* (pp. 93–119). New York, NY: NOVA Science Publishers.

Limniou, M., & Papadopoulos, N. (2011). Teaching strategies and procedures in chemical education based on blended Learning. In J. P. Henderson & A. D. Lawrence (Eds), Teaching Strategies, 81-111. New York, NY: NOVA Science Publishers.

Limniou, M., Papadopoulos, N., & Kozaris, I. (2009). The role of simulations and real-time applications in collaborative learning. In E. Luzzatto & G. DiMarco (Eds.), *Collaborative learning: methodology, types of interactions and techniques* (pp. 225–255). New York, NY: NOVA Publishers.

Limniou, M., & Smith, M. (2010). Teachers' and students' perspectives on teaching and learning through virtual learning environments. *European Journal of Engineering Education*, *35*(6), 645–653. doi:10.1080/03043797.2010.505279

McKenna, K., & Green, A. (2002). Virtual group dynamics. *Group Dynamics*, *6*(1), 116–127. doi:10.1037/1089-2699.6.1.116

Mearns, J. (2009). Social learning theory. In H. Reis & S. Sprecher (Eds.), *Encyclopedia of Human Relationships* (Vol. 3, pp. 1537–1540). Thousand Oaks, CA: Sage. doi:10.4135/9781412958479.n506

Ngai, E. W. T., Poon, J. K. L., & Chan, Y. H. C. (2007). Empirical examination of the adoption of WebCT using TAM. *Computers & Education*, *48*(2), 250–267. doi:10.1016/j.compedu.2004.11.007

Oblinger, D. G., & Oblinger, J. L. (2005). *Educating the net generation*. Retrieved from http://www.educause.edu/ir/library/pdf/pub7101.pdf

Panciera, K., Halfaker, A., & Terveen, L. (2009). Wikipedians are born, not made: a study of power editors on Wikipedia. In *Proceedings of the ACM Special Interest Group on Computer-Human Interaction*. New York, NY: Association for Computing Machinery. doi:10.1145/1531674.1531682

Ponte, D., & Simon, J. (2011). Scholarly communication 2.0: Exploring researchers' opinions on Web 2.0 for scientific knowledge creation, evaluation and dissemination. *Serials Review*, *37*(3), 149–156. doi:10.1080/00987913.2011.10765376

Protivnak, J. J., & Foss, L. L. (2009). An exploration of themes that influence the counselor education doctoral student experience. *Counselor Education and Supervision*, *48*(4), 239–256. doi:10.1002/j.1556-6978.2009.tb00078.x

Quan-Baffour, K. P. & Vambe, M. T. (2008). Critical issues in the supervision of post-graduate dissertations in distance education environments. *The Journal for Open and Distance Education and Educational Technology, 4*(1).

Ren, Y., & Kraut, R. E. (2009). A simulation for designing online community: Member motivation, contribution, and discussion moderation. *Organization Studies*, *28*(3), 377–408.

Research Excellent Framework (REF). (2011). *Assessment framework and guidance submissions*. Retrieved from: http://www.ref.ac.uk/media/ref/content/pub/assessmentframeworkandguidanceonsubmissions/GOS including addendum.pdf

Schulze, S. (2012). Empowering and disempowering students in student-supervisor relationships, *Koers-Bulletin for Christian Scholarship, 77*(2). Retrieved from http://koersjournal.org.za/index.php/koers/article/view/47/560

Shang, S. S. C., Li, E. Y., Wu, Y. L., & Hou, O. C. L. (2011). Understanding Web 2.0 service models: A knowledge-creating perspective. *Information & Management*, *48*(4-5), 178–184. doi:10.1016/j.im.2011.01.005

Silius, K., Miilumaki, T., Huhtamaki, J., Tebest, T., Merilainen, J., & Pohjolainen, S. (2010). Students' motivations for social media enhanced studying and learning. *Knowledge Management & E-Learning: An International Journal*, *2*(1), 51–67.

Slavin, R. E. (2006). *Educational psychology: Theory and practice*. New York: Pearson Publishing Ltd.

Sobrero, P. M., & Craycraft, C. G. (2008). Virtual communities of practice: A 21st century method for learning, programming, and developing professionally. *Journal of Extension*, *46*(5). Retrieved from http://www.joe.org/joe/2008october/a1.php

Vitae. (2013). *Vitae Researcher Development Framework*. Retrieved http://www.vitae.ac.uk/researchers/428241/Vitae-Researcher-Development-Framework.html

Watts, J. H. (2008). Challenges of supervising part-time PhD students: Towards student-centred practice. *Teaching in Higher Education*, *13*(3), 369–373. doi:10.1080/13562510802045402

Welbourne, J. L., Blanchard, A. L., & Wadsworth, M. B. (2013). Motivations in health communities and their relationship to community, connectedness and stress. *Computers in Human Behavior*, *29*(1), 129–139. doi:10.1016/j.chb.2012.07.024

Wolf, A. (2000). Emotional expression online: Gender differences in emoticon use. *Cyberpsychology & Behavior*, *3*(5), 827–833. doi:10.1089/10949310050191809

Zuber-Skerritt, O., & Roche, V. (2004). A constructivist model for evaluating postgraduate supervision: A case study. *Quality Assurance in Education*, *12*(2), 82–93. doi:10.1108/09684880410536459

ADDITIONAL READING

Anderson, P. (2007). What is Web 2.0? Ideas, technologies and implications for education: a report for JISC Technology and Standards Watch. Retrieved from http://www.jisc.ac.uk/media/documents/techwatch/tsw0701b.pdf

Anderson, S. (2011). The twitter toolbox for educators. *Teacher Librarian*, *39*(1), 27–30.

Armstrong, J., Franklin, T., McLoughlin, C., Westera, W., Schmidt, S., Kelly, B., & Marwick, A. E. (2008). A review of current and developing international practice in the use of social networking (Web 2.0) in higher education. Retrieved from http://dspace.ou.nl/bitstream/1820/1930/1/the%20use%20of%20social%20networking%20in%20HE.pdf

Bellarby, L., & Orange, G. (2006). Knowledge sharing through communities of practice in the voluntary sector. In E. Coakes & S. Clarke (Eds.), Encyclopedia of communities of practice in information and knowledge management. Hershey, PA: Idea Group.

Blanch, K. (2013). Identity, Facebook and education: Students negotiating identity on a class' Facebook page. Retrieved from http://otago.ourarchive.ac.nz/bitstream/handle /10523/4092/BlanchKeelyF2013MA.pdf?sequence=1

Blanchard, A. (2007). Developing a sense of virtual community measure. *Cyberpsychology & Behavior*, *10*(6), 827–830. doi:10.1089/cpb.2007.9946 PMID:18085972

Bradshow, P. (2008, February 15). Teaching students to twitter: The good, the bad and the ugly. Retrieved from http://onlinejournalismblog.com/2007/02/15/teachingstudentstotwitter thegoodthebadandtheugly/

Cadman, K., & Ha, H. T. (2001). Only connect: Transactional supervision as the "rainbow bridge". In A. Bartlett & G. Mercer (Eds.), *Postgraduate research supervision: Transforming (R)elations* (pp. 215–232). New York, NY: Peter Lang.

Cobb, S. C. (2009). Social presence and online learning: A current view from a research perspective. *Journal of Interactive Online Learning*, *8*(3), 241–254. Retrieved from http://anitacrawley.net/Articles/Social%20Presence%20and%20Online%20Learning%20A%20Current%20View%20from%20a%20Research.pdf

Dunlap, J. C., & Lowenthal, P. R. (2009). Tweeting the night away: Using Twitter to enhance social presence. *Journal of Information Systems Education*, *20*(2), 129–136.

Epp, E. M., Green, K. F., Rahman, A. M., & Weaver, C. G. (2010). Analysis of student-instructor interaction patterns in real-time, scientific online discourse. *Journal of Science Education and Technology*, *19*(1), 49-57. doi: 10.1007/s10956-009-9177-z

Hsu, P.-L., & Yen, Y.-H. (2012). Facebook as a teaching enhancement tool to facilitate college student learning: A case study. In *Proceedings of the 11th WSEAS International Conference on Education and Educational Technology (EDU '12)*. Montreux, Switzerland: World Scientific and Engineering Academy and Society Press.

Kraska, M. (2008). Retention of graduate students through learning communities. *Journal of Industrial Teacher Education*, *45*(2), 45–70.

Pemberton, J., & Mavin, S. (2007). CoPs: One size fits all. *The International Journal of Knowledge and Organizational Learning Management*, *14*(1), 1–3.

Research Excellent Framework (REF). (2011). Assessment framework and guidance submissions. Retrieved from: http://www.ref.ac.uk/media/ref/content/pub/assessmentframeworkandguidanceonsubmissions/GOS including addendum.pdf

Wellman, B., & Gulia, M. (1999). Net surfers don't ride alone: virtual communities as communities. In P. Kollock & M. Smith (Eds.), *Communities in cyberspace* (pp. 331–367). Berkley, CA: University of California Press.

Wenger, E. (1998). Communities of practice: Learning as a social system. *System Thinker.* Retrieved from http://www.co-i-l.com/coil/knowledge-garden/cop/lss.shtml

Wenger, E., McDermott, R. A., & Snyder, W. M. (2002). *Cultivating communities of practice: A guide to managing knowledge*. Boston, MA: Harvard Business School Press.

Wenger, E., White, N., & Smith, J. D. (2009). Digital habitats: Stewarding technology for communities. Portland, OR: CPSquare.

Whittle, J. (1994). A model for the Management of Research degree supervision in a post-1987 university. In O. Zuber-Skerritt & Y. Ryan (Eds.), *Quality in Postgraduate Education* (pp. 38–50). London, U.K: Kogan Page.

Wright, T., & Cochrane, R. (2010). Factors influencing successful submissions of PhD Theses. *Studies in Higher Education*, *25*(2), 181–195. doi:10.1080/713696139

Zhang, Y., Fan, Y., Wei, K. K., & Chen, H. (2010). Exploring the role of psychological safety in promoting the intention to continue sharing knowledge in virtual communities. *International Journal of Information Management*, *30*(5), 425–436. doi:10.1016/j.ijinfomgt.2010.02.003

KEY TERMS AND DEFINITIONS

Blended Learning: A combination of different pedagogical theories in a face-to-face learning environment with or without technologically mediated interactions between students, teachers and learning resources.

Computer-Mediated Communication: Two or more individuals communicate via separate computers through the Internet or an intranet.

Research: The process of carrying out a systematic and scientific investigation and publishing accurate results.

Social Learning: Occurs when the learners' behavior is changing from the environment through the process of observational learning, i.e. by observing how other learners behave around them.

Social Media: Platforms based on the Web 2.0 technology that allows the sharing of ideas, information and documents among users.

Virtual Community: A group of individuals who share the same interests and interact without geographical limitations through a social network system.

Virtual Learning Environments: E-learning platforms where teachers and learners have access to learning material, assessments, discussions, chat, etc.

This work was previously published in Student-Teacher Interaction in Online Learning Environments edited by Robert D. Wright, pages 50-75, copyright year 2015 by Information Science Reference (an imprint of IGI Global).

Chapter 25
Internet-Based Technology Use in Second Language Learning: A Systematic Review

Shuyi Guan
University at Albany, State University of New York, USA

ABSTRACT

Ever since computer technologies were accessible to second language learners and teachers, various types of computer-assisted language learning (CALL) have been harnessed in the service of teaching languages. Most recently, the advent of online technologies has sparked CALL practitioners to integrate this powerful form of teaching and learning into language education. This paper synthesizes the extant research on these online language education activities and the state of current understanding regarding the potential of Internet-based teaching and learning second languages. The results of analyzing extensive studies of Internet-based second language learning reveals that Internet-based technology has been widely used in second language learning. In addition, Internet-based technologies are effective instructional tools for second language learning and teaching.

1. INTRODUCTION

Since computer technologies have been accessible to language learners and teachers, various types of computer-assisted language learning (CALL) programs have been harnessed in the service of teaching languages over the past 30 years. In the last decade, the advent of Internet technologies has sparked CALL developers and practitioners to integrate this powerful tool of teaching and learning second languages into language education. With the tools available today, online learning can be active, collaborative, and meaningful (Murugaiah & Thang, 2010).The present review examines extensively the existing research on online language education activities and the state of our current understanding regarding the potential of Internet-based teaching and learning second languages. This review focuses on three research questions: (1) how have Internet-based technologies been used in second language learning; (2) how have Internet-based technologies enhanced second language skills; and (3) how have Internet-based technologies changed students' and teachers' perspectives of second language learning and teaching?

DOI: 10.4018/978-1-4666-8246-7.ch025

2. METHOD

The technologies examined in this review refer to Internet-based technologies used in second language learning. This includes language course work like voice boards, wikis, blogs, course management tools (e.g. Blackboard System), and online language learning games. Any studies that were not using Internet technology as a central tool weren't included. To locate the research literature on Internet-based technology used in second language learning, I used the databases PsycINFO, ERIC, EEBSCO, and Education Full Text. The initial database search was based on a combination of the two groups of key words: (1) second language learning, foreign language learning, and (2) online learning, online teaching, and Internet-based learning. Manual search of references, such as the Annual Review of Psychology and the Handbook of Educational Psychology were also used to identify the exiting literature.

As a result, a total of 117 articles from 28 journals were selected for the review. Based on the number of articles cited in this review paper, the top six journals are Computer Assisted Language Leaning, ReCALL, Modern Language Journal, CALICO Journal, Computers in Human Behavior, and Computers & Education.

This article is organized as follows: First, the Internet-based technologies that are used in second language teaching and learning is described. Afterwards, the effect of Internet-based technologies in second language acquisition and students' and teachers' perspectives of online learning are discussed. Finally, the potential problems of online second language learning and implications for future work are provided.

3. INTERNET-BASED TECHNOLOGIES USE IN SECOND LANGUAGE LEARNING

The extensive Internet-based technologies have been used in the following four areas: (1) telecollaboration, (2) 3D virtual worlds, (3) mobile-assisted language learning, and (4) authentic online videos. Telecollaboration, such as Facebook, wikis, blogs, and podcasts have been widely used in second language learning, and there is extensive research on several kinds of online collaborative learning (e.g. Guth & Helm, 2012; Lee, 2009; Ware & O'Dowd, 2008). On the other hand, authentic online videos are a more traditional teaching and learning method that has been used even before the Internet technology emerged. Authentic online videos are usually used as a part of other online learning tools (e.g. Second Life and podcasts) but there is limited research on it. Existing research on each of these four areas are discussed in more details below, with starting with telecollaboration, the most widely researched type of technology used by second language learners and educators; and ending with authentic online videos, the least researched area of technology with this population.

3.1. Telecollaboration

Research has revealed that students reported positively about their language learning experience in online collaborative learning (see Lehtonen & Tuomainen, 2003; Guth & Helm, 2012; Lee, 2009; Ware & O'Dowd, 2008).Currently, Facebook is considered the most popular platform for online social networking among young generations, especially university students. It was found that students believed Facebook could be used as an online environment to facilitate English as Second language (ESL) (Kabilan, Ahmad, & Abidin, 2010). In addition, Facebook-integrated instruction can significantly enhance students' interest and motivation as it is already something they are familiar(Shih, 2011).

Wikis represent a unique type of collaborative learning where collaboration amongst peers can result in a project where multiple users are able to add their thoughts and ideas in order to create a comprehensive and combined final product(Bradley, Lindstrom, & Rystedt, 2010; Chao & Lo, 2011; Kessler, 2009; Lund, 2008). Wikis also hold the potential for collective knowledge advancement and language development (Lund, 2008). For example, Kessler and Bikowski (2010) reported a study on collaborative learning on a wiki in English as a Foreign Language (EFL) online course. Students performed five main language acts in the wiki: adding new information, deleting information, clarifying or elaborating on information, synthesizing information and adding web links. In performing these language acts, the students were able to contribute their own information to the group product, thus acting as a collaborative team member. The results showed that student interaction and language use benefited from the flexible learning environment.

The development of Web 2.0 technology brings blogs and podcasts into second language education. Blogs can be easily created and published instantly to the Internet, and then readers of the blog can leave comments in an interactive way by responding to the blog posts. A podcast is an online audio file that allows users to automatically receive available web-based audio files. Podcasting is appealing and supports language acquisition because it allows learners to listen to authentic recordings on a personal computer, as well as to record and publish their own talks (Lee, 2009).

Both reading and writing blogs, or listening to and creating podcasts are beneficial to second language learners. Lee (2009) conducted a study of a Spanish-American telecollaborative project through which students created blogs and podcasts. This study showed that effective use of online task-based instruction created a dynamic climate for interactive collaboration and afforded unique opportunities for both American and Spanish students to explore the target languages and cultures. The study also suggested that building interpersonal relationships and making personal commitments to online contributions are vital to successful intercultural exchanges (Lee, 2009).

Another study by Lee (2010) on blog technology used in second language learning revealed that by regularly creating blog entries there was a positive impact on learners' writing fluency and increased their incentive to write for a large audience. Students enjoyed the flexibility to personalize their blogs by choosing from a variety of free templates to make the design and layout attractive. This study also stressed that learners' critical thinking is essential for the implementation of blog and podcasting projects in second language instruction (Lee, 2010). When students published their work on a blog or podcast, they have to be active knowledge creators. They also had to write comments on other students' work which foster students' critical thinking and gave them a deeper understanding of the topic.

3.2. 3D Virtual Worlds

Online virtual worlds afford a number of interactional opportunities and resources for formal language instruction (Sykes, Oskoz & Thorne, 2008). For instance, Zheng and her collaborators (Zheng, Young, Wagner & Brewer, 2009) tracked Chinese learners of English as they interacted in a virtual world as a component of the English language class, and found that the amount and quality of learner participation far surpassed that of the face to face classroom. Another research (Jones, Squires, & Hicks, 2008) on an Internet-based spoken language learning system within a 3D online learning environment revealed that participants did improve their spoken language skills within the authentic and situated environment.

Second Life is a 3D virtual world where language students can communicate in real time with native speakers of the language they are studying (Jauregi, Canto, de Graaff, Koenraad, & Moonen, 2011). The effects of Second Life on students learning a second language include (1) reducing student anxiety and increasing motivation (Wehner, Gump, & Downey, 2011), (2) improving students engagement in language learning activities (Deutschmann & Panichi, 2009; Deutschmann, Panichi, & Molka-Danielsen, 2009), and (3) providing sufficient scaffolding, support, and feedback to students in order to promote further reflection (Grant & Clerehan, 2011). Learners of Spanish participating in language learning tasks in

Second Life reported positive outcomes in terms of rapport and productive language use (Jauregi, Canto, de Graaff, Koenraad & Moonen, 2011). Consistent findings were found in similar studies conducted by Peterson (2010) and Deutschmann & Panichi (2009) in similar studies with learners of English as a foreign language.

3.3. Mobile-Assisted Language Learning

With the development of mobile technologies and wide use of smart phones, *mobile-assisted language learning* (MALL) can be seen as a viable solution to blend a learners' learning environment into their everyday life. Mobile phones with Internet provide a unique opportunity to learn outside of the classroom, making learning available anytime and anywhere. In a study using MALL to learn English prepositions and Chinese idioms, mobile technology was a key element in supporting a creative output such as taking suitable pictures in an appropriate context to illustrate the prepositions or idioms under study (Wong & Looi, 2010). For example, during the lesson of learning English prepositions, such as "above, over, under, below", the students were assigned smartphones. The students were asked to venture out of the classroom to take photos that best demonstrated the usage of the individual preposition (Wong & Looi, 2010). They then posted these entries to a wiki space for peer sharing and review. A similar study was conducted in a Chinese language class where students were asked to become photo-bloggers by using their smartphones to take photos in their daily lives and make sentences that went along with the picture (Wong, Chin, Tan, & Liu, 2010). In these two studies, MALL is not only a content-based (delivery of learning content), but also a design-oriented (authentic or social mobile learning activities) method (Wong & Looi, 2010). MALL can be used as a tool to nurture students' self-directed seamless learning practices.

MALL is also reported to be an effective way for specific second language acquisition (Che, Lin, Jang, Lien, & Tsai, 2009; de Jong, Specht, & Koper, 2010; Demouy & Kukulska-Hulme, 2010; Kiernan & Aizawa, 2004; Kukulska-Hulme, 2009; Li et al., 2010). For instance, the effects of using vocabulary learning programs on mobile phones in relation to students' English vocabulary learning are investigated with Turkish college students (Basoglu & Akdemir, 2010). The results indicated that using mobile phones as a vocabulary learning tool is more effective than traditional vocabulary learning methods. Students spent more time studying with the mobile vocabulary learning tool than studying vocabulary on paper because it is entertaining and they can use it in their leisurely time (Basoglu & Akdemir, 2010). Nah (2011) showed that by using the Internet through a mobile phone to learn English as a foreign language (EFL), listening skills have significant potential, and language learners in South Korea hold positive attitudes towards using mobile phones as a tool for learning. According to this study, there are three factors that influence the learners' attitude towards the use of the listening website on a mobile phone. The first factor is the novelty of the new technology, and how students like the experience of talking in English through the mobile discussion board, completing the online tasks in their spare time and submitting the tasks online directly from their mobile phones. In addition, it is very convenient for language learners to participate in learning activities with less time or space constraints when they use their own mobile device. The third factor with the positive influence on attitude is the interactivity of the online learning tools because language learners are able to work hand in hand with their peers and teachers by interacting synchronously or asynchronously through short message services, mobile email, and mobile discussion boards (Nah, 2011).

Mobile phones can also be used in cross-platform language learning support systems, such as language learning service via interactive television (iTV). The mobile phone can support learners' understanding of TV programs by enabling them access to the summary of the program as well as access to difficult linguistic and cultural items, such as a sombrero if they are studying Spanish that may appear in the program (Fallahkhair, Pemberton, & Griffiths, 2007; Pemberton, Fallahkhair, & Masthoff, 2005).

3.4. Authentic Online Videos

According to the findings of existing empirical studies (e.g. Chen, 2011; Hada, Ogata, & Yano, 2002), subtitled second language videos are particularly useful for foreign language learning. For example, research has shown that the SynctoLearn tool, which provides synchronized subtitles, can be used as a supporting tool to help English as a Foreign Language (EFL). Students reduce their cognitive load and anxiety levels when tackling authentic videos (Chen, 2011). In addition, observing authentic subtitled videos "allow students to see a model of successful interaction, to be exposed to useful vocabulary and sentence structures within the context of an authentic situation while maintaining the need for them to generate their own original dialog" (Arslanyilmaz & Pedersen, 2010, p. 65). Other studies (e.g., Jauregi & Banados, 2008) reported that video-web communication tools can enhance the quality of the foreign language curriculum by facilitating an encouraging, virtual environment for meaningful interaction between nonnative and native speakers of Spanish.

Podcasting, another new technology of delivering audio and video files via the Web, is becoming increasingly popular among college students and has been used in educational contexts. The current use of podcasting in second language education is limited primarily to the delivery of recorded lectures in a portable, online format (O'Brien, & Hegelheimer, 2007). Researchers (e. g. O'Bryan & Hegelheimer, 2007) believe podcasting has the potential to not only act as a rich source of input and instruction for students in the language classroom, but also to eventually transform teaching all together.

4. THE EFFECT OF INTERNET-BASED TECHNOLOGIES ON SECOND LANGUAGE ACQUISITION

Extensive empirical research exists in comparing the linguistic outcomes of Internet-based second language courses to those of traditional face-to-face courses (e.g. Shih, 2011; Sagarra & Zapata, 2008). Internet-based second language instruction has been found to have positive outcomes in terms of students' language acquisition. For instance, a study of investigating student's oral communication skills of English in a blended Turkish college class showed that students had obvious development in their oral communication skills and felt positive about their perceptions of integrating technology in the lesson (Kırkgöz, 2011).

On the other hand, some research found that face-to-face instruction is more favorable in terms of linguistic development than online instruction. For example, Wang (2010) did a study that analyzed students' online utterances and offline interactions, and the results showed that online language learning promoted social interaction among students and their engagement; however, it did not automatically facilitate students in their adoption of active learning strategies. Therefore, this study did not find positive outcomes in terms of linguistic development.

More specifically, there are four basic language skills for second language learning: reading, listening, writing, and speaking. Reading and listening are the input in the process of second language acquisition, while writing and speaking are the output. In the next session, I will discuss how Internet-based technologies enhance these four second language acquisition skills respectively.

4.1. Reading

A study (de Milliano, Vermeer, Hootsen, & van der Werf, 2008) about the use of a dictionary with affix information of Dutch in an adaptive e-learning environment showed that learners made significant progress in vocabulary and reading, as a result of the use of an e-learning environment in which the difficulty of the texts was adapted to the level of the learners' vocabulary. Research (e.g. Al-Shehri & Gitsaki, 2010) also showed that ESL students who had access to the online dictionary during reading comprehension tasks performed better on vocabulary tests but spent more time on the reading task than the students who did not have access to an online dictionary. In addition, some of the studies (e.g. Arnold, 2009) showed that when students read online instead of printed materials, some of them purposely seek out more difficult texts to challenge themselves. That is also indicative of learners' growing motivation and self-confidence of online reading.

4.2. Listening

Developing listening comprehension skills is considered crucial for second language acquisition. Many studies about listening abilities are based on what learners report while listening to an oral message in a second language (e.g.Vandergrift, 2003). Roussel (2011) used a video recorded on the computer screen while L2 learners were listening to an MP3-track in German to objectively examine what learners do while listening. The video of the participants screen showed the movement of the mouse and its time-course, including the pauses and the backward or forward movements learners do in order to master their listening task. The study revealed that the opportunity to have personal control over information input given by the use of technology does improve learners' information processing (Roussel, 2011). In addition, McBride (2008) did a study on an online mini course designed to improve college EFL students' listening comprehension. The pretest and posttest results showed that students' listening comprehension improved with slow online dialogues.

Research also showed that there appeared to be higher vocabulary acquisition and knowledge retention with online listening tasks (Absalom & Rizzi, 2008). A study (Smidt & Hegelheimer, 2004) on authentic web-delivered video suggested that online academic lectures on ESL listening comprehension can improve the supplementary gain of vocabulary and listening comprehension.

4.3. Writing

In online writing situations, students are in great need of writing aids. Online writing technologies can provide not only writing guidelines to raise students' consciousness, but also learning resources and tools which include online translators, online dictionaries, phraseology, and wordlists (Kuo, 2008).

Writing skills and fluency have also been reported to improve as the result of online language learning activities (Ishihara, 2007; Lee, 2010) with learners effectively using the target language to manage the online conversations (Chun, 2008), and negotiate their instructional processes (Blake, 2000). The three most popular online writing activities in college language education--forums, blogs, and wikis—are favorable by college students, and help students improve their ability to differentiate English writing styles (Miyazoe & Anderson, 2010).

Synchronous online peer response groups have been increasingly used in EFL writing. A study (Liang, 2010) of synchronous online interaction among Taiwanese undergraduate EFL peer groups indicated that relationships among different types of online interaction depend on group makeup and dynamics.

4.4. Speaking

It has been frequently suggested that computer-mediated-communication (CMC) can help learners improve their oral proficiency (Abrams, 2003). Deutschmann and Panichi (2009)'s study revealed that students became more actively involved in online oral proficiency in the virtual world Second Life. In addition, spoken oral interactions between second language learners and tutors were found in online language learning environments (Heins, Duensing, Stickler, & Batstone, 2007). Synchronous learning management systems (SLMS), which include online chat, whiteboard, videoconferencing feature, addressed the vital need for real-time communication to support the students' gain of language skills (Wang & Chen, 2007).

5. STUDENTS' AND TEACHERS' PERSPECTIVES OF INTERNET-BASED SECOND LANGUAGE LEARNING

5.1. Students' Perspectives

Online language learners report favorably on the rapport-building that occurs in online language courses (Jiang & Ramsay, 2009) and increases in motivation (Thang & Bidmeshki, 2010), accuracy (Kelm, 1992) and overall learner satisfaction (Strambi & Bouvet, 2003). In addition, Alameen (2011) reported that Web 2.0 digital stories used by English language learners provided an interactive venue for building learner communities, fostering collaboration, engaging learners in multi-literacies, and creating opportunities for global audience interaction and feedback.

The quality and amount of interaction among students is widely acknowledged to be an important indicator of successful online language learning experiences. There are studies which show that the experience of increased asynchronous online interaction with peers and teachers in the Internet-based second language course design produced a change in the students' perceptions towards the necessary interactive elements. For example, the usage of forums, blogs, and wikis in EFL-blended learning courses have been explored in research and the results revealed students' positive perceptions of the blended course design with online writings (Miyazoe & Anderson, 2010). In this study, the blended learning course design includes weekly face-to-face instruction and out-of-class online writing activities. Forums were used for topical discussions; blogs were used for an optional free writing activity; and wikis were set up in order to conduct a collaborative translation from English to Japanese. Throughout the course, the instructor did not participate in the online activities, but carefully observed what was happening in the system. The questionnaires and observations showed that the different activities provided by the blended course design were not only challenging, but were fun for the students to complete.

Another study on the use of the WIKI in a large blended learning class showed that the online learning experience extended the classroom beyond the physical space and engaged students in interactional communication in the second language, encouraged them to find the meaning of the words, and challenged learners to find solutions to real life problems around them (Aborisade, 2009). A study (Huang, Lin, & Chiang, 2010) of web 2.0 used in a Chinese foreign language classroom also indicated that the instructor and students alike responded positively to online learning, which suggests that web 2.0 is a good tool in promoting effective learning of Chinese.

In addition, there are many studies about students' satisfaction or perceived effectiveness of a blended second language class. For example, Jochum's (2010) study of online Spanish instruction revealed that students' comfort levels significantly increased in writing in Spanish and taking online Spanish courses. Also, the students appreciated the online format in comparison to a "normal" second language learning class structure and felt that they benefited from it.

As part of a larger study examining the influence of popular culture and the internet on heritage language development, Lee (2006) explored the social networking practices of two Korean-American heritage language learners. Employing case studies of her two siblings, the author investigated their linguistic and pragmatic practices. Data suggests that online social venues provided them with authentic opportunities to use the language and to support the development of their online social networks. Online practices enabled them to participate in social interactions without the pressure of spelling words correctly. But they were also frustrated because they could not distinguish between correct and incorrect forms of the language.

5.2. Teachers' Perspectives

With the increase in Internet technologies in asynchronous instruction, questions concerning the role of the instructor as it determines the quality and impact of learning (Meskill & Anthony, 2007). Comas-Quinn (2011) argued that while technological challenges and the sheer amount of change that teachers were faced with were largely responsible for some of the negative attitudes reflected in teachers' opinions about the course. A less obvious explanation for their unenthused attitudes might be found in the way that learning, teaching and training are conceptualized by both teachers and the institution. Belz and Muller-Hartmann (2003) examined how social, cultural, and institutional affordances and restrictions in a telecollaborative foreign language learning partnership shaped the group of online teachers.

Some critics have commented that online courses may discourage teacher-student interaction, which is considered by teachers and researchers as an important element in language learning. For example, Ng, Yeung, & Hon (2006) found that the amount of interaction between the student and teacher may depend solely on the students understanding of the targeted language.

6. CONCLUSION AND IMPLICATIONS

How have Internet-based technologies been used in second language learning? It is clear that Internet-based technologies have been widely used in second language learning. The Internet-based technologies that are reviewed in this paper include at least four types, telecollaboration, 3D virtual worlds, mobile learning, and authentic online videos. There are some other technologies that have not been discussed in this paper because they have not been extensively used in language education, and also there aren't enough empirical studies on those technologies. For example, the MOO is a text-based online virtual reality system in which multiple users are connected at the same time. Although there is limited research on it, it has shown that MOOs are very suitable as a venue for culturally and linguistically challenging language learning students through online tandem partnerships (Kotter, 2001). In Kotter (2001)'s study, a MOO-based language learning project was used in a tandem English-German learning class. The result showed that partners improved their own communicative competence by conversing with native speakers in a non-threatening environment, and by receiving instant and extensive feedback.

What is research evidence on Internet-based technologies enhancing second language acquisition from both students' and teachers' perspectives? It is widely accepted by researchers that Internet-based technologies are effective instructional tools for second language learning and teaching. Most of researchers agree that second language learners benefit from Internet-based technologies. However, few studies did question the value of implementing Internet-based technologies into second language learning.

6.1. Potential Problems of Internet-Based Second Language Learning

Murphy (2009) reported the benefits, challenges and solutions of using synchronous online communication for learning French as a second language.

Benefits ranged from students' sense of freedom in the class, feelings of confidence to enhanced self-esteem along with motivation to complete the work because of the factor of peer learning. Challenges included teachers' inability to keep up with the work, audio and technical problems and scheduling. Solutions included technical support and using students as moderators to relay incomprehensible messages from the teacher to other students.

Dalarna University in Sweden, offered a web-based English learning platform including asynchronous document exchange and collaborative writing tools, e-mail, recorded lectures in various formats, text chat, and audiovisual seminars. The study (Cunningham, Fagersten, & Holmsten, 2010) of this learning program revealed four communication problems experienced in this kind of education: (a) technical problems; (b) students not understanding the teacher because of poor sound conditions or poor perception skills in English; (c) students not understanding fellow students because of limited proficiency on one or both parts; (d) the teacher not understanding the student because of the student's unintelligible pronunciation, in combination with less than optimal sound conditions.

6.2. Implications for Future Research

Based on the journal articles that have been reviewed in this paper, most of the studies focused on college students' second language learning. There are quite a few studies about online language learning for K-12 students. Future research should go beyond college students, and pay more attention to K-12 students' second language acquisition and learning outcomes in Internet-based language learning.

Research should also go beyond ESL and Spanish and focus on other second languages. For instance, there are few studies on Chinese, which is one of the most popular languages in the world. Although "learning second language online" can be a general research topic, different languages have very distinct features that may bring diverse outcomes when learning the language online.

In addition, more research needs to be conducted in specific language skills, such as listening and speaking. We have reviewed reading, listening, writing, and speaking abilities as the outcomes of online learning. There are plenty of studies on second language reading and writing skills (e.g. Bloch, 2009; Kilickaya & Krajka, 2010; Liu, Chen, & Chang, 2010; Ma & Kelly, 2006), but there are not sufficient studies about online listening and speaking. The instruments and measures for analyzing online listening and speaking is limited, and it is not easy to evaluate students' listening and speaking ability compared to reading and writing. Future research should examine not only reading, vocabulary, grammar, writing, and spelling, but also oral speaking and listening comprehension.

REFERENCES

Aborisade, P. (2009). Investigating a Nigerian XXL-Cohort Wiki-Learning Experience: Observation, Feedback and Reflection. *Electronic Journal of e-Learning, 7*(3), 191-202.

Abrams, Z. I. (2003). The Effect of Synchronous and Asynchronous CMC on Oral Performance in German. *Modern Language Journal*, *87*(2), 157–167. doi:10.1111/1540-4781.00184

Absalom, M., & Rizzi, A. (2008). Comparing the Outcomes of Online Listening versus Online Text-Based Tasks in University Level Italian L2 Study. *ReCALL*, *20*(1), 55–66. doi:10.1017/S0958344008000517

Al-Shehri, S., & Gitsaki, C. (2010). Online Reading: A Preliminary Study of the Impact of Integrated and Split-Attention Formats on L2 Students' Cognitive Load. *ReCALL*, *22*(3), 356–375. doi:10.1017/S0958344010000212

Alameen, G. (2011). Learner Digital Stories in a Web 2.0 Age. *TESOL Journal*, *2*(3), 355–369. doi:10.5054/tj.2011.259954

Arnold, N. (2009). Online Extensive Reading for Advanced Foreign Language Learners: An Evaluation Study. *Foreign Language Annals*, *42*(2), 340–366. doi:10.1111/j.1944-9720.2009.01024.x

Arslanyilmaz, A., & Pedersen, S. (2010). Enhancing Negotiation of Meaning through Task Familiarity Using Subtitled Videos in an Online TBLL Environment. *Turkish Online Journal of Educational Technology - TOJET, 9*(2), 64-77.

Basoglu, E. B., & Akdemir, O. (2010). A Comparison of Undergraduate Students' English Vocabulary Learning: Using Mobile Phones and Flash Cards. *Turkish Online Journal of Educational Technology - TOJET, 9*(3), 1-7.

Belz, J. A., & Muller-Hartmann, A. (2003). Teachers as Intercultural Learners: Negotiating German-American Telecollaboration along the Institutional Fault Line. *Modern Language Journal*, *87*(1), 71–89. doi:10.1111/1540-4781.00179

Blake, K. R. (2000). Using the World Wide Web To Teach News Writing Online. *Journalism And Mass Communication Educator*, *55*(1), 4–13. doi:10.1177/107769580005500102

Blake, R., Wilson, N. L., Cetto, M., & Pardo-Ballester, C. (2008). Measuring Oral Proficiency in Distance, Face-to-Face, and Blended Classrooms. *Language Learning & Technology*, *12*(3), 114–127.

Bloch, J. (2009). The Design of an Online Concordancing Program for Teaching about Reporting Verbs. *Language Learning & Technology*, *13*(1), 59–78.

Bradley, L., Lindstrom, B., & Rystedt, H. (2010). Rationalities of Collaboration for Language Learning in a Wiki. *ReCALL*, *22*(2), 247–265. doi:10.1017/S0958344010000108

Chao, Y.-C. J., & Lo, H.-C. (2011). Students' Perceptions of Wiki-Based Collaborative Writing for Learners of English as a Foreign Language. *Interactive Learning Environments*, *19*(4), 395–411. doi:10.1080/10494820903298662

Che, P.-C., Lin, H.-Y., Jang, H.-C., Lien, Y.-N., & Tsai, T.-C. (2009). A study of English mobile learning applications at National Chengchi University. *International Journal of Distance Education Technologies*, *7*(4), 38–60. doi:10.4018/jdet.2009062403

Chen, H.-J. H. (2011). Developing and evaluating SynctoLearn, a fully automatic video and transcript synchronization tool for EFL learners. *Computer Assisted Language Learning*, *24*(2), 117–130. doi:10.1080/09588221.2010.526947

Chenoweth, N., Ushida, E., & Murday, K. (2006). Student Learning in Hybrid French and Spanish Courses: An Overview of Language Online. *CALICO Journal*, *24*(1), 115–146.

Chun, D. M. (2008). Computer-mediated discourse in instructed environments. Magnan, Sally Sieloff (Ed), 15-45.

Comas-Quinn, A. (2011). Learning to Teach Online or Learning to Become an Online Teacher: An Exploration of Teachers' Experiences in a Blended Learning Course. *ReCALL*, *23*(3), 218–232. doi:10.1017/S0958344011000152

Cunningham, U., Fagersten, K. B., & Holmsten, E. (2010). "Can You Hear Me, Hanoi?" Compensatory Mechanisms Employed in Synchronous Net-Based English Language Learning. *International Review of Research in Open and Distance Learning*, *11*(1), 161–177.

de Jong, T., Specht, M., & Koper, R. (2010). A Study of Contextualised Mobile Information Delivery for Language Learning. *Journal of Educational Technology & Society*, *13*(3), 110–125.

de Milliano, I., Vermeer, A., Hootsen, G., & van der Werf, R. (2008). Affix information, dictionary use, and transfer of second language learners in an adaptive electronic learning environment. *Pedagogische Studiën*, *85*(1), 16–31.

Demouy, V., & Kukulska-Hulme, A. (2010). On the Spot: Using Mobile Devices for Listening and Speaking Practice on a French Language Programme. *Open Learning*, *25*(3), 217–232. doi:10.1080/02680513.2010.511955

Deutschmann, M., & Panichi, L. (2009). Talking into Empty Space? Signalling Involvement in a Virtual Language Classroom in Second Life. *Language Awareness*, *18*(3-4), 310–328. doi:10.1080/09658410903197306

Deutschmann, M., Panichi, L., & Molka-Danielsen, J. (2009). Designing oral participation in Second Life--A comparative study of two language proficiency courses. *ReCALL: Journal of Eurocall*, *21*(2), 206–226. doi:10.1017/S0958344009000196

Fallahkhair, S., Pemberton, L., & Griffiths, R. (2007). Development of a Cross-Platform Ubiquitous Language Learning Service via Mobile Phone and Interactive Television. *Journal of Computer Assisted Learning*, *23*(4), 312–325. doi:10.1111/j.1365-2729.2007.00236.x

Grant, S., & Clerehan, R. (2011). Finding the Discipline: Assessing Student Activity in "Second Life". *Australasian Journal of Educational Technology*, *27*(5), 813–828.

Guth, S., & Helm, F. (2012). Developing Multiliteracies in ELT through Telecollaboration. *ELT Journal*, *66*(1), 42–51. doi:10.1093/elt/ccr027

Hada, Y., Ogata, H., & Yano, Y. (2002). Video-based language learning environment using an online video-editing system. *Computer Assisted Language Learning*, *15*(4), 387–408. doi:10.1076/call.15.4.387.8273

Heins, B., Duensing, A., Stickler, U., & Batstone, C. (2007). Spoken interaction in online and face-to-face language tutorials. *Computer Assisted Language Learning*, *20*(3), 279–295. doi:10.1080/09588220701489440

Huang, C.-K., Lin, C.-Y., & Chiang, Y.-H. (2010). Incorporating Competency-Based Blended Learning in a Chinese Language Classroom: A Web 2.0 Drupal Module Design. *International Journal on E-Learning*, *9*(4), 529–548.

Ishihara, N. (2007). Web-Based Curriculum for Pragmatics Instruction in Japanese as a Foreign Language: An Explicit Awareness-Raising Approach. *Language Awareness*, *16*(1), 21–40. doi:10.2167/la398.0

Jauregi, K., & Banados, E. (2008). Virtual interaction through video-web communication: A step towards enriching and internationalizing language learning programs. *ReCALL: Journal of Eurocall*, *20*(2), 183–207. doi:10.1017/S0958344008000529

Jauregi, K., Canto, S., de Graaff, R., Koenraad, T., & Moonen, M. (2011). Verbal interaction in Second Life: Towards a pedagogic framework for task design. *Computer Assisted Language Learning*, *24*(1), 77–101. doi:10.1080/09588221.2010.538699

Jochum, C. J. (2010). Blended Spanish instruction: Perceptions and design a case study. *Journal of Instructional Psychology*, *38*(1), 40–46.

Jones, G., Squires, T., & Hicks, J. (2008). Combining Speech Recognition/Natural Language Processing with 3D Online Learning Environments to Create Distributed Authentic and Situated Spoken Language Learning. *Journal of Educational Technology Systems*, *36*(4), 375–392. doi:10.2190/ET.36.4.c

Kabilan, M. K., Ahmad, N., & Abidin, M. J. Z. (2010). Facebook: An Online Environment for Learning of English in Institutions of Higher Education? *The Internet and Higher Education*, *13*(4), 179–187. doi:10.1016/j.iheduc.2010.07.003

Kang, H. (2011). *Computer-Based Writing and Paper-Based Writing: A Study of Beginning-Level and Intermediate-Level Chinese Learners' Writing*. ProQuest LLC. Retrieved in May 21, 2013 from http://gateway.proquest.com/openurl?url_ver=Z39.88-2004&rft_val_fmt=info:ofi/fmt:kev:mtx:dissertation&res_dat=xri:pqdiss&rft_dat=xri:pqdiss:3441424

Kelm, O. R. (1992). The Use of Synchronous Computer Networks in Second Language Instruction: A Preliminary Report. *Foreign Language Annals*, *25*(5), 441–454. doi:10.1111/j.1944-9720.1992.tb01127.x

Kessler, G. (2009). Student-Initiated Attention to Form in Wiki-Based Collaborative Writing. *Language Learning & Technology*, *13*(1), 79–95.

Kessler, G., & Bikowski, D. (2010). Developing collaborative autonomous learning abilities in computer mediated language learning: Attention to meaning among students in wiki space. *Computer Assisted Language Learning*, *23*(1), 41–58. doi:10.1080/09588220903467335

Kiernan, P. J., & Aizawa, K. (2004). Cell Phones in Task Based Learning--Are Cell Phones Useful Language Learning Tools? *ReCALL*, *16*(1), 71–84. doi:10.1017/S0958344004000618

Kilickaya, F., & Krajka, J. (2010). Comparative Usefulness of Online and Traditional Vocabulary Learning. *Turkish Online Journal of Educational Technology - TOJET, 9*(2), 55-63.

Kirkgoz, Y. (2011). A Blended Learning Study on Implementing Video Recorded Speaking Tasks in Task-Based Classroom Instruction. *Turkish Online Journal Of Educational Technology - TOJET, 10*(4), 1-13.

Kotter, M. (2001). MOOrituri te salutant? Language Learning through MOO-Based Synchronous Exchanges between Learner Tandems. *Computer Assisted Language Learning*, *14*(3-4), 289–304. doi:10.1076/call.14.3.289.5795

Kukulska-Hulme, A. (2009). Will Mobile Learning Change Language Learning? *ReCALL*, *21*(2), 157–165. doi:10.1017/S0958344009000202

Kuo, C.-H. (2008). Designing an Online Writing System: Learning with Support. *RELC Journal: A Journal of Language Teaching and Research, 39*(3), 285-299.

Lee, J. (2006). Exploring the Relationship between Electronic Literacy and Heritage Language Maintenance. *Language Learning & Technology*, *10*(2), 93–113.

Lee, L. (2009). Promoting intercultural exchanges with blogs and podcasting: A study of Spanish-American telecollaboration. *Computer Assisted Language Learning*, *22*(5), 425–443. doi:10.1080/09588220903345184

Lee, L. (2010). Fostering reflective writing and interactive exchange through blogging in an advanced language course. *ReCALL: Journal of Eurocall*, *22*(2), 212–227. doi:10.1017/S095834401000008X

Lehtonen, T., & Tuomainen, S. (2003). CSCL- A tool to motivate foreign language learners: The Finnish application. *ReCALL: Journal of Eurocall*, *15*(1), 51–67. doi:10.1017/S095834400300051X

Li, M., Ogata, H., Hou, B., Hashimoto, S., Liu, Y., Uosaki, N., & Yano, Y. (2010). Development of Adaptive Kanji Learning System for Mobile Phone. *International Journal of Distance Education Technologies*, *8*(4), 29–41. doi:10.4018/jdet.2010100103

Liang, M.-Y. (2010). Using Synchronous Online Peer Response Groups in EFL Writing: Revision-Related Discourse. *Language Learning & Technology*, *14*(1), 45–64.

Liu, P.-L., Chen, C.-J., & Chang, Y.-J. (2010). Effects of a computer-assisted concept mapping learning strategy on EFL college students' English reading comprehension. *Computers & Education*, *54*(2), 436–445. doi:10.1016/j.compedu.2009.08.027

Lund, A. (2008). Wikis: A collective approach to language production. *ReCALL: Journal of Eurocall*, *20*(1), 35–54. doi:10.1017/S0958344008000414

Ma, Q., & Kelly, P. (2006). Computer Assisted Vocabulary Learning: Design and evaluation. *Computer Assisted Language Learning*, *19*(1), 15–45. doi:10.1080/09588220600803998

McBride, C. (2008). Adaptive and Maladaptive Strategy Use in Computer-Assisted Language Learning Activities for Listening Comprehension. *Indian Journal of Applied Linguistics*, *34*(1-2), 65–86.

Meskill, C., & Anthony, N. (2007). Learning to Orchestrate Online Instructional Conversations: A case of faculty development for foreign language educators. *Computer Assisted Language Learning*, *20*(1), 5–19. doi:10.1080/09588220601118487

Miyazoe, T., & Anderson, T. (2010). Learning Outcomes and Students' Perceptions of Online Writing: Simultaneous Implementation of a Forum, Blog, and Wiki in an EFL Blended Learning Setting. *System: An International Journal of Educational Technology and Applied Linguistics*, *38*(2), 185–199. doi:10.1016/j.system.2010.03.006

Murday, K., Ushida, E., & Chenoweth, N. (2008). Learners' and Teachers' Perspectives on Language Online. *Computer Assisted Language Learning*, *21*(2), 125–142. doi:10.1080/09588220801943718

Murphy, E. (2009). Online Synchronous Communication in the Second-Language Classroom. *Canadian Journal of Learning and Technology*, *35*(3), 10–22.

Murugaiah, P., & Thang, S. M. (2010). Development of Interactive and Reflective Learning among Malaysian Online Distant Learners: An ESL Instructor's Experience. *International Review of Research in Open and Distance Learning*, *11*(3), 21–41.

Nah, K. C. (2011). Optimising the use of wireless application protocol (WAP) sites for listening activities in a Korean English as a foreign language (EFL) context. *Computer Assisted Language Learning*, *24*(2), 103–116. doi:10.1080/09588221.2010.526946

Ng, C., Yeung, A. S., & Hon, R. Y. H. (2006). Does Online Language Learning Diminish Interaction between Student and Teacher? *Educational Media International*, *43*(3), 219–232. doi:10.1080/09523980600641429

O'Bryan, A., & Hegelheimer, V. (2007). Integrating CALL into the classroom: The role of podcasting in an ESL listening strategies course. *ReCALL: Journal of Eurocall*, *19*(2), 162–180. doi:10.1017/S0958344007000523

Pemberton, L., Fallahkhair, S., & Masthoff, J. (2005). Learner Centred Development of a Mobile and iTV Language Learning Support System. *Journal of Educational Technology & Society*, *8*(4), 52–63.

Peterson, M. (2010). Computerized games and simulations in computer-assisted language learning: A meta-analysis of research. *Simulation & Gaming*, *41*(1), 72–93. doi:10.1177/1046878109355684

Roussel, S. (2011). A computer assisted method to track listening strategies in second language learning. *ReCALL: Journal of Eurocall*, *23*(2), 98–916. doi:10.1017/S0958344011000036

Sagarra, N., & Zapata, G. C. (2008). Blending Classroom Instruction with Online Homework: A Study of Student Perceptions of Computer-Assisted L2 Learning. *ReCALL*, *20*(2), 208–224. doi:10.1017/S0958344008000621

Shih, R.-C. (2011). Can Web 2.0 Technology Assist College Students in Learning English Writing?Integrating "Facebook" and Peer Assessment with Blended Learning. *Australasian Journal of Educational Technology*, *27*(5), 829–845.

Smidt, E., & Hegelheimer, V. (2004). Effects of Online Academic Lectures on ESL Listening Comprehension, Incidental Vocabulary Acquisition, and Strategy Use. *Computer Assisted Language Learning*, *17*(5), 517–556. doi:10.1080/0958822042000319692

Strambi, A., & Bouvet, E. (2003). Flexibility and Interaction at a Distance: A Mixed-Mode Environment for Language Learning. *Language Learning & Technology*, *7*(3), 81–102.

Sykes, J. M., Oskoz, A., & Thorne, S. L. (2008). Web 2.0, Synthetic Immersive Environments, and Mobile Resources for Language Education. *CALICO Journal*, *25*(3), 528–546.

Thang, S., & Bidmeshki, L. (2010). Investigating the Perceptions of UKM Undergraduates towards an English for Science and Technology Online Course. *Computer Assisted Language Learning*, *23*(1), 1–20. doi:10.1080/09588220903467269

Tomei, L. A. (2006). The Impact of Online Teaching on Faculty Load: Computing the Ideal Class Size for Online Courses. *Journal of Technology and Teacher Education*, *14*(3), 531–541.

Vandergrift, L. (2003). Orchestrating Strategy Use: Toward a Model of the Skilled Second Language Listener. *Language Learning*, *53*(3), 463–496. doi:10.1111/1467-9922.00232

Wang, M.-j. (2010). Online Collaboration and Offline Interaction between Students Using Asynchronous Tools in Blended Learning. *Australasian Journal of Educational Technology*, *26*(6), 830–846.

Wang, Y., & Chen, N.-S. (2007). Online Synchronous Language Learning: SLMS over the Internet. *Innovate: Journal of Online Education, 3*(3).

Ware, P. D., & O'Dowd, R. (2008). Peer Feedback on Language Form in Telecollaboration. *Language Learning & Technology*, *12*(1), 43–63.

Wehner, A. K., Gump, A. W., & Downey, S. (2011). The Effects of Second Life on the Motivation of Undergraduate Students Learning a Foreign Language. *Computer Assisted Language Learning*, *24*(3), 277–289. doi:10.1080/09588221.2010.551757

Winke, P., Goertler, S., & Amuzie, G. L. (2010). Commonly taught and less commonly taught language learners: Are they equally prepared for call and online language learning? *Computer Assisted Language Learning*, *23*(3), 199–219. doi:10.1080/09588221.2010.486576

Wong, L.-H., Chin, C.-K., Tan, C.-L., & Liu, M. (2010). Students' Personal and Social Meaning Making in a Chinese Idiom Mobile Learning Environment. *Journal of Educational Technology & Society*, *13*(4), 15–26.

Wong, L. H., & Looi, C. K. (2010). Vocabulary Learning by Mobile-Assisted Authentic Content Creation and Social Meaning-Making: Two Case Studies. *Journal of Computer Assisted Learning*, *26*(5), 421–433. doi:10.1111/j.1365-2729.2010.00357.x

Zheng, D., Young, M. F., Wagner, M. M., & Brewer, R. A. (2009). Negotiation for action: English language learning in game-based virtual worlds. *Modern Language Journal*, *93*(4), 489–511. doi:10.1111/j.1540-4781.2009.00927.x

This work was previously published in the International Journal of Cyber Behavior, Psychology and Learning (IJCBPL), 4(4) edited by Robert K. Atkinson and Zheng Yan, pages 69-81, copyright year 2014 by IGI Publishing (an imprint of IGI Global).

Chapter 26
Assistive Technology and Distance Learning:
Making Content Accessible

Kathleen Bastedo
University of Central Florida, USA

Jessica Vargas
Rollins College, USA

ABSTRACT

For those with disabilities, distance-learning courses can provide access to a world that was once inaccessible. Online learning becomes a possibility and for many a gateway to contributing to the world around them. However, there are many points to consider when ensuring accessibility in distance-learning courses. By exploring the current research and trends, this chapter reviews learning management systems, learner interaction styles and tools, and methods to design accessible course materials. It provides the educator with not only a working vocabulary but also with strategies and implementation methods for ensuring accessible content in online learning.

INTRODUCTION

Distance learning has been in existence for almost 150 years (Phillips, 1998), but it has never changed as quickly as it has over the last 20 years. The advent of the Internet, the availability of learning management systems (LMS), the variety and ease in use of all types of media (e.g., audio, video, social media), and the changing face of today's learners are all reasons for these developments. This chapter explores these changes as well as the latest trends in distance learning, the differences between online learning modalities among the K-12 and the higher education environments, and how the needs of all students, including students with disabilities, can be met online today and in the future.

DOI: 10.4018/978-1-4666-8246-7.ch026

Objectives

The objectives of this chapter are:

- Investigate the types of interactions in distance learning
- Identify the distance learner and their technological needs
- Distinguish between two classifications of LMS (i.e., open vs. closed or proprietary)
- Recognize features of learning management systems that incorporate accessible design
- Identify the laws related to accessibility of distance learning materials in K-12 and higher education
- Apply accessibility best practices to the creation of distance learning course materials

DISTANCE LEARNING

Historical Overview

As mentioned, distance learning has changed. Correspondence courses, which have been around since the late 1800s (Phillips, 1998), were perhaps the first noted distance learning courses available. Communication between instructors and students was slow and materials were transmitted using the United States Postal Service. With the advent of the Internet, communication between online learners and instructors occurs at lightning speed. Instructors are no longer restricted to the physical classroom; they can pursue academic ventures while delivering a class literally a world away. Likewise, students who lead busy lives can attend classes and advance their careers at times that are convenient for them. The very nature of this modality has transformed how instructors teach and how students learn.

In addition, educational institutions began to invest in distance learning in order to reach a larger demographic that could no longer be accommodated at a physical site (e.g., lack of physical classroom space). Other students soon found reasons to sign on as well. Non-traditional students who were unable to pursue a degree in the face-to-face setting (e.g., individuals working full-time, single-parents) were afforded the opportunity to do so online. Student choices towards instruction expanded because of the availability of these types of courses, and eventually non-traditional students began taking online education as a matter of convenience (Moskal, Dziuban, Upchurch, Hartman, & Truman, 2006). Due to student demand, many institutions began to offer more online courses. As new technologies became embedded into American culture, students began to expect instructors to incorporate technologies into the classroom and deliver more courses online. As the number of these courses increased, the number of students taking these courses also began to rise. According to the 2010 Sloan Survey of Online Learning conducted by the Sloan Consortium, "in fall 2009, colleges—including public, nonprofit private, and for-profit private institutions—reported that one million more students were enrolled in at least one Web-based course, bringing the total number of online students to 5.6 million" (as cited in Kaya, 2010, p. 1) from the previous year. Demographics have also changed to reflect that most traditional students now take some form of distance education study (Zatynski, 2013).

Distance Learning and Disabilities

This leads to a discussion about students with disabilities and education. Prior to 1970, it was difficult if not impossible for many students with disabilities to attend public school, never mind institutions of higher education. In response to this situation, Congress first passed the Education for All Handicapped Children Act (later known as the Individuals with Disabilities Education Act of 1990 or IDEA) in the mid-1970s to ensure that students with disabilities would have access to a free and appropriate public education or FAPE (National Dissemination Center for Children with Disabilities, 2012; Special Education News, 2013). With this law in effect, more students with disabilities began to attend K-12 schools. Provision of transitional services from K-12 to institutions of higher education in the 1997 amendments to IDEA, along with Section 504 of the Rehabilitation Act (U.S. Department of Labor, 2011), and the ADA, helped to increase the number of these students applying to institutions of higher education (U.S. Department of Justice, 2009; U. S. Government Accountability Office, 2009). Given the combination of these factors along with the proliferation of online course offerings, it is not surprising that institutions have reported an increase in the number of students with disabilities not only attending institutions of higher education, but taking online courses as well. In 1999, the U.S. Department of Education's National Center for Education Statistics (NCES) reported that "the numbers of students with disabilities transitioning from high school to higher education is expected to increase even more in the decades to come because of increased implementation of federal laws" (Justesen, Stage, & de la Teja, 2013). The strength of these laws together is intended to ensure that all students with disabilities have the right to the same educational opportunities as the rest of their peers.

The benefits to taking distance education courses for students with disabilities are similar to their peers without disabilities such as the increased flexibility and convenience online courses provide. Learning from home provides many of these students with the ability to work in familiar surroundings and function with the equipment and support systems they already have in place, especially if they are physically unable to attend school (Woods, Maiden, & Brandes, 2011). Due to these reasons, distance learning appeals to students with or without disabilities.

Distance Learning Defined

Distance learning is a method of instruction where the student does not always have to be present in the physical classroom in order to interact with the instructor. Some or all course content can be delivered over the Internet using an LMS. The LMS provides instructors an area to place their course materials online and for students to receive that instruction while interacting with other students and/or the instructor. Distance learning utilizes two modes of learning: synchronous and asynchronous. Synchronous course components require instructors and students to be at their computers at the same time (e.g., an online chat). Instructors can also provide learning activities, quizzes, discussions, etc. that students can access at various times independently or asynchronously (e.g., discussion board interactions).

In higher education there are generally two types of classes designed for distance learning: fully online courses and blended courses. For fully online courses, all course materials (e.g., assignments, interactions, assessments, grades) are provided and submitted via the online environment (e.g., LMS) without a face-to-face component. There is no specific face-to-face time as everyone meets virtually in the designated online environment, though some courses may require minimal face-to-face requirements (e.g., attendance at proctored examinations).

The second mode of distance learning courses common in higher education is called a blended course (also known as a hybrid or mixed-mode course), which consists of both face-to-face and online class components. At the University of Central Florida, where online classes have existed since 1996, students not only succeed better in a blended format, but also both faculty and students alike preferred the blended method over either fully-online or fully face-to-face classes (Moskal et al., 2006). It is up to the instructor's discretion which components are completed online and which components are completed in the face-to-face environment.

Distance Learning in the K-12 Setting

Although distance learning has existed in higher education longer than in the K-12 environment (U.S. Department of Education, 2010), online courses and programs have been increasing rapidly at the K-12 level (Barth, Hull, & St. Andre, 2012). Even though the idea of distance learning in the K-12 environment may seem unfamiliar or new to some, the following provides a list of reasons why online learning has been emerging in this environment:

- **Creation of a Virtual Learning Environment:** for students who may not have the opportunity to take a course due to the lack of the availability of a trained local instructor or the lack of class availability or for students who have a medical condition or a physical disability that prevents them from attending class.
- **Access to Higher-Level Credited Courses:** for those students who have the capability to advance further while still taking classes in the K-12 environment.
- **Increased Access to Education for Nontraditional Students:** for students who may have left schooling for a variety of reasons (e.g., dropouts, juvenile delinquency).

Currently, most K-12 environments offer face-to-face courses and online courses. Blended learning in K-12 is when a student takes a combination of both face-to-face classes and fully online courses during the school year. Reduced seat time, while common in the higher education setting, is not typically a component of blended learning in the K-12 setting.

In higher education, the same instructor teaches both components in the face-to-face and in the online environment for both blended and fully online courses. In most cases the onus of designing these courses falls largely to the instructor teaching these courses. In order to meet the educational needs of faculty members slated to teach online, many institutions offer professional development programs while other institutions expect faculty to learn on their own. Course content usually remains the intellectual property of the instructor who created the course, though there are exceptions to this practice.

In the K-12 environment, however, online courses are often created and delivered by for-profit, third-party vendors. These instructors are generally not affiliated with the school system that the student attends. Also, vendors have the ability to purchase courses from other vendors (Staker & Horn, 2012). In fact, there is a movement by some K-12 institutions that include a clause for students to take an online course as a graduation requirement. For example, beginning with the 2011-2012 school year, high school students in the Florida Public School system are required to successfully complete one online course during high school before they graduate (Online Sunshine, 2012).

Despite all the complexities facing the institutional implementation of these courses, today's instructor must also consider how to accommodate the various learners in his/her classroom. In a traditional face-to-face classroom environment, instructors have multiple avenues in place, such as the Individualized Education Plan (IEP) at the K-12 level and the institution's disability services office in higher education, to assist students with disabilities. However, as more and more digital materials are added to courses, instructors are less equipped to ensure that students with disabilities are able to access this type of content. Fortunately, growing trends in distance learning and accessibility can be applied to meet the needs of students with disabilities and professionals online.

Quality Control of Online Courses

This discussion also raises the salient question: How does one control the quality of online courses? In the K-12 environment this has become a point of concern with more research necessary to fully answer the question (U.S. Department of Education, 2010). In higher education, one organization has been working towards that goal for well over 10 years. Although it's not the purpose of this chapter to instruct how to build and design distance learning courses from scratch, becoming familiar with the Quality Matters Program (2013; http://www.qualitymatters.org/) will assist instructors in doing so. The Quality Matters Rubric© contains several accessibility-related topics that are used to evaluate the design of a course in addition to covering many other content areas. There are also many other rubrics that are available for free online, but care should be taken to review these rubrics to make sure accessibility is addressed. With this push towards online instruction, it can be safely assumed that distance learning courses are here to stay. However, it is up to individuals on the forefront to make sure online content remains accessible to students with disabilities.

Differences Between Face-to-Face and Online Course Components

Learning management systems have become synonymous with distance learning courses because most courses today are embedded into one of these systems for several reasons. For example, they help keep the course organized, track student data, and provide the tools to help students interact with the instructor and each other. Prior to delving into the discussion about the accessibility of LMS, the primary differences between face-to-face and online course components are outlined.

Time: Within the face-to-face environment, class meetings and learning opportunities are constrained by the physical space and time designations placed on a course. It is difficult to replicate or provide the information for those students who miss instruction in the face-to-face setting. In the online environment, the information has been provided in a digital format so students can easily locate the information within the course when they need to and have the option of viewing the information at their own convenience within a given period of time.

Location: Face-to-face classes require a dedicated physical space, which may limit the growth of a university or college due to space constraints. Turning to online has meant that faculty and students do not require a physical learning space and thus classes are not limited to a set date, time, or place. Class meetings generally occur completely inside an LMS. Online classes also appeal to students with mobility concerns (e.g., lack of transportation or have a difficult time maneuvering across large campuses). Undergraduate data shows that "students with mobility disabilities enrolled in a distance education course more often than students with no disabilities (26 percent compared with 20 percent)…" (Radford & Weko, 2011, p. 3).

Discussion: Regardless of modality, meaningful class discussion that includes everyone's participation is difficult to engender. In-class discussions must occur within a designated class time so that students and instructors can interact and learn from each other but it's rare that all students are able to participate given classroom time constraints. It can be especially difficult for someone with learning disabilities or speech difficulties to formulate an answer in this setting. Discussion in the online environment generally takes place over a much longer period of time providing students with the time they need to better formulate an answer.

Assessments: It is generally easier to provide proctored exams in a face-to-face environment because instructors have the opportunity to monitor students in person, within a specific setting. When moving assessments into the online environment, there is a heightened concern for cheating. The following are a few strategies developed to help combat cheating in the online environment:

1. Not using the same exam over and over,
2. Shuffling the order of the questions (Harmon, Lambrinos, & Buffolino, 2010),
3. Include higher level types of questions, and
4. When feasible, assign an authentic assessment such as a project, an essay, or a research paper (Olt, 2002; Watson & Sottile, 2010).

Community: The opportunity to build a learning community is available in both mediums. So despite the concern that the online modality is considered to be less personal, instructors find that students who may not ordinarily speak up in class find the online modality space as an opportunity to contribute. In many cases, instructors report that they often feel they know their online students better than students they only see in the face-to-face environment.

LEARNING MANAGEMENT SYSTEMS CLASSIFICATION

Enterprise vs. Open-Source Systems

Over the years, distance learning systems have been created to house online course tools and materials. Generally termed a "learning management system," they are also called "course management systems" or "virtual learning environments." They are available from a variety of vendors and not surprisingly, supplying these systems has become a multi-billion dollar industry. These tools allow educators to:

1. Deliver content,
2. Manage assessments,
3. Provide materials for students to download,
4. Integrate other learning technologies,
5. Create opportunities for online learning activities,
6. Encourage communication exchanges between instructors and students, and
7. Disseminate grades to users.

These systems can be proprietary (closed source) or open source. Proprietary systems mean that the public does not have access to the source code that is used to run the program (e.g., Blackboard Learn®). Open source means the code is available to the public who has the ability to customize, change, or adjust the code as they need. The trend is toward LMS that are cloud-based, offer open-source code access, customer support, and a fee for use (e.g., Canvas®, D2L®). Even though a system may be open source, depending on the sophistication of the LMS, it is not always better to be responsible for updating the code. It may be better for the institution to pay for the product vendor to host the system and let the vendor update the code as well. The information in Table 1, though by far not an exhaustive list, includes the LMS (and related information) that are most often used in distance learning in both the higher education and the K-12 environments.

Many of these vendors are aware of the limitations of their systems and work continually with their user base to improve the system experience. Whichever system institutions choose, it's best to maintain a close working relationship with the respective product vendor. Most of the vendors will address accessibility issues as they arise and several have won awards related to accessibility. Desire-2-Learn®, for example, has been awarded the Gold Level NFB-NVA Certification by the National Federation of the Blind twice (Desire-2-Learn, 2013). However, some components of an LMS may not be accessible and seeking accessibility is always an ongoing process especially as new tools are added to the systems. In addition, most LMS also offer a free option to use their system to try it out to conduct a pilot study so testing can occur before purchasing or investing time, energy, or money in such a product.

Table 1. LMS comparison list

LMS	Description	Benefits	Challenges
Blackboard Learn® (http://www.blackboard.com/)	Blackboard™, founded in 1997, has the largest user base to date (usage has been adopted by over 60 countries), but has been seeing a steady decrease over the last few years with the availability of new systems (Chung, Pasquini, & Koh, 2013). It is a proprietary (closed source) system that can be self-hosted by the institution or hosted by the company. Institutions pay according to the number of licenses determined by user enrollments.	Can support institutions with a large amount of users	Currently the most expensive of LMS available to implement Features available according to pricing structure
Desire2Learn® (http://www.desire2learn.com/)	Desire2Learn®, founded in 1999, is an open source, cloud-based learning system. The institution pays for its use, but its open source ability allows end users to help customize its features as necessary.	Full customization options from system-wide to course level Can support institutions with a large amount of users	Customization options can be overwhelming for those with limited experience
Canvas® (http://www.instructure.com/)	A relative newcomer, Canvas®, founded in 2008 by Instructure, Inc.™, is an open source, cloud-based system. The LMS can be self-hosted for free and the institution using the system can update the code or the institution can pay the company to host it for them and to make updates. It also incorporates Web 2.0 functionality and tools.	Ease of use for faculty and students Works best for smaller institutions Content creation is simple based on Web 2.0 technologies Newest modifications go to cloud-based customers first	Customization occurs on a system level rather than course level Third-party tool integration can mean commonly used features go down with minimal available support to fix those items
Moodle® (https://moodle.org/)	Moodle®, founded in 2002 by Martin Dougiamas (Moodle, 2012), is a free, open source, self-hosted LMS. It has enjoyed widespread adoption of its tool mostly in the international markets.	Cost is minimal to implement Works best for smaller institutions (Smith, 2011) Maintains a large community base of programmers dedicated to its continual improvement	Lack of human resource capabilities
Sakai® (http://www.sakaiproject.org/)	Sakai®, developed by a group of colleges and universities in 2004 (Unicorn, n.d.), is a free, open source LMS used for teaching, research, and collaboration in what is called a Collaboration and Learning Environment. It can be self-hosted for free or an institution can pay a service for hosting purposes. Since one of its goals is for use in research, the system contains a system-wide wiki, mailing list distribution, archiving and a rich site summary or an RSS reader. Yet it contains many of the same features available in other LMS (Sakai Project, n. d.).	Cost is minimal to implement Maintains a large community base of programmers dedicated to its continual improvement	Complicated programming language makes it difficult to manage and implement Lack of human resource capabilities

INTERACTIONS IN DISTANCE LEARNING

As distance learning began to evolve and options of LMS became available, there were concerns related to the type of interaction available in the online classroom. Critics worried that with correspondence courses, students were only self-directed learners who missed the opportunity to reflect and to reconstruct their knowledge when confronted with multiple viewpoints. This lack of interaction was often cited as a barrier to distance learning (Parker, 1999). Improvements in technologies over the years have improved the quality of interactions in distance learning. There are five types of interactions that instructors can incorporate into the curriculum. The first three are the most common types of interactions, while the last two interactions listed have evolved along with distance learning and the Internet.

- **Learner to Instructor:** The most common interaction, this requires that interactions occur between the instructor and the learner and vice versa.
- **Learner to Learner:** Regardless of instructor intent, students will inevitably interact with each other. These interactions become more meaningful with guidance from the instructor.
- **Learner to Content:** Learners interact with the content either by reconstructing its meaning or working with problems that allow students to further engage with the content.
- **Learner to Tools:** Learners engage with the tools selected for the classroom curriculum and learning opportunities. There are a wide variety of tools available ranging from Web 2.0 technologies to hardware and software.
- **Learner to Environment:** The learner engages with the environment via different classroom modalities (e.g., face-to-face classroom, blended/hybrid, and fully online), which dictates how the students will engage in the classroom.

Distance Learning Tools for Interaction

There are a variety of tools that assist in facilitating interaction in distance learning. These tools have been classified into two categories: asynchronous and synchronous technologies and are defined as follows:

- **Asynchronous Technologies:** These technologies have an anytime, anywhere component that allows a variety of learners to engage in the online environment at various times. They have the greatest capabilities for breaking down learning barriers as they allow the user to access online course content at their own convenience. These tools include email, discussion boards, social networking sites, Google Drive™, wikis, and other online collaborative methods (e.g., e-portfolios, audio/videos).
- **Synchronous Technologies:** These technologies provide learners the opportunity to engage during a set date and time. The strength to these technologies is that interactions occur simultaneously and questions/answers can be delivered within the construct of the activity. Furthermore, these technologies solidify learning communities quickly by having students engage with each other and the instructor (e.g., chat, video or web conferencing, and live podcasts).

After all this discussion about interactions in distance learning and the tools that facilitate those interactions, it may be difficult to decide when and which tool to incorporate into an online course. Table 2 identifies the type of interaction, the available tools, and the benefits to teaching and learning. Because many of these tools overlap, choose the interactions and tools that best meet the need of the learning objective.

Table 2. Matching interactions with the tool

Type of Interaction	Asynchronous Tools	Synchronous Tools	Value of Teaching	Value of Learning
Learner to instructor	Discussion board Email Course Calendar Rubrics Announcements	Videoconferencing tools (e.g., Skype™, Adobe™, Connect®, Collaborate®, Google Hangouts™) Live Chat/Instant messaging	Provides "written" documentation of communications. Identifies potential need for intervention.	Enables students the opportunity to engage with the instructor.
Learner to learner	Discussion board Email Text Peer Review	In-class peer review Live Chat/Instant Messaging Videoconferencing tools Group projects	Provides opportunities for virtual coaching and peer mentoring. Creates a learning community.	Encourages peer sharing of information and experiences.
Learner to content	Rubrics Games HTML pages YouTube™ Weblinks Podcast PowerPoint®	Live-streaming lecture (e.g., lecture capture, webinars) Videoconferencing tools PowerPoint®	Solicits understanding from learners on a specific topic	Provides information that is integral in student learning of class material.
Learner to tools	Blogs Wikis ePortfolio	Paper-based assignments	Aggregates student learning in one centralized location.	Allows for student-generated content. Students are allowed an opportunity to demonstrate learning in a tangible format, which maximizes retention.
Learner to environment	LMS Social networking applications (e.g., Twitter™, LinkedIn™, Facebook™, etc.)	Videoconferencing tools Face-to-face classroom time	Allows learning to occur in a structured environment.	Creates opportunity for students to learn within a community.

ACCESSIBILITY AND ASSISTANCE TECHNOLOGY FOR STUDENT LEARNING

Access is providing the flexibility to accommodate the user's needs and preferences. The following is a list of users who need various types of access to the Internet and online course materials. Namely, students with:

1. Visual impairments,
2. Hearing impairments,
3. Learning disabilities,
4. Mental disabilities,
5. English as a second language,
6. Physical impairments and
7. Slow connection speeds.

At the K-12 level, an IEP must be completed on an annual basis for qualified students. It is the IEP team's responsibility to determine how the student will access the curriculum and if any assistive technology (AT) is needed based on the student's goals. In higher education, there is no IEP available to students; therefore, students must learn to become self-advocates and meet with the institution's student disability office as needed. There are typically a few accessible computers stations scattered across campuses and at the institution's student disabilities office, but these stations are generally designed and may not meet the specific needs of each individual student with disabilities.

Students with disabilities who complete high school and move onto higher education are often faced with an additional set of challenges. Some students will be reluctant to report their disability for fear of non-acceptance by other students. Some students may be unable to develop the necessary self-advocacy skills in order to become successful on their own. In other cases, some faculty perceive students as trying to abuse the system to obtain unnecessary accommodations related to homework and test taking. Students who are not officially diagnosed with a disability may not be eligible to receive services from the institution's disabilities office (Justesen et al., 2013). These are just some of the obstacles students with disabilities attending higher education will face on their own.

Four Components of Access

In addition to self-advocacy skills, students will also need access to the following four components of access in order to help them be successful when taking distance learning courses. They are computer access, browser access, access to the tools located within the LMS, and online course material accessibility. The following information provides a breakdown of these components.

Computer Access

Computer accessibility also varies depending on the student's type of disability. Students with visual impairments may require screen enlargement programs so they can read the print on a screen. For web pages, it is easy to enlarge the text on a browser page by pressing the control and the plus key on a PC running Windows® and the command and the plus key on an Apple Macintosh®. Further evaluation by trained professionals may be necessary to accommodate other visual impairments. For a student who is blind, screen reading software such as JAWS® for Windows® may be required.

Accommodating students with hearing impairments can be a daunting task due to the increase in the availability and ease of use of media tools. A transcript makes it easier for the instructor to film a video or record an audio clip; and it also provides the basis for captioning, which is required by law to assist students with hearing impairments. Captioning also helps students who are speakers of English as a second language and for students who work in noisy or quiet (e.g., library) environments.

Learning keyboarding skills at the K-12 level is critical for students to be successful at the college level. For some students with disabilities computer access may be the only way they can make significant contributions to classroom or homework activities. Proficiency using the computer and the Internet (e.g., e-mail, search tools, creating/viewing web pages, using social media, and media in general) are skills today's students need to succeed in a competitive work force. For students with physical disabilities, alternate access may be required. Assistive equipment can range from an adapted mouse, an alternate or an onscreen keyboard, special scanning software, or a specialized switch that can be activated using various body parts (e.g., hand, finger, head, or foot). The AT used on campus may be unfamiliar to a student who requires access so training may also be needed.

Web Browser Access

A web browser or browser is a software application that provides users with the ability to access, view, and retrieve materials on the Internet. Some of the common browsers include Mozilla Firefox®, Microsoft Internet Explorer®, Safari® by Apple™, and Google Chrome™. In order for individuals with disabilities to be able to use the same materials, browsers must be equipped with accessibility features. Most browsers have these features built-in, such as: the ability to adjust the size of the text (zoom in or out), the ability to change the color or improve color contrast, and access to keyboard shortcuts.

Learning Management Systems

The last component that needs to be evaluated for accessibility in the online learning environment is the LMS that is being used by the institution. In most cases users do not have a say as to which LMS will be supported by the institution. However, it is still the responsibility of the institution to ensure LMS accessibility to its students.

Unfortunately, when some LMS are being created, developers do not always consider accessibility during the design phase. For instance, the discussion tool can be difficult for a blind student to access or for those who have a learning disability to follow the flow of a particular discussion. Likewise, chat tools tend to be overall inherently inaccessible for students who are blind. In both cases, it may be necessary to change the assignment interaction strategy to one that is accessible (e.g., use the email tool instead), until the tool is retrofitted for accessibility by the LMS, or until another accessible tool is found and can be used in the meantime. Assessment tools are generally accessible and most LMS provide a way to extend time to one or more students as needed. There continues to be improvements in these areas, but institutions need to be diligent and maintain an open line of communication with the LMS, in order to address issues as they arise.

Course Page Accessibility

When it comes to the creation of accessible online course materials, it is the responsibility of the institution (both the K-12 and higher education levels) and the instructor to provide these materials in accessible formats. In many cases instructors are not aware of the strategies or techniques that should be used to assist students to easily read or access online materials. Some things to consider before creating content are: style elements such as color and background as well as date format, layout, and organization of course pages, which all play an important part in making digital content accessible. If course materials are located outside of an LMS, for example on a college or department website, then these pages must be accessible as well. There are a variety of tools (some of the most common tools are listed in Table 3) to ascertain whether or not the content created is accessible. One great tool for reviewing web accessibility of content is WAVE (see http://wave.webaim.org/ for details), a free evaluation tool for checking HTML files. Use this tool and others similar to it to check the accessibility of all web pages.

It is becoming not only easier to add multimedia components to course materials, but it is also easier to add multimedia components to assessments. Therefore, keep in mind that the instructor is responsible for making these components accessible as well. For example, any images that are added to assessments must have alt text, audio portions must include text transcripts, and videos must have captions. There is a multitude of resources available on the Internet designed for this purpose; however, if the instructor is not sure where to begin, Table 3 contains a list of concepts and best practices in order to get started.

RESOURCES FOR ACCESSIBILITY IN DISTANCE LEARNING

Gaining access to professional organizations can also help the instructor keep current with how AT is evolving in the distance-learning medium. Table 4 contains many online resources and several helpful organizations. There are also more resources located in the *Additional Readings* section of this chapter.

Table 3. Best practices for accessibility

Concept	What to Do
Formatting Text	Avoid using small font sizes. Use fonts that are basic, simple, and easily read on a computer screen (e.g., sans-serif fonts). Use a limited number of font styles. Most web developers will only recommend 2-3 fonts per page of onscreen content. Only underline text when it is a link. Use bold for emphasis instead. Use headings to show topics and subtopics within the content. Use WebAim Color Contrast Checker (http://webaim.org/resources/contrastchecker/) to ensure high contrast between the text and the background (e.g., avoid using dark blue text on a black background). Avoid using only color to denote importance (e.g., using red text, color blind students will see grey instead, which depending on contrast may or may not be helpful.)
File Formatting	Use standard file extensions that work for all Windows®, Macintosh®, and Linux® users, including mobile technologies. PDFs should be scanned in as Optical Character Recognition (OCR) so it is read as text and not an image. Use the built-in Microsoft PowerPoint® Accessibility Checker to verify PowerPoint® presentations are accessible (http://office.microsoft.com/en-us/powerpoint-help/check-for-accessibility-issues-HA010369192.aspx)
Graphics Usage	Provide a text description for images included on the page. Use an alt tag, which provides the opportunity to offer a short description in the HTML code (http://teach.ucf.edu/resources/document-formatting-guidelines/images/#about). If an alt tag does not provide enough characters to describe a picture, then use a long description in the HTML code. For the technically savvy, you can incorporate a span class using CSS and HTML to hide the text from the page visually. However, a screen reader will read the *hidden* content. The class' attribute would look like this: .hidden {position: absolute; left: -9999px;}
Audio/Video Usage	Provide users with either open or closed captioning. Open captioning is when captions are on all of the time and there is no ability to turn them off. Closed captioning allows the user control of turning the captions on and off. Search for video that has closed captioning. Ask companies to add closed captioning to their video products. If the instructor does not have copyright permission to add captions, provide a video transcript. Provide scene descriptions so that someone unable to see the content may know what's occurring onscreen.

TRENDS IN DISTANCE LEARNING

As distance learning continues to evolve so do the trends that will influence its future. Some of the most current trends in distance learning, such as mobile devices, HTML5 used in web and mobile application development, Massive Open Online Courses (MOOCs), and the proliferation of companies offering adaptive learning options, are discussed below.

Mobile Devices

The increased use of mobile devices by both students and instructors, especially in higher education, is affecting user's access in positive ways. These devices are portable, personalized with data and settings, and allow free or relatively inexpensive applications, especially those related to traditional AT, to be incorporated into the device quickly and easily. Preferred applications for those who require AT are generally built in HTML5 and tend to be more naturally accessible for users, but not always. Each device or application must be evaluated on its own merits and it should not be assumed that it is accessible. Some of these devices have built-in hardware features that are also inherently accessibility features (e.g., GPS, speech-to-text, text-to-speech navigation). With these types of features now within the mainstream culture, technology improves faster as more individuals have the ability to test it. Furthermore, it has been noted that mobile devices' counterpart, desktops and laptops, have been experiencing a marked decline. According to the market research firm, IDC, "…smart phones and tablets carried the 'smart connected device' category to new highs, topping one billion units worldwide" (Nagel, 2013, p. 1). This means that certain devices are becoming more accessible especially when professionals and instructors know how to utilize these technologies.

HTML5

Currently an increase in the use of HTML5 marks some exciting changes in terms of design and previously inaccessible materials like those using Adobe Flash®. In particular, HTML5 along with Accessible Rich Internet Applications (ARIA) will contribute extensively to the future appearance of the Web, its ease of use, and overall accessibility for individuals with disabilities. HTML5 focuses on creating accessible multimedia by turning the browser into a media player. What's particularly interesting is that Google™ decided in August 2011 to no longer support legacy browsers in order to be able to create enriched media applications using HTML5 (Panchapakesan, 2011). A larger question looms regarding when HTML5 will see full implementation. In the meantime, HTML5 promises to make content consistent without requiring multiple plugins. The intent of ARIA is to increase the overall web accessibility for screen reader users. It identifies the areas of a web page to the screen reader user and explains what is being *seen* (e.g., the navigation, title, or content). These two technologies lend hope that media will become even more heavily integrated while making access universal to all, which is the principle mission of Universal Design for Learning (UDL). But with these two exciting developments, there's still much to be done in making content user-friendly and media enriched.

Massively Open Online Courses

Another trend in online learning provides access to anyone. Deriving its title from the gaming realm (i.e., "Massively Multiplayer Online Games"), Massively Open Online Courses, or MOOCs have seen a marked increase in availability on the Web. These courses invite users from anywhere in the world to participate in learning a particular topic regardless of their institution affiliation. Evolving from sites such as MIT's

Table 4. Online resources

Title	URL	Description
Accessibility Tips Page	http://teach.ucf.edu/resources/accessibility-tips/	This page is designed to help individuals create or modify online course components so they are accessible.
Access Technology Higher Education (ATHEN)	http://www.athenpro.org/	Access Technology Higher Education Network focuses on accessible learning technology in higher education.
Association on Higher Education and Disability (AHEAD)®	http://www.ahead.org	A professional association dedicated to ensuring that all individuals with disabilities have access to postsecondary education.
Assistive Technology Industry Association (ATIA)	http://www.atia.org/i4a/pages/index.cfm?pageid=1	A not-for-profit organization of those involved with manufacturing, selling and providing technology-based assistive devices and services.
Blended Learning Toolkit	http://blended.online.ucf.edu/	A free resource created by the University of Central Florida and the American Association of State Colleges and Universities; it provides best practices, models and research related to blended learning.
California University System, Chico	http://www.csuchico.edu/roi/the_rubric.shtml	This rubric includes six domains that can be used to evaluate online course instruction.
Center for Applied Special Technology (CAST)	http://www.cast.org	A non-profit organization that works to provide learning opportunities and practical applications of accessibility.
Center on Disabilities at California State University (C-SUN)	http://www.csun.edu/cod/conference/	Provides an avenue for practitioners to share knowledge and best practices in the field of AT.
Closing the Gap (CTG)	http://www.closingthegap.com/	Provides resources and training opportunities through the publishing of its magazine.
Equal Access to Software and Information (EASI)	http://people.rit.edu/easi/itd.htm	Home of the free, Information Technology and Disabilities E-Journal.
Educause	http://www.educause.edu/	A non-profit organization that promotes the use of information technology to advance higher education.
Faculty Focus	http://www.facultyfocus.com/	Provides effective teaching strategies for face-to-face and online teaching.
FETC	http://fetc.org/	An organization that explores integration of technology and teaching strategies for K-12 and higher education through its annual conference.
IDC	http://www.idc.com	Use the search terms, “Education” and “IT” and you can track future trends.
National Federation for the Blind	https://nfb.org/	Advocating for blind individuals, the organization’s goal is to educate everyone with how to accommodate those who are blind by providing training, education and technology.
Quality Matters Program	https://www.qualitymatters.org/	A program created to assist faculty with designing a quality online program.

OpenCourseWare, where information was provided, but the teaching component was missing, MOOCs boast anywhere from 250 to thousands of users and today's MOOCs generally provide student-to-instructor interaction. A downside to taking one of these classes is the high levels of attrition rates; yet, the benefit to taking one can be far reaching. Most allow individuals the ability to access material for free, though some require students to purchase a textbook. Also, there is a large variety of courses available from some very credible institutions (e.g., Stanford). Individuals that successfully complete a MOOC may be able to apply this information towards promotions or other comparable rewards at their place of employment. Since college credit is generally not provided with the completion of a MOOC, a badge is sometimes awarded to indicate some level of proficiency or completion. As James Marshall Crotty (2012) of Forbes online magazine stated, "they are a free or low-cost way in which job-seekers can demonstrate hyper-specialized competency in lieu of, or as an adjunct to, a certificate or diploma" (p. 1). Some educational experts see MOOCs as an area of disruptive innovations, meaning "technology takes root in areas of nonconsumption – where the alternative is nothing at all" (Horn & Staker, 2011, p. 1). In many cases, MOOCs provide higher education courses to those who could not otherwise afford to do so.

No matter where MOOCs lead higher education, these courses should be created with accessibility in mind. When the institution falls under the premise of the Rehabilitation Act of 1973 or the ADA or both, any content including audio or video components will need to be adapted for accessibility as appropriate (Anastopoulus & Baer, 2013).

Flipped Classrooms

Another learning trend that bears discussing is what has been labeled, the "Flipped Classroom" (Goodwin & Miller, 2013). Based on the first tier of Bloom's Taxonomy of Learning (Kahn, 2012), this pedagogical style insists that mastery of information occurs in the online mode. According to this teaching premise, instructors provide basic knowledge and comprehension tasks online prior to the face-to-face meeting of the course. This is typically accomplished by taping a lecture and placing it into an online environment. In theory, watching the instructor's lecture prepares students to handle kinesthetic tasks in the classroom to further enrich learning. Originally designed to provide classroom information for students who were absent from class (Tucker, 2012), the flipped classroom optimizes the classroom-learning environment by ensuring that students are provided with material to review at their own pace with the ability to re-examine material as needed. This frees up the instructor to use classroom time to reinforce learning or tackle harder-to-grasp concepts. In the K-12 learning environment, taped lectures are provided online, there is commonly no decrease in the face-to-face learning time as there is in higher education (e.g., blended or hybrid courses). The idea is for the taped lectures to replace the assigned homework, and homework activities are discussed in the face-to-face setting. Care should be taken when implementing the use of taped lectures, and they should be used in conjunction with discussions and other types of activities whether online or in the face-to-face environment. Any taped lectures placed into an online environment will require captioning to accommodate students with hearing impairments. This is where lessons learned in the face-to-face and online environment become increasingly important for those who are aware of accessibility concerns.

Adaptive Learning

"Adaptive learning," also referred to as "computer-based learning" or "intelligent tutoring," is one last trend worthy of discussion. It is a concept based on the premise from the 1970s that predicted how computers would be used to create programs to provide interactive teaching opportunities for students (Dunn, 2012). Originally cost prohibitive, advances in computer technology, decreased overall computer costs, and advances in research in the area of student algorithm models has once again brought adaptive learning to the forefront (National Institute of Standards & Technology, 2005). It is being promoted as a way to provide students with a personalized learning environment. Many companies creating materials for adaptive learning provide personalized programs that *learn* how the student is progressing, which automatically increases or decreases the difficulty of the content and testing materials being provided. Adaptive learning collects detailed analytics and in some cases provides the flexibility to adapt student feedback within the courseware. Claims by companies piloting these products include better student retention, higher student satisfaction rates, and overall higher student scores. Other benefits to adaptive learning products may include a lower cost to students, single sign-on through the LMS, and the application of UDL in the design of the course materials (e.g., videos include captioning options). Distance learning has become the perfect medium for this concept and has the ability to meet the needs of today's diverse learners.

CONCLUSION

The focus of this chapter covered the history and definition of distance learning, types of distance learning interactions, and accessibility of online courses. Several trends affecting course delivery have also been discussed. Though many of the current issues related to managing and delivering distance learning were reviewed, there is still more work to be done in terms of ensuring access of online materials. This chapter has been designed to help guide instructors in creating accessible course materials for distance learning, understanding the landscape of today's learner, becoming familiar with the various types of LMS, and combating issues that could arise when these practices are not implemented. There have been dramatic improvements over the years by combining the developer's visions for new and improved technology and the end user experience.

Most of these trends support the overall status quo of education and some are purported to improve ease of access and learning outcomes. Who knows what other new developments and technologies are on the horizon. Keeping in mind that some technologies are considered as disruptive innovation, George Mehaffey, Vice President for Academic Leadership and Change at the American Association of State Colleges and Universities (2012), cautions those in education to learn to welcome and embrace change and "never be satisfied with the status quo" even though "following these rules will be more difficult" because "disruption happens most often to the unprepared." Accessibility will have to evolve as these new trends and disruptive technologies come to the forefront of education.

REFERENCES

Anastopoulus, N., & Baer, A. M. (2013). When opening doors to education, institutions must ensure that people with disabilities have equal access. *The New England Journal of Higher Education*. Retrieved from http://www.nebhe.org/thejournal/moocs-when-opening-the-door-to-education-institutions-must-ensure-that-participants-with-disabilities-have-equal-access/

Barth, P., Hull, J., & St. Andre, R. (2012). Searching for the reality of virtual schools. *The Center for Public Education*. Retrieved from http://www.centerforpubliceducation.org/Main-Menu/Organizing-a-school/Searching-for-the-reality-of-virtual-schools-at-a-glance/Searching-for-the-reality-of-virtual-schools-full-report.pdf

Chung, C., Pasquini, L., & Koh, C. (2013). Web-based learning management system considerations for higher education. *Learning and Performance Quarterly, 1*(4).

Crotty, J. M. (2012). Why get a pricey diploma when a bleepin' badge will do? *Forbes*. Retrieved from http://www.forbes.com/sites/jamesmarshallcrotty/2012/01/26/the-end-of-the-diploma-as-we-know-it/

Desire2Learn. (2013). *Innovations and awards*. Retrieved from http://www.desire2learn.com/about/awards/

Dunn, J. (2012). How adaptive learning technology is being used in online courses. *Edudemic*. Retrieved from http://www.edudemic.com/2012/03/how-adaptive-learning-technology-is-being-used-in-online-courses/

Goodwin, B., & Miller, K. (2013). Evidence on flipped classrooms is still coming in. *Educational Leadership*, *70*(6), 78–80.

Harmon, O., Lambrinos, L., & Buffolino, J. (2010). Assessment design and cheating risk in online instruction. *Online Journal of Distance Learning Administration*, *8*(3).

Horn, M. B., & Staker, H. (2011). *The rise of K-12 blended learning*. Retrieved from http://www.innosightinstitute.org/innosight/wp-content/uploads/2011/01/The-Rise-of-K-12-Blended-Learning.pdf

Justesen, T. R., Stage, F. K., & de la Teja, M. H. (2013). College students with disabilities – Accommodating, special learning needs. *Online Educational Encyclopedia: Classroom Management – Creating a Learning Environment to Association for Science Education (ASE).* Retrieved from http://education.stateuniversity.com/pages/1865/College-Students-with-Disabilities.html

Kahn, R. L. (2012). A taxonomy for choosing, evaluating, and integrating in-the-cloud resources in a university environment. *Journal of Educational Technology Systems*, *41*(2), 171–181. doi:10.2190/ET.41.2.e

Kaya, T. (2010). Enrollment in online courses at the highest rate ever. *The Chronicle of Higher Education*. Retrieved from http://chronicle.com/blogs/wiredcampus/enrollment-in-online-courses-increases-at-the-highest-rate-ever/28204

Mehaffy, G. L. (2012). Challenge and change. *Educause Review Online*. Retrieved from http://www.educause.edu/ero/article/challenge-and-change

Moodle. (2012). *Moodle headquarters*. Retrieved from http://moodle.com/hq/

Moskal, P., Dziuban, C. D., Upchurch, R., Hartman, J., & Truman, B. (2006). Assessing online learning: What one university learned about student success, persistence, and satisfaction. Peer review: Emerging trends and key debates in undergraduate education. *Learning & Technology*, *8*(4), 26–29.

Nagel, D. (2013). Smart connected devices hit record levels even as PCs decline. *Campus Technology*. Retrieved from http://campustechnology.com/articles/2013/03/27/smart-connected-devices-hit-record-levels-even-as-pcs-decline.aspx

National Dissemination Center for Children with Disabilities. (2012). *IDEA – The individuals with disabilities act*. Retrieved from http://nichy.org/laws/idea

National Institute on Standards and Technology. (2005). ATP focused program: Adaptive learning systems. *Advanced Technology Program*. Retrieved from http://www.atp.nist.gov/focus/als.htm

Olt, M. (2002). Ethics and distance education: Strategies for minimizing academic dishonesty in online assessment. *Capella University*. Retrieved from http://www.westga.edu/~distance/ojdla/fall53/olt53.html

Online Sunshine. (2012). *The 2012 Florida statutes: Title XLVIII, chapter 1003*. Retrieved from http://leg.state.fl.us/statutes/index.cfm?App_mode=Display_Statute&Search_String=&URL=1000-1099/1003/Sections/1003.428.html

Panchapakesan, V. (2011). Our plans to support modern browsers across Google apps. *Google: Official Enterprise Blog*. Retrieved from http://googleenterprise.blogspot.com/2011/06/our-plans-to-support-modern-browsers.html

Parker, A. (1999). Interaction in distance education: The critical conversation. *AACE Journal*, *1*(12), 13–17.

Phillips, V. (1998). Virtual classrooms, real education. *Nation's Business*, *86*(5), 47–51.

Quality Matters Program. (2013). *Quality matters program: A national benchmark for online course design*. Retrieved from https://www.qualitymatters.org/

Radford, A. W., & Weko, T. (2011). Learning at a distance: Undergraduate enrollment in distance education courses and degree programs (PDF). *National Center for Education Statistics*. Retrieved from http://nces.ed.gov/pubs2012/2012154.pdf

Sakai Project. (n.d.). *About sakai*. Retrieved from http://www.sakaiproject.org/about-sakai

Smith, K. (2011). Butler LMS evaluation executive summary. *The LMS Project*. Retrieved from http://blogs.butler.edu/lms/files/2011/08/executive-summary.pdf

Special Education News. (2013). *EHA: Education for all handicapped children act*. Retrieved from http://www.specialednews.com/special-education-dictionary/eha---education-for-all-handicapped-children-act.htm

Staker, H., & Horn, M. B. (2012). *Classifying K-12 blended learning*. Retrieved from http://www.innosightinstitute.org/innosight/wp-content/uploads/2011/01/The-Rise-of-K-12-Blended-Learning.pdf

Tucker, B. (2012). The flipped classroom: Online instruction at home frees class time for learning. *Education Next*. Retrieved from http://educationnext.org/the-flipped-classroom

U. S. Government Accountability Office. (2009). Higher education and disability: Education needs a coordinated approach to improve its assistance to schools in supporting students. *United States Government Accountability Office*. Retrieved from http://www.gao.gov/new.items/d1033.pdf

Unicorn. (n.d.). *Sakai collaboration and learning environment*. Retrieved from http://www.unicon.net/opensource/sakai

U.S. Department of Education. (2010). *Understanding the implications of online learning for educational productivity*. Retrieved from http://www2.ed.gov/about/offices/list/os/technology/implications-online-learning.pdf

U.S. Department of Justice. (2009). *A guide to disability rights laws*. Retrieved from http://www.ada.gov/cguide.htm#anchor62335

U.S. Department of Labor. OSAM. (2011). *Section 504, rehabilitation Act of 1973*. Retrieved from http://www.dol.gov/oasam/regs/statutes/sec504.htm

Watson, G., & Sottile, J. (2010). Cheating in the digital age: Do students cheat more in online courses? *Online Journal of Distance Learning Administration*, *13*(1).

Woods, M., Maiden, J., & Brandes, J. (2011). An exploration and the representation of students with disabilities in distance education. *Online Journal of Distance Learning Administration*, *19*(5).

Zatynski, M. (2013). Calling for success: Online retention rates get boost from personal outreach. *ESSelect*. Retrieved from http://www.educationsector.org/sites/default/files/publications/ESS_ECore_1.pdf

ADDITIONAL READING

W3C Math home. (2011). *What is MathML?* Retrieved from http://www.w3.org/Math/

Access, I. T. (2013). *The National Center on Accessible Information Technology in Education. What is the difference between open and closed captioning?* Retrieved from http://www.washington.edu/accessit/articles?50

Burgstahler, S. (2003). The role of technology in preparing youth with disabilities for post-secondary education and employment. *Journal of Special Education Technology*, *18*(4), 7–19.

Educause. (2013). 7 things you should know about. *Educause*. Retrieved from http://www.educause.edu/research-and-publications/7-things-you-should-know-about

Kelly, R. (Ed.). (2013). Synchronous and asynchronous learning tools: 15 strategies for engaging online students using real-time chat, threaded discussions and blogs. *Faculty Focus*. Retrieved from http://www.facultyfocus.com/free-reports/synchronous-and-asynchronous-learning-tools-strategies-for-engaging-online-students/

Moskal, P., Dziuban, C., & Hartman, J. (2013). Blended learning: A dangerous idea? *The Internet and Higher Education*, *18*, 15–23. Retrieved from http://www.sciencedirect.com/science/article/pii/S109675161200084X doi:10.1016/j.iheduc.2012.12.001

Vai, M., & Sosulski, K. (2011). *Essentials of online course design: A standards-based guide*. New York, NY: Routledge.

KEY TERMS AND DEFINITIONS

Accessible Rich Internet Applications (ARIA): Improves the way screen readers read information on the Internet to the user, thereby increasing overall web accessibility for screen reader users.

Cloud-Based: When digital information/data is stored somewhere on the Internet for someone else.

Hypertext Markup Language v5 (HTML5): The latest revision of HTML, the coding language that is used to present formatted content on the Internet.

Individuals with Disabilities Education Act (IDEA): As amended in 2004, this federal law is designed to make sure students with disabilities receive the following services: early intervention, special education, and any other related services.

Individualized Education Plan (IEP): Is a plan developed by a team of specialists assigned to a student with disabilities in the K-12 environment. The IEP has input by the parents and possibly the student. The plan must contain student objectives and it must be reviewed and updated each year by law (i.e., IDEA).

Job Access with Speech (JAWS®): A software program, called a screen reader, developed for personal computers that helps individuals who are blind or visually impaired read what is on the computer screen.

Proprietary Software: Also called closed source, refers to source code that is not open to the public, but instead must be changed, modified, or updated by the owner (business).

Screen Reader: Generic term for software that "reads" information presented on a computer screen to individuals who have a disability, such as a visual impairment or a learning disability.

Self-Hosted: Housing a software program or system (e.g., an LMS) in a special physical location or on specific hardware that is housed at the institution.

This work was previously published in Assistive Technology Research, Practice, and Theory edited by Boaventura DaCosta and Soonhwa Seok, pages 233-251, copyright year 2014 by Medical Information Science Reference (an imprint of IGI Global).

Chapter 27
Enterprise 2.0 in Engineering Curriculum

Andreas Ahrens
Wismar University of Applied Sciences, Germany

Olaf Bassus
Wismar University of Applied Sciences, Germany

Jeļena Zaščerinska
Centre for Education and Innovation Research, Latvia

ABSTRACT

Engineering education is facing a challenge to bring e-business closer to student engineers. Enterprise 2.0 application in engineering education advances engineering students' enterprise for the development of innovative products, processes, and services. The aim of the research is to analyze student engineers' Enterprise 2.0 application underpinning elaboration of pedagogical guidelines on student engineers' Enterprise 2.0 application in engineering curriculum. The meaning of key concepts of Enterprise 2.0 and engineering curriculum is studied. Moreover, the study indicates how the steps of the process are related following a logical chain: Enterprise 2.0 → engineering curriculum design → modelling Enterprise 2.0 application in engineering curriculum → empirical study within a multicultural environment. The present empirical research was conducted during the Baltic Summer School "Technical Informatics and Information Technology" in 2009, 2010, and 2011. The findings of the research allow drawing the conclusions that student engineers' Enterprise 2.0 application in engineering curriculum is efficient.

INTRODUCTION

Engineers succeed harder to find a job: engineer entering the service area has changed from working permanently at a large-scale enterprise to accepting project-related orders of large-scale enterprises by free engineers' office (Bassus, Wolfgramm, 2009, p. 38). Starting own business is a viable solution to overcome the unemployed or migrant status student engineers are exposed to.

Engineering curriculum is facing a challenge of Enterprise 2.0 application that brings e-business closer to student engineers and advances their enterprise.

DOI: 10.4018/978-1-4666-8246-7.ch027

Aim of the research is to analyze student engineers' Enterprise 2.0 application underpinning elaboration of pedagogical guidelines on student engineers' Enterprise 2.0 application in engineering curriculum.

The remaining part of this paper is structured as follows: The introductory background section demonstrates the authors' position on the topic of the research. The following part of the chapter involves five sections. Section 1 introduces theoretical framework on Enterprise 2.0 in engineering education. Research design is revealed in Section 2. The associated results of the empirical study are presented and interpreted in Section 3. Findings of the empirical study are analyzed in Section 4 followed by issues, controversies and their solutions. Afterwards, pedagogical guidelines on student engineers' Enterprise 2.0 application in engineering curriculum are given. Finally, some concluding remarks and a short outlook on interesting topics for further work are elaborated.

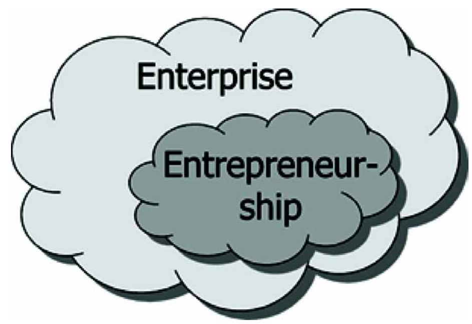
BACKGROUND

The conceptual framework of the present research is based on the approach to enterprise considered in a broader social context than within business framework only (Oganisjana & Koke, 2008, p. 225). Therein, the term *enterprise* involves *entrepreneurship* as shown in Figure 1 (Zaščerinska, Ahrens, & Bassus, 2011, p. 475).

Enterprise is defined as an individual complex capability to identify, generate and realize new socially valuable opportunities in the personal, professional, cultural, economic and other contexts of the social life (Oganisjana & Koke, 2008, p. 225).

The methodological background of the present research is based on System-Constructivist Theory. System-Constructivist Theory and, consequently, System-Constructivist Approach to learning introduced by Reich (Reich, 2005) emphasize that human being's point of view depends on the subjective aspect:

Figure 1. The relationship between enterprise and entrepreneurship



- Everyone has his/her own system of external and internal perspectives that is a complex open system and
- Experience plays the central role in the knowledge construction process (Maslo, 2007, p. 39).

MAIN FOCUS OF THE CHAPTER

Theoretical Framework

The theoretical framework of the present contribution involves the meaning of the key concepts of *Enterprise 2.0* and *engineering curriculum design* studied.

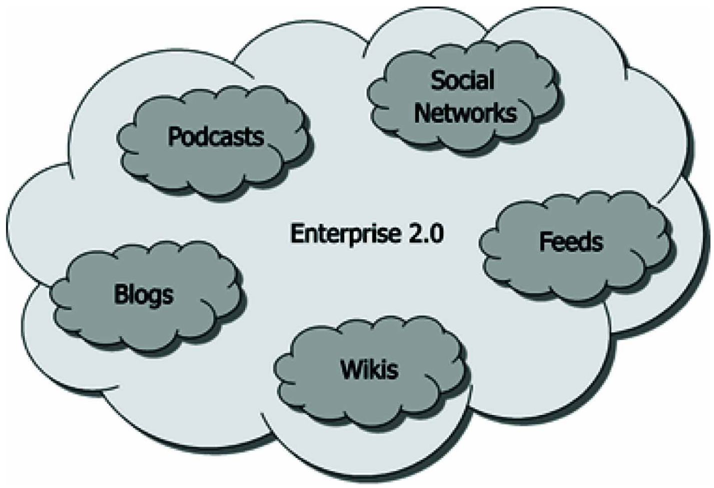
Enterprise 2.0 Definition

The present research is based on a widely accepted conception of Enterprise 2.0 as use of Web technologies for enterprise (business) purposes (Bassus, Ahrens, & Zaščerinska, 2011, p. 376).

Typical Enterprise 2.0 includes corporate blogs, wikis, feeds, and podcasts (Vossen, 2009, p. 38) as shown in Figure 2.

Blogs are a common way to stay in touch with customers, to inform about new products and to receive immediate feedback; they can also be used internally in order to discuss specific topics among the staff of an enterprise, in particular if people

Figure 2. Elements of Enterprise 2.0



are geographically distributed (Vossen, 2009, p. 38). Blogs allow a moderated interaction between participants, be it customers or colleagues, and a simple and efficient distribution of announcements, experiences, opinions, reports, or evaluations. A blog is useless without regular updates, a reasonable number of readers, continuous moderation, and good content. It is also a good idea for a company to treat independent bloggers just like regular journalists, since they might have a considerable readership. In order to stay up-to-date with a company blog, but also with other information an enterprise might publish, there are essentially two approaches: pull and push. The active or pull way is to read the information at my own liberty and pace; in the passive or push approach, the information will be delivered to me automatically.

A podcast is a particular form of feed consisting of audio or video material (Vossen, 2009, p. 38).

Wikis allow collaborative work on a common set of documents by many authors, and have been discovered as a new way of performing knowledge management in a learning organization.

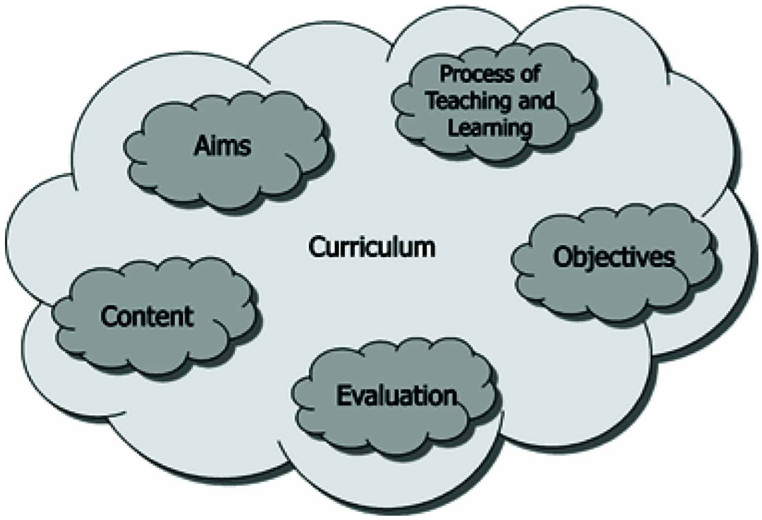
Online networks bring a dimension to the Web that goes beyond simple links between pages; they add links between people, between communities (Vossen, 2009, p. 38) and between organizations.

A network on the Web is typically the result of employing some software that is intended to focus on building an online community and, consequently, organization for a specific purpose (Vossen, 2009, p. 38). Social networks connect people with common interests and may be as simple as a blog, or as complex as Facebook or MySpace for mostly private applications, as LinkedIn or Xing for professional applications, or as Twitter for both. Another impact is that a social network may open up novel sources of revenue, in particular through advertising. Finally, Vossen (Vossen, 2009, p. 38) underlines that technology enables functionality, which as a "byproduct" leads to data collections, and users have a new tendency to socialize over the Web, by exploiting that functionality and the technology.

Engineering Curriculum Design

The search for an engineering curriculum design reveals the interaction of synonyms of the term *curriculum*, namely, *approach, plan* (often in Germany and Russia), *design*, *way of thinking,* as well as *strategy* and *programme* (Bassus, Zaščerinska, & Ahrens, 2011, p. 84).

Figure 3. Curriculum components

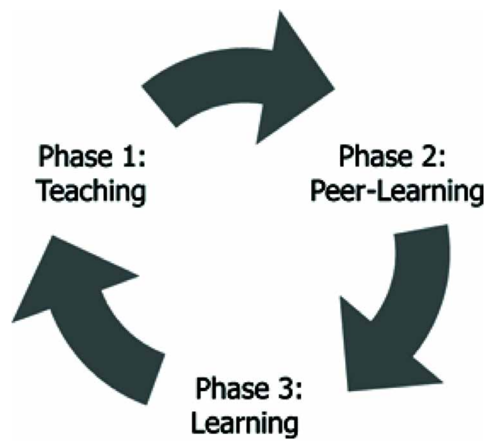


The present contribution considers curriculum as a central, organizing stance (Portelli & Vilbert, 2002a, p. 39). Curriculum comprises the following components: aim, objectives, content, process of teaching and learning as well as evaluation as depicted in Figure 3.

Curriculum based on System-Constructivist Approach to learning centres on possibilities for the co-construction and co-production of enterprise innovation, rather than on enterprise innovation as simply manager transmitted or simply employee created (Portelli & Vilbert, 2002a, p. 39). Therein, curriculum is centred on the process design (Philippou, 2005, p. 357). Moreover, the curriculum paradigm changes from an input based teaching/learning process to an outcome based process (Bluma, 2008, p. 673). Hence, the curriculum demonstrates how the learning outcomes are to be achieved by determining the phases of the process of teaching and learning: from teaching in Phase 1 to learning in Phase 3 through peer-learning in Phase 2 as depicted in Figure 4. Consequently, the present curriculum is regarded as peer-centred.

The stages of engineering curriculum design include the following steps (Boev, et al., 2011, pp. 41-42):

Figure 4. Phases of the process of teaching and learning



1. Curriculum conception (a brief description of the curriculum) that is aimed at identifying the curriculum constituencies and creation of the system ensuring the interaction with constituencies and studying of their needs.
2. Determination of curriculum educational objectives that are based on the needs of the constituencies. The curriculum objectives should be consistent with the mission of the institution to ensure its market competitiveness and demand of constituencies.

3. Definition of measurable curriculum learning outcomes, namely, knowledge, skills, and attitudes, which a student acquires during his study within the curriculum. The curriculum learning outcomes should correspond with the needs of the constituencies and ensure the achievement of the programme objectives by the graduates.
4. The curriculum design that demonstrates how the learning outcomes are to be achieved by defining the curriculum modules that ensure their achievement and by assigning European Credit Transfer and Accumulation System (ECTS) to learning outcomes. Each module has a number of learning outcomes that have their credit value depending on their contribution to achievement of programme outcomes. An educator responsible for a module must ensure development of its syllabus, teaching technologies, and supporting facilities aiming at achievement of module learning outcomes. Each module must have the assessment methods and tools for achievement of planned learning outcomes. The credits should not be assigned to a module if module does not include assessment of outcomes to be achieved. The notional learning time for a module is defined in accordance with its credit value.
5. Development of the assessment system for achievement of learning outcomes and curriculum objectives that should be done systematically and used for curriculum continuous improvement. The professional accreditation of curriculum by the accrediting agency is an important part of the assessment system of an institution.

Modelling Enterprise 2.0 Application in Engineering Curriculum

Theoretical analysis and empirical findings (Bassus, Zaščerinska, & Ahrens, 2011; Zaščerinska, Ahrens, & Bassus, 2011; Ahrens & Zaščerinska, 2011; Bassus, Ahrens, & Zaščerinska, 2011) allow modelling Enterprise 2.0 application in engineering curriculum as following:

1. Enterprise 2.0 application in engineering curriculum is conceptualized as promoting student engineers' self-confidence and capability to cope with their own problems in all spheres of life in a knowledgeable and enterprising way (Oganisjana & Koke, 2008, p. 225).
2. Educational objective of Enterprise 2.0 application in engineering curriculum is determined as to actively involve the student engineers in the life of Enterprise 2.0 (Portelli & Vilbert, 2002b, p. 15) by providing innovative opportunities and organizing student engineers' cognitive activity (Ahrens & Zaščerinska, 2011, p. 314).
3. Measurable learning outcomes are defined as
    a. Student engineers' knowledge of the Enterprise 2.0 concept,
    b. Student engineers' skills to use Enterprise 2.0 for their individual, organizational and professional purposes. It should be mentioned that by individual purposes private use of Enterprise 2.0 is meant: business functions are used within the family and friends. By organizational purposes use of Enterprise 2.0 between the colleagues is determined: business is made between the participants within the enterprise. And by professional purposes Enterprise 2.0 is used for business with the partners of the enterprise (Zaščerinska, Ahrens, & Bassus, 2011, p. 478).
    c. Student engineers' attitude towards participation in activities for their professional development such as education, in-service training and/or learning.

4. Enterprise 2.0 application is implemented in the Web 2.0 module of engineering curriculum (Ahrens & Zaščerinska, 2011, p. 316). The Web 2.0 module examines the advantages and problems of this technology such as architecture and management, protocol design, and programming, which makes new social communication forms possible. The Web 2.0 module does not reveal the concept of Enterprise 2.0. However, the Web 2.0 module comprises Enterprise 2.0 technologies (Ahrens & Zaščerinska, 2011, p. 316). The Web 2.0 module is assigned to 1 credit relevant to the European Credit Transfer System (ECTS). The teaching technology proceeds as following (Ahrens & Zaščerinska, 2011, p. 314-315):
    a. Phase 1 Teaching of Enterprise 2.0 application is aimed at a safe environment for all the students considering the essence of constructive social interaction and its organizational regulation. The present phase of Enterprise 2.0 application is organized in a frontal way involving the students to participate.
    b. Phase 2 Peer-Learning of Enterprise 2.0 application is designed for the students' analysis of an open professional problem situation and their search for a solution. The present phase of Enterprise 2.0 application involves the students to act in peers. A variety of teaching/learning activities with use of Enterprise 2.0 is provided by role plays, simulations, dialogues, prepared talks, discussions, and communication games and information-gap activities (Zaščerinska, 2009).
    c. Phase 3 Learning of Enterprise 2.0 application emphasizes the students' self-regulation with use of assessment of the process and self-evaluation of the results. The students present their self-evaluation by the end of each class.
5. The assessment system for achievement of learning outcomes and curriculum objectives comprises student engineers' self-evaluation, internal evaluation, and external evaluation (Hahele, 2005).

Research Design

The research design comprises the purpose and question, sample and methodology of the present empirical study to be considered.

Research Purpose and Question

The present empirical study was conducted during student engineers' Enterprise 2.0 application in the engineering curriculum of Baltic Summer School *Technical Informatics and Information Technology* to examine the efficiency of Enterprise 2.0 application in engineering curriculum. The research question is as follows: Has student engineers' Enterprise 2.0 application been efficient?

Sample of the Research

The present research conducted during the Baltic Summer School „Technical Informatics and Information Technology" in 2009, 2010 and 2011 involves 85 respondents, namely,

- 22 participants of Fifth Baltic Summer School, August 7-22, 2009, Tartu, Estonia,
- 28 participants of Sixth Baltic Summer School, August 13-28, 2010, Kaunas, Lithuania,
- 24 participants of Seventh Baltic Summer, August 12-27, 2011, Riga, Latvia,
- an educator of Baltic Summer School and
- 10 researchers in the field of educational research from different countries.

All the participants of Baltic Summer School *Technical Informatics and Information Technology* have got Bachelor or Master Degree in different fields of Computer Sciences and working experience in different fields related to computing and information technology.

The participants of Baltic Summer School *Technical Informatics and Information Technology* are with different cultural background and diverse educational approaches from different countries, namely, Latvia, Lithuania, Estonia, Russia, Belarus, Mongolia, Egypt, Germany, Pakistan, Indonesia, Great Britain, China, India, Nigeria, Romania and Mexico, etc. Hence, the sample is multicultural as the respondents with different cultural backgrounds and diverse educational approaches were chosen. Hence, the group's socio-cultural context (age, field of study and work, mother tongue, etc.) is heterogeneous.

Research Methodology

Interpretative research paradigm which corresponds to the nature of humanistic pedagogy (Lūka, 2008, p. 52) has been determined. Interpretative paradigm is characterized by the researchers' practical interest in the research question (Cohen, Manion, et al., 2003).

The qualitative evaluation research aimed at examining the efficiency of Enterprise 2.0 application has been used in the study (Kardoff, 2004, p. 137; Flick, 2004, p. 149).

Therein, efficiency involves quality and effectiveness as depicted in Figure 5 (Zaščerinska & Ahrens, 2011).

Figure 5. Elements of efficiency

Quality of Enterprise 2.0 application is regarded as the improvement of student engineers' knowledge, skills and attitudes (Zaščerinska, 2011a, p. 125). In its turn, effectiveness is considered as the educator's contribution to the student engineers' knowledge, skills and attitudes in Enterprise 2.0 application (Zaščerinska, 2011a, p. 125-126).

Enterprise 2.0 application is efficient if the inputs (Enterprise 2.0 application) produce the maximum output (students' knowledge, skills and attitudes (Zaščerinska, 2010b, p. 3) (Commission of the European Communities, 2006, p. 2). Therein, students' knowledge, skills and attitudes are the outcome criterion of efficiency of Enterprise 2.0 application (Zaščerinska, 2010b, p. 3).

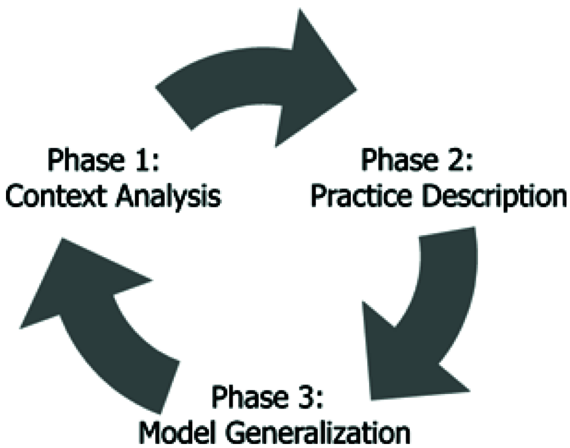
Figure 5 shows how the qualitative evaluation research proceeds (Zaščerinska, 2011a, p. 109)

- From the phase of exploration of the context analysis aimed at determining the present situation of Enterprise 2.0 application in promoting students' motivation and their readiness to implement the joint activity,
- Through the description of the practice that analyzes differences in levels of features researched and
- To the phase of generalization of the model that evaluates whether or not Enterprise 2.0 application is efficient for the development of students' knowledge, skills and attitudes (see Figure 6).

The qualitatively oriented research allows the construction of only few cases (Mayring, 2007, p. 1). Moreover, the cases themselves are not of interest, only the conclusions and transfers we can draw from this material (Mayring, 2007, p. 6).

Selecting the cases for the case study comprises use of information-oriented sampling, as opposed to random sampling (Flyvbjerg, 2006, p. 229). This is because an average case is often not the richest in information. In addition, it is

Figure 6. Phases of qualitative evaluation research



often more important to clarify the deeper causes behind a given problem and its consequences than to describe the symptoms of the problem and how frequently they occur (Flyvbjerg, 2006, p. 229).

Educator Contribution to Engineering Students' Learning Outcomes

The present part of the empirical study reveals analysis of engineering students' learning outcomes in Enterprise 2.0 application within Baltic Summer School *Technical Informatics and Information Technology* in 2009, 2010, and 2011 through thorough analysis of two surveys of the student engineers' feedback regarding their needs before and after educators' contribution.

Pre-Survey

In 2009 analysis of the students' feedback regarding their needs in Enterprise 2.0 application in the pre—and post-survey was based on the following questionnaire:

- **Question 1:** Do you know the word Web 2.0?
- **Question 2:** Do you know the basic idea of Web 2.0?
- **Question 3:** Have you already used Web 2.0, namely, Facebook, Twitter, Wikipedia, etc.?
- **Question 4:** Do you think Web 2.0 requires a lot of profound knowledge, namely, math, physics, etc.?
- **Question 5:** Do you think Web 2.0 is useful for your individual needs?
- **Question 6:** Do you think Web 2.0 is useful for your organizational use?
- **Question 7:** Do you think Web 2.0 is useful for your professional use?

It should be mentioned that needs analysis of three levels, namely, individual, organizational and professional, serves as an indicator of Enterprise 2.0 application in engineering education (Zaščerinska, Ahrens, & Bassus, 2011, p. 482).

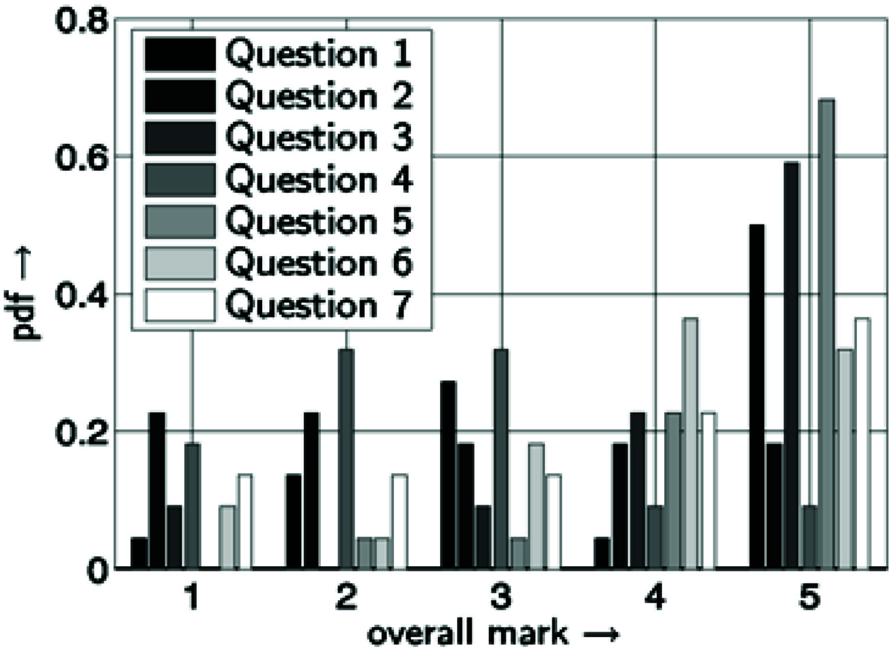
The evaluation scale of five levels for each question is given where "1" means "disagree" and low level of experience (knowledge, skills and attitudes (Zaščerinska, 2010a, p. 415) in Enterprise 2.0 application and "5" points out "agree" and high level of experience in Enterprise 2.0 application.

Analysis of the pre-survey, as depicted in Figure 7, carried out with 22 participants of Fifth Baltic Summer School, shows that the student engineers' Enterprise 2.0 application is heterogeneous as well as the student engineers do not know the possibilities offered by Web 2.0 properly.

In 2010 analysis of the students' feedback regarding their needs in Enterprise 2.0 application in the pre—and post-survey was based on the following questionnaire:

- **Question 1:** Do you know the concept of Enterprise 2.0?
- **Question 2:** Do you use Enterprise 2.0 for your individual purposes?
- **Question 3:** Do you use Enterprise 2.0 for your organizational purposes?

Figure 7. PDF (probability density function) of the pre-survey on August 7, 2009



- **Question 4:** Do you use Enterprise 2.0 for your professional purposes?
- **Question 5:** Do you participate in activities for your professional development, namely, education, in-service training, and/or learning, in use of Enterprise 2.0?

The evaluation scale of five levels for each question is given where "1" means "disagree" and low level of experience in Enterprise 2.0 application and "5" points out "agree" and high level of Enterprise 2.0 application.

Results of the pre-survey reveal that the student engineers do not realize the possibilities offered by Enterprise 2.0 properly.

In 2011 analysis of the students' feedback regarding their needs in Enterprise 2.0 application in the pre—and post-survey was based on the following questionnaire:

- **Question 1:** Do you have your own business and / or enterprise? The evaluation scale of two levels for the question is given where "1" means "no" and "2" - "yes."
- **Question 2:** Do you plan to start your own business and / or enterprise? The evaluation scale of two levels for the question is given where "1" means "no" and "2" - "yes."
- **Question 3:** To which extent do modern business and enterprise employ Web technologies? The evaluation scale of five levels for the question is given where "0-20%" means a low level of experience in Enterprise 2.0 application and "80-100%" points out a high level of Enterprise 2.0 application.
- **Question 4:** Please, indicate at least 3 Web technologies used by business and / or enterprise for business applications (up to five). The evaluation scale of five levels for the question is pointed out. 1 point is given for each correct answer thereby "1" means a low level of experience in Enterprise 2.0 application and "5" - a high level of Enterprise 2.0 application.

Results of the pre-survey reveal that the student engineers do not realize the possibilities for business offered by Enterprise 2.0 properly:

- One engineering student has got his/her own business,
- 11 engineering students plan to start their own business and / or enterprise,
- Nine engineering students consider that modern business employs Web technologies to 40-60%, 10 student engineers – 60-80% and five engineering students – 80-100%.
- Four student engineers indicated no Web technologies used by business, two engineering students - one Web technology used by business, three engineering students – two Web technologies used by business, 14 student engineers – three Web technologies used by business and one engineering student – four Web technologies used by business.

This is a reason why a support system to contribute to students' learning outcomes in a multicultural study's context was elaborated. This support system differs from the one offered in the special module of Web 2.0 by other educators as the proposed support system proceeds in a certain sequence.

Educator Contribution

Baltic Summer School *Technical Informatics and Information Technology* has been held in the Baltic States since 2005. The goal of studies in the Baltic Summer School is to prepare the student for international Master and Ph.D. programs in Germany, further specialization in computer science and information technology or other related fields, and learning in a simulated environment.

The Baltic Summer School contains a special module on Web 2.0 where Enterprise 2.0 is part. The process of teaching and learning was implemented in a certain sequence as following:

Phase 1 *Teaching* of Enterprise 2.0 application: The *Preparing a Good Introduction to a Presentation* information-gap activity (Buckmaster, 2004, p. 1) was analyzed in details. The student engineers' ability to make presentations for academic purposes in English is one of the expected results in the Web 2.0 module. The *Preparing a Good Introduction to a Presentation* information-gap activity is aimed at specialized training in Enterprise 2.0 application. The preparatory phase of Enterprise 2.0 application includes e-mailing the student engineers the task. The *Preparing a Good Introduction to a Presentation* information-gap activity comprised the following procedure:

Stage 1 was aimed at asking the student engineers to read out the task and at discussing the task in the whole group. There were no difficulties to understand the task because the student engineers did similar exercises.

Stage 2 assumed the student engineers to implement the task individually and/or in peers. If necessary, they applied Enterprise 2.0: the Web 2.0 module was hold in a computer classroom with the Internet connection available. The student engineers shared the Enteprise 2.0 resources available with pleasure.

Stage 3 dealt with sharing the student engineers' experience in reordering and completing the sentences with the group's participants. The student engineers managed to complete the sentences without any difficulty. However, the sentence order was given by the student engineers in a variety of combinations.

Stage 4 was designed to compare the engineering student dicoveries with the findings of other students. All the student engineers were helpful and friendly during the present stage of the studies: if there was a difficulty to find an idea on reordering the sentences, expression or word, the student engineers could get the necessary assistance from the groupmates and the educator. The observation revealed that word order contained some difficulties for the particular student engineers.

Stage 5 was devoted to re-completing the task by each student in the classroom. It was carried out by the engineering students with an interest: the student engineers re-asked some questions.

Phase 2 *Peer-Learning* of Enterprise 2.0 application**:** The prepared talk on the topic of the student engineers' master thesis was analyzed in details. The prepared talk on the topic of the students' master thesis is aimed at specialized training in searching for information with Enterprise 2.0 application. The preparatory stage included

- E-mailing the student engineers the task to prepare a presentation in English on the topic of the students' master theses,
- Clarifying whether the engineering students are able to work with the PowerPoint programme,
- A class with the emphasis on making a successful presentation for academic purposes in English that involves discussion on the presentation aims, its structure, materials, its procedure, use of the PowerPoint programme.

The prepared talk on the topic of the engineering students' master theses comprised the following procedure:

Stage 1 was aimed at a student engineer's presentation to his/her groupmates about his/her master thesis with Enterprise 2.0 application and the PowerPoint programme. The student engineers assisted each other in the technical area of presenting with use of the PowerPoint programme if there were some problems with the technical equipment, namely,

- New version of the PowerPoint programme of the student's presentation was not suitable to the PowerPoint programme available in the computer classroom,
- Transferring the presentation from the students' flash to the desktop of the computer, etc.,
- Opening the presentation files saved in the programmes different from the programmes available in the classroom, and
- Re-connecting the projector from the classroom computer to a private computer, etc.

Stage 2 engaged the students to switch the roles of speakers and listeners and to repeat the activity.

Stage 3 was devoted to the discussion on the student engineers' presentations. The discussion revealed that the engineering students while futher practising a presentation would take into consideration

- Pronunciation of academic terminology: the engineering students know how to spell the term, however, they do not pay a lot of attention to its pronunciation,
- Time limit for academic presentation, namely, 10 minutes in the Web 2.0 module, whereas the students' presentations took 15-20 minutes,
- Slide limit for academic presentation: there were 10 slides set as a requirement whereas the engineering students prepared 12-25 slides to emphasize the significance of the content of their master theses,
- To put only key words or phrases on a slide, not the whole sentence or text,
- Non-verbal aspects of communication:
  - The engineering students' location and distance within the public zone while making a presentation whereas some of the presenting students were standing at a classroom's wall,
  - To vary the pace and pitch of his/her voice,
  - Irritating nervous habits such as running his/her fingers through his/her hair or clicking the fingers or a pen, etc,
  - Not to turn his/her back on the audience in order to read the text of the presentation from the screen on the wall,

- Not to cross his/her arms and
- To look into each other's eyes,

- To bring an answer to a question subsequently if there is no possibility to reply immediately: for example, the presentation took a longer time than it was suggested.

Phase 3 *Learning* of Enterprise 2.0 application: The student engineers presented their self-evaluation. Self-evaluation comprised three questions as following:

1. What is your attitude to the Enterprise 2.0 application today?
2. What have you learned in the Enterprise 2.0 application?
3. How can you apply this knowledge in your academic field?

The present phase of English studies for academic purposes was organized in an individual way.

The students revealed their willingness to share their experience obtained in the classroom by the end of each class. Moreover, the students emphasized the importance of the possibility (Ilyinska, 2004, p. 92-93, 95)

- To see things from different perspectives,
- To produce a new organisation of familiar components and
- To consider new ideas by making connections among the olds.

Phase 3 *Learning* of Enterprise 2.0 application identified the most successful teaching and learning methods as demonstrated in Table 1 in order to improve the engineering students' learning outcomes.

Post-Survey

In 2009, analysis of the post-survey carried out in the Fifth Baltic Summer School on August 11, 2009 reveals that the participants' Enterprise 2.0

Table 1. Phases of Enterprise 2.0 application and their most successful teaching and learning methods

Phase	Most successful teaching and learning methods
Phase 1 Teaching Phase	communication games, information-gap activities
Phase 2 Peer-Learning Phase	Dialogue, role play, discussion, simulation: - conference and video-conference, - debate, - seminar and - project; prepared talk
Phase 3 Learning Phase	self-evaluation

application has become homogeneous and the participants have put the emphasis on Enterprise 2.0 application for professional needs as shown in Figure 8.

In 2010, results of the post-survey demonstrate the positive changes in comparison with the pre-survey:

- The level of the participants' experience in terms of knowledge of the concept of Enterprise 2.0 has been enriched,
- The level of the participants' experience in Enterprise 2.0 application for individual needs, for organizational and professional needs increased and
- The level of the participants' experience in terms of participation in activities for professional development such as education, in-service training and/or learning has been improved.

In 2011, results of the post-survey demonstrate the positive changes in comparison with the pre-survey:

- The number of engineering students who plan to start their own business increased from 11 to 16.
- The number of student engineers who considered that modern business employs Web technologies to 40-60% decreased from nine to five, 60-80% – decreased from 10 to nine and 80-100% – increased from five to 10 engineering students.
- The number of engineering students who indicated one or no Web technologies used by business decreased from six student engineers to five, two Web technologies used by business – decreased from three engineering student to one, three Web technologies used by business – increased from 14 student engineers to 15 and four Web technologies used by business – increased from one engineering student to three.
- The number of students who has got his/her own business remained steady – one engineering student.

Findings of the Research

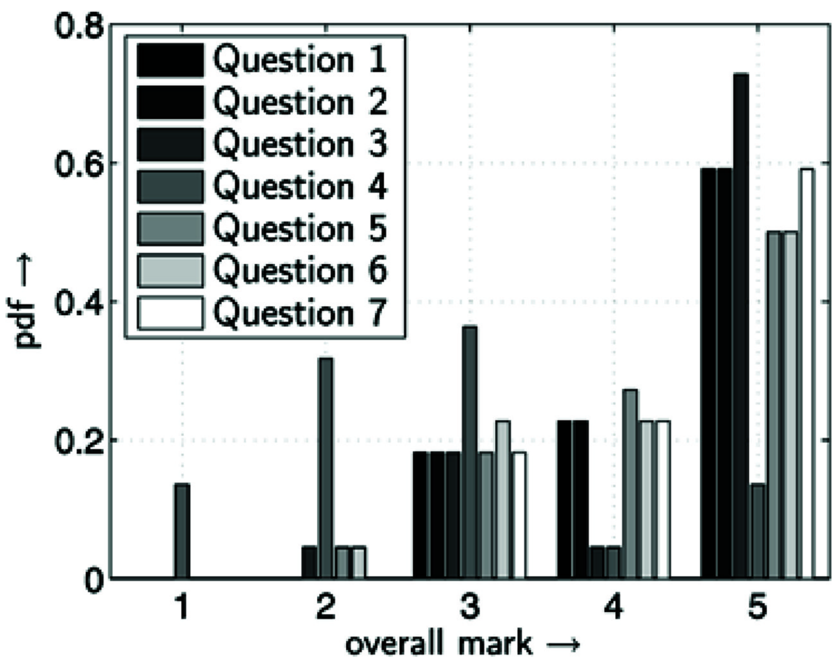
The present part reveals analysis of the research results in Enterprise 2.0 application within Baltic Summer School *Technical Informatics and Information Technology* in 2009, 2010, and 2011 through thorough analysis of student engineers' self-evaluation, internal and external evaluation.

Analysis of Students' Self-Evaluation of the Research Results

In 2010, in order to find out how each student's learning outcomes changed after Enterprise 2.0 application, analysis of the engineering students' self-evaluation comprised the structured interviews of three questions, namely,

1. What is your attitude to the Enterprise 2.0 application today?
2. What have you learned in the Enterprise 2.0 application?

Figure 8. PDF (probability density function) of the post-survey on August 11, 2009



3. How can you apply this knowledge in your academic field?

The aim of the interviews was to reveal the engineering students' evaluation of Enterprise 2.0 application for the development of student engineers' learning outcomes.

Comparing the answers of those 28 engineering students in the sample, the structured interviews were focused on the engineering students' positive experience in Enterprise 2.0 application. For example, a student reveals the inter-relationship between the positive experience of social interaction and cognitive activity in Enterprise 2.0 application:

I feel this class to be very useful to me because I am improving my knowledge in Enterprise 2.0 application.

The student evaluates her own learning process:

I think I like the Web 2.0 module, because I begin to understand how to apply Enterprise 2.0.

The summarizing content analysis (Mayring, 2004, p. 269) of the structured interviews demonstrates that Enterprise 2.0 application promotes the development of students' learning outcomes. Moreover, Enterprise 2.0 application contributes to the safe and friendly teaching/learning environment for all the participants and provides opportunities of constructive social interaction and cognitive activity.

Analysis of Internal Evaluation of the Research Results

Internal evaluation involves engineering students and educators of the educational establishment. Analysis of the internal evaluation of the engineering students' learning outcomes comprised the data processing, analysis, interpretation, and analysis of the results of the pre-survey and post-survey of the student engineers.

In order to determine the developmental dynamics of each student's learning outcome in 2010, comparison of the pre-survey and post-survey results was carried out.

The *Mean* results of the descriptive statistics highlighted in Table 2 demonstrate that the level of the students' Enterprise 2.0 application has increased in the post-survey (3.28) in comparison with the pre-survey (1.68).

The comparison of the *Standard Deviation* results as shown in Table 3 reveals that the scores of the post-survey are spread wider than the scores in the pre-survey.

The results of *Mean* and *Standard Deviation* within the surveys of the students' feedback regarding their needs in Enterprise 2.0 reveal that most of answers are concentrated around Level 2 and 3. Thus, there is a possibility to increase the students' use of Enterprise 2.0 within Web 2.0 technologies.

In order to determine the developmental dynamics of each student's learning outcome in 2011, comparison of the pre-survey and post-survey results was carried out.

The *Mean* results of the descriptive statistics highlighted in Table 4 demonstrate that the level of the students' Enterprise 2.0 application has increased in the post-survey (2.39) in comparison with the pre-survey (2.15).

Table 2. Mean analysis of the pre- and post-survey in 2010

Question	Pre-Survey	Post-Survey
1	1.86	3.25
2	1.75	3.44
3	1.54	3.33
4	1.57	3.16
5	1.68	3.21
mean	**1.68**	**3.28**

Table 3. Standard deviation analysis of the pre- and post-surveys in 2010

Question	Pre-Survey	Post-Survey
1	1.85	2.35
2	1.14	2.40
3	1.99	2.39
4	1.57	2.19
5	1.96	2.31
mean	**1.70**	**2.33**

Table 4. Mean analysis of the pre- and post-survey in 2011

Question	Pre-Survey	Post-Survey
1	1.04	1.04
2	1.46	1.66
3	3.83	4.21
4	2.25	2.66
mean	**2.15**	**2.39**

The results of *Mean* within the surveys of the students' feedback regarding their needs in Enterprise 2.0 reveal that most of answers are concentrated around Level 2. Thus, there is a possibility to increase the students' Enterprise 2.0 application within Web 2.0 technologies.

Hence, considering judgment to be part of the art of statistics (Gigenzer, 2004, p. 603), the conclusion has been drawn that Enterprise 2.0 application influenced the development of the engineering students' learning outcomes demonstrated by the difference between the levels of the student engineers' learning outcomes in the pre- and post-survey.

Analysis of External Evaluation of the Research Results

The external evaluation comprises 10 researchers from different countries. It should be mentioned that all the researchers participated in the external evaluation of the research results are professors in the fields connected with educational research.

The external evaluation of the research results comprised the non-structured interview of one question as following: What is the researcher's view on the present research on Enterprise 2.0 application for the development of engineering students' learning outcome? The aim of the non-structured interviews was to reveal the researchers' evaluation of Enterprise 2.0 application for the development of engineering students' learning outcome.

For example, a respondent considered the model of Enterprise 2.0 application for the development of engineering students' learning outcome to be a transformative methodology. The researcher stressed the following advantages of the model: focus of establishing a system, viewing the overall personality of the learner, the fact that educators can indeed change the typical classroom environment, the sequence of the implementation of the model, developing newer constructs that will truly help the student to internalize new material and the student having the "ability to create knowledge".

The summarizing content analysis (Mayring, 2004, p. 269) of the data reveals that the respondents evaluate Enterprise 2.0 application for the development of engineering students' learning outcome positively. Thus, the conclusion can be drawn that Enterprise 2.0 application enhances development of engineering students' learning outcome.

ISSUES, CONTROVERSIES, PROBLEMS

One of the Enterprise 2.0 issues is to consider the historical development of *Enterprise 2.0* and *Enterprise 2.0* in pedagogy.

Another point is the paradigm shift from socialization within Web 2.0 to peer contribution within Web 3.0 (Ahrens & Zaščerinska, 2011, p.

Table 5. Enterprise 2.0 in pedagogy in different historical periods

Phase	Historical Period	Approach	Elements of Enterprise	Educational settings
1.	2000 - 2006	Enterprise 1.0 as socialization	Social software	Tasks with use of Enterprise 1.0
2.	2006 - up to now	Enterprise 2.0 as community	Social software and online networks	Teaching techniques with use of Enterprise 2.0
3.	2007 - up to now	Enterprise 3.0 as organization	Online networks	Practice of the Enterprise 3.0 curriculum
4.	2010 - up to now	Enterprise 4.0 as society	Ambient intelligence, WebOS or Web operating system, artificial intelligence	University Degree

319) and growing need to quantify uncertainty with greater precision (Nadhan, 2008) that has already increased the significance in the Enterprise 2.0 institutionalization. However, Enterprise 2.0 is conceptualized but still not institutionalized (Nadhan, 2008).

SOLUTIONS AND RECOMMENDATIONS

Table 5 demonstrates that the study of *Enterprise 3.0* and *Enterprise 3.0* in pedagogy has not had a long story (Bassus, Ahrens, & Zaščerinska, 2011, p. 381).

Regarding the institutionalization of Enterprise 2.0, an attempt has led to the concept of Enterprise 3.0 defined as an agency based on the curriculum practice (Bassus, Zaščerinska, & Ahrens, 2011, p. 84).

FUTURE RESEARCH DIRECTIONS

Enterprise 3.0 demonstrates the technology of online networks to assemble and manage large communities with a common interest in peer contribution, where organisations and enterprises have made use of the potential of Web 3.0 with single solutions such as online networks. However, Enterprise 4.0 as shown in Table 5 will be derived from the full application of Web 4.0 concepts such as ambient intelligence, WebOS or Web operating system, artificial intelligence, rather than Web 3.0 point solutions (Bassus, Ahrens, & Zaščerinska, 2011, p. 381). This remains as an open point for the future. It should be mentioned that the concept of a Web operating system or WebOS is distinct from Internet operating systems. Web operating system or WebOS is independent of the traditional individual computer operating system.

Another direction of further research might include Enterprise 2.0 application in five phases (Zaščerinska, 2011b, p. 145):

- Teaching in Phase 1,
- Teaching with elements of peer-learning in Phase 2,
- Peer-learning in Phase 3,
- Peer-learning with elements of learning in Phase 4 and
- Learning in Phase 5.

CONCLUSION

The findings of the research allow drawing the conclusions that Enterprise 2.0 application is efficient for the enhancement of student engineers' learning outcomes.

Regarding quality assurance, it is evident that the student engineers' learning outcomes have been enriched. Therein, Enterprise 2.0 application has contributed to the development of the engineering students' learning outcomes.

Regarding effectiveness of the educator's contribution to the student engineers' learning outcomes, it is evident that the engineering students widened their experience in social interaction and cognitive activity with the Enterprise 2.0 application. The engineering students' attitude is positive. That shows that the studies influence the student engineers' learning outcomes.

Moreover, validity of the qualitative evaluation research has been provided by use of the mixed methods' approach to the data obtaining, processing, and analysis. Validity and reliability of the research results have been provided by involving other researchers into several stages of the conducted research. External validity has been revealed by international co-operation. Therein, the researchers' positive evaluation of Enterprise 2.0 application for the development of engineering students' learning outcomes validates the findings of the present research.

Thus it might be stressed that Enterprise 2.0 application is efficient if students' needs are met and a support system implemented in the phases of a certain sequence is designed that would secure their social experience in social interaction and cognitive activity.

The present research has *limitations*. The inter-connections between engineering students' learning outcomes, Enterprise 2.0 application, and the sequence of its implementation have been set. Another limitation is the empirical study conducted by involving educators and students at master level of one tertiary institution. Therein, the results of the study cannot be representative for the whole area. Nevertheless, the results of the research - definition of Enterprise 2.0, Enterprise 2.0 application and the qualitative evaluation research – may be used as a basis of the development of engineering students' learning outcomes at master level of other tertiary institutions.

The following pedagogical guidelines on Enterprise 2.0 application in engineering curricula are elaborated: Enterprise 2.0 application proceeds from Phase 1 *Teaching* aimed at determining the notion of constructive social interaction and its organizational regulation through Phase 2 *Peer-Learning* designed for the students' analysis of an open academic problem situation and their search for its solving that provide each student with the opportunity to construct his/her own social experience to Phase 3 *Learning* focused on the students' self-regulation with use of evaluation of the process and self-evaluation of the result.

REFERENCES

Ahrens, A., & Zaščerinska, J. (2011). Enterprise 3.0 in engineering education. In G. Noviks (Ed.), *Proceedings of the 15th International Student Scientific Practical Conference Human Environment. Technology* Rēzekne: Rēzeknes Augstskolas Izdevniecība.

Bassus, O., Ahrens, A., & Zaščerinska, J. (2011). Clustering for the development of engineering students' use of enterprise 3.0. In *Proceedings of the 4th International Conference of Engineering & Business Education and 1st SAFRI Journey to Excellence Conference* (pp. 373-383). Cape Town, South Africa: Cape Peninsula University of Technology.

Bassus, O., & Wolfgramm, K. (2009). The innovative entrepreneurship training program at Hochschule Wismar University of Technology, Business and Design. In Ahrens & Lange (Eds.), *First Asian Conference on e-Business and Telecommunications* (pp. 36-39). Berlin: Mensch & Buch.

Bassus, O., Zaščerinska, J., & Ahrens, A. (2011). From enterprise 2.0 to 3.0: Challenges in engineering and business education. In Bassus, Ahrens, & Lange (Eds.), *Information and Communication Technologies in Engineering and Business* (pp. 79-96). Berlin, Germany: Mensch & Buch.

Bluma, D. (2008). Teacher education in the context of Bologna process. In I. Žogla (Ed.), *Association for Teacher Education in Europe Spring University Conference Teacher of the 21st Century: Quality Education for Quality Teaching* (pp. 673–680). Riga, Latvia: University of Latvia.

Boev, O. V., Kriushova, A. A., Kulyukina, E. S., Surygin, A. S., Freeston, I., Heitmann, G., & Chuchalin, A. I. (2011). *Guidelines on engineering curriculum design aligned with the European qualification framework and European standards for quality assurance of engineering education*. Tomsk: TPU Publishing House.

Buckmaster, R. A. (2004). *English for specific purposes on-line course.* Retrieved March 15, 2005, from http://www.sisekaitse.ee/?id=831

Cohen, L., & Manion, L. et al. (2003). *Research methods in education*. London: Routledge/Falmer Taylor & Francis Group.

Commission of the European Communities. (2006). *Efficiency and equity in European education and training systems.* Retrieved December 3, 2011, from ec.europa.eu/education/policies/2010/doc/comm481_en.pdf

Flick, U. (2004). Design and process in qualitative research. In U. Flick, E. Von Kardoff, & I. Steine (Eds.), *A Companion to Qualitative Research* (pp. 146–152). London: SAGE.

Flyvbjerg, B. (2006). Five misunderstandings about case-study research. *Qualitative Inquiry*, *12*(2), 219–245. doi:10.1177/1077800405284363

Gigerenzer, G. (2004). Mindless statistics. *Journal of Socio-Economics*, *33*(5), 587–606. doi:10.1016/j.socec.2004.09.033

Ilyinska, L. (2004). *English for science and technology: Course design, text analysis, research writing*. RTU Publishing House.

Kardoff, E. (2004). Qualitative evaluation research. In U. Flick, E. Von Kardoff, & I. Steinke (Eds.), *A Companion to Qualitative Research* (pp. 137–142). London: SAGE.

Lūka, I. (2008). Development of students' ESP competence and educator's professional activity in tertiary level tourism studies. In I. Žogla (Ed.), *Association for Teacher Education in Europe Spring University Conference Teacher of the 21st Century: Quality Education for Quality Teaching* (pp. 689–697). Riga, Latvia: University of Latvia.

Maslo, E. (2007). Transformative learning space for life-long foreign languages learning. In D. Cunningham, D. Markus, J. Valdmanis, et al. (Eds.), *International Nordic-Baltic Region Conference of FIPLV Innovations in Language Teaching and Learning in the Multicultural Context* (pp. 38-46). Rīga: SIA Izglītības Soļi.

Mayring, P. (2004). Qualitative content analysis. In Flick, von Kardoff, & Steinke (Eds.), *A Companion to Qualitative Research* (pp. 266-269). London: SAGE.

Mayring, P. (2007). On generalization in qualitatively oriented research. *Forum Qualitative Sozial Forschung*, *8*(3), 1–8.

Nadhan, E. G. (2008). *Forecast for the next generation enterprise 3.0.* Paper presented at the EDS Distinguished SE Open Group Enterprise Architecture Practitioners Conference. Chicago, IL.

Oganisjana, K., & Koke, T. (2008). Developing students' enterprise. In Maslo, Kiegelmann, & Huber (Ed.), Qualitative Psychology in the Changing Academic Context (pp. 218-233). Tübingen, Germany: Academic Press.

Philippou, S. (2005). The problem of the European dimension in education: A principled reconstruction of the Greek Cypriot curriculum. *European Educational Research Journal*, *4*(4), 343–367. doi:10.2304/eerj.2005.4.4.2

Portelli, J. P., & Vilbert, A. B. (2002a). A curriculum of life. *Education Canada*, *42*(2), 36–39.

Portelli, J. P., & Vilbert, A. B. (2002b). Standards, equity, and the curriculum of life. *Analytic Teaching*, *22*(1), 4–19.

Reich, K. (2005). *Systemisch-konstruktivistische pädagogik*. Weinheim: Beltz.

Vossen, G. (2009). Web 2.0: A buzzword, a serious development, just fun, or what? In J. Filipe, D. A. Marca, B. Shishkov, M. van Sinderen (Eds.), *ICE-B 2009 - Proceedings of the International Conference on e-Business*, (pp. 33-40). Milan, Italy: INSTICC Press.

Zaščerinska, J. (2009). Designing teaching/learning activities to promote e-learning. In AhrensLange (Eds.), *First Asian Conference on e-Business and Telecommunications* (pp. 22-35). Berlin, Germany: Mensch & Buch.

Zaščerinska, J. (2010a). Conditions, criteria, indicators and levels of forming communicative competence. In *Proceedings of International Scientifical Conference Society, Integration, Education of Rezekne Higher Education Institution*. Rēzekne, Latvia: Rēzeknes Augstskolas Izdevniecība.

Zaščerinska, J. (2010b). *Efficiency of English for academic purposes activity in student language education: developing the system of the external and internal perspectives.* Paper presented at the European Conference on Educational Research Education and Cultural Change. Helsinki, Finland. Retrieved December 3, 2011, from http://www.eera-ecer.eu/ecer-programmes/conference/ecer-2010/contribution/465-2/?no_cache=1&cHash=3b88f1a563

Zaščerinska, J. (2011a). Social dimension of web 3.0 in engineering education. In Bassus & Ahrens, & Lange (Eds.), *Information and Communication Technologies in Engineering and Business* (pp. 101-130). Berlin, Germany: Mensch & Buch.

Zaščerinska, J. (2011b). How to teach content: Existing concepts and prospects for development. *Changing Education in a Changing Society*, *1*, 134–149.

Zaščerinska, J., & Ahrens, A. (2011). *Components of languaging in tertiary studies*. Paper presented at the European Conference on Educational Research 2011 Urban Education. Berlin, Germany.

Zaščerinska, J., Ahrens, A., & Bassus, O. (2011). Enterprise 2.0 and 3.0 in education: Engineering and business students' view. In M. M. Cruz-Cunha, G. D. Putnik, N. Lopes, P. Gonçalves, & E. Miranda (Eds.), *Business Social Networking: Organizational, Managerial, and Technological Dimensions* (pp. 472–494). Hershey, PA: IGI Global. doi:10.4018/978-1-61350-168-9.ch025

KEY TERMS AND DEFINITIONS

Constituencies: Broad statements that describe what graduates are expected to attain within a few years of graduation.

Curriculum: A central, organizing stance (Portelli & Vilbert, 2002a, p. 39).

Effectiveness of Enterprise 2.0 Application: Educator's contribution to the student engineers' knowledge, skills and attitudes to Enterprise 2.0 application (Zaščerinska, 2011a, p. 125-126).

Enterprise 2.0: Use of Web technologies for enterprise (business) purposes.

Enterprise 3.0: An agency based on the curriculum practice (Bassus, Zaščerinska, & Ahrens, 2011, p. 84).

Experience: Knowledge, skills, and attitudes (Zaščerinska, 2010a, p. 415).

Learning Outcomes: Knowledge, skills, and attitudes.

Quality of Enterprise 2.0 Application: Improvement of students' knowledge, skills and attitudes (Zaščerinska, 2011a, p. 125).

This work was previously published in a Handbook of Research on Enterprise 2.0 edited by Maria Manuela Cruz-Cunha, Fernando Moreira, and João Varajão, pages 599-617, copyright year 2014 by Business Science Reference (an imprint of IGI Global).

Section 3
Frameworks and Methodologies

This section provides in-depth coverage of conceptual architecture frameworks to provide the reader with a comprehensive understanding of the emerging developments within the field of Curriculum Design and Classroom Management. Research fundamentals imperative to the understanding of developmental processes within Curriculum Design and Classroom Management are offered. From broad examinations to specific discussions on methodology, the research found within this section spans the discipline while offering detailed, specific discussions. From basic designs to abstract development, these chapters serve to expand the reaches of development and design technologies within the Curriculum Design and Classroom Management community. This section includes 16 contributions from researchers throughout the world on the topic of Curriculum Design and Classroom Management.

Chapter 28
Blended Course Design:
Where's the Pedagogy?

Patricia McGee
University of Texas at San Antonio, USA

ABSTRACT

Blended or hybrid course design is generally considered to involve a combination of online and classroom activities. However defining blended courses solely based on delivery mode suggests there is nothing more to a blended course than where students meet and how they use technology. Ultimately there is a risk that blended courses defined in this way will not utilize effective strategies that have proven to improve learning for students. This study investigates pedagogical strategies or designs that have reported success in higher education coursework as published in articles that address blended pedagogy. A qualitative meta-interpretive analysis identified eight themes: definitions of blended design, meetings for the learner, online priority, technology with a purpose, focused e-interactions, active learning, distribution of time, pedagogical chunking, and outliers and omissions.

INTRODUCTION

Blended or hybrid courses have been adopted by institutions of higher education as a strategy to reduce classroom use, increase learner engagement, and increase utilization of information technology (Snart, 2010). The US National Center for Academic Transformation (NCAT) set the standard for adoption of alternative course delivery models through course redesign models (see http://www.thencat.org/PlanRes/R2R_ModCrsRed.htm) yet the parameters of hybrid or blended courses are broad and the terms used interchangeably blurring the meaning. *Hybrid learning* typically refers to multiple and distinct instructional modes that combine to produce an instructional sequence. This might involve combinations of classroom lectures, online tutorials, workshops, research, etc. Such modes may be intentional or optional, selected by the learner or directed by the curriculum, and occur in multiple locations with or without the interaction of peers. *Blended learning* has come to mean a combination of face-to-face learning with technology-delivered experiences/instruction that are integrated so the learner experiences a 'blend' as opposed to isolated experiences in different modes but not connected. In this format students work in a classroom, or extend their work

DOI: 10.4018/978-1-4666-8246-7.ch028

online then return to the classroom closing a loop of interaction and learning. These experiences are 'blended' so that learning is connected and integrated by design. Hybrid courses segment learning experiences rather than integrate them as do blended courses. In this sense, hybrid courses are closer to NCAT's Supplemental Model of course design where little changes in the classroom and online experiences are extras rather than requirements.

It is the author's contention that blended courses offer an affordance not possible through classroom only, 100% online, or supplemental courses. What does a well-designed blended course look like? Do common features in blended courses exist? What is effective blended pedagogy? This study attempts to articulate those characteristics of blended courses that contribute to an effective pedagogical approach.

PEDAGOGICAL ORGANIZATION IN BLENDED COURSES

This study builds on the author's previous work regarding blended course "best" practices (McGee & Reis, 2012). Best practice guides for blended learning are readily available from different countries, various institutions, and from a variety of businesses. The term "best" implies only one way to accomplish something well, and that is not the case with blended pedagogy. Effective *practice* is a more accurate descriptor. McGee and Reis (2012) analyzed effective practices for blended course design and found while many research-based recommendations are available, there is little articulation of *pedagogical* strategies to inform course design. Without understanding the unique pedagogy of a blended courses, it is difficult to design. McGee and Reis (2012) use the following definition to better communicate the essential components of a blended design:

Blended course designs involve instructor and learners working together in mixed delivery modes, typically face-to-face and technology mediated, to accomplish learning outcomes that are pedagogically supported through assignments, activities, and assessments as appropriate for a given mode and which bridge course environments in a manner meaningful to the learner.

No clearly articulated *pedagogical* models exist to guide course design, in spite of reported success and student preference for the blended delivery mode. Picciano (2009) believes we know so little about this delivery system because there is no taxonomy or commonly accepted framework that provides a foundation for critical study. "One school's blended is another school's hybrid, or another school's mixed-mode" (p.8). The lack of a coherent framework based on effective practices contributes to the ill-defined nature of a blended course. The metaphor of hybrid car versus integrated power systems illustrates the dilemma. Turning 'on' one mode while another mode is 'off' may be efficient and effective, however, such an approach is essentially different from an approach where there is no discernable segregation between power systems. In a learning context, a hybrid approach may be effective and appropriate for some courses, but hybrid is essentially different from a blended approach.

Khan (2007) alludes to five pedagogical designs in his dimensions of the blend:

1. Blending offline and online learning;
2. Blending self-paced and live, collaborative learning;
3. Blended structured and unstructured learning;
4. Blending custom content with off-the-shelf content;
5. Blending learning, practice, and performance report (p. 7).

Each of Khan's designs offers insight into the breadth of possibilities and dilemmas when making decisions about blended course structures.

Much of the blended literature is anecdotal with a focus on instructor, program, or institutional reflections regarding the contributions/challenges of design and implementation. Research in this area concentrates on learner traits, grades, faculty/learner levels of satisfaction, and/or levels of learner engagement (see Dzuiban, Hartman, & Moskal, 2004; Nagal, 2009). There is evidence that utilizing a blended/hybrid course design impacts teaching and learning in different ways and thus offers other dimensions to the course design. As courses are re-designed so may instructors re-conceive their role and practices. Bonk and Graham (2005) propose the following categories of blends related to instructor shifts:

1. **Enabling Blends:** Enabling blends primarily focus on addressing issues of access and convenience. For example, blends that are intended to provide additional flexibility to the learners or blends that attempt to provide the same opportunities or learning experience but through a different modality;
2. **Enhancing Blends:** Enhancing blends allow for incremental changes to the pedagogy but do not radically change the way teaching and learning occurs. This can occur at both ends of the spectrum. For example, in a traditional F2F learning environment, additional resources and perhaps some supplementary materials may be included online. At the other end of the spectrum, a field-based course may allow students to interact with professionals and peers and get support online with few course meetings, but assignments and assessments remain unchanged;
3. **Transforming Blends:** Transforming blends are blends that allow for a radical transformation of the pedagogy. For example, a change from a model where learners are just receivers of information to a model where learners actively construct knowledge through dynamic interactions. These types of blends enable intellectual activity that was not practically possible without the technology. (Patel, 2006, p. 4)

An instructional integration of technology plays a key role in blended course delivery and potentially to academic success in general. Habley and McClanahan (2004) note instructional use of technology as number six of the fifteen factors contributing to student retention in general. Huang, Ma, and Zhang (2008) confirm virtual learning environments contribute to success, but they also claim the distribution of engagement and interaction improves, expands and individualizes learning. Norberg, Dzuiban, and Moskal (2011) found that geographical location does not define blended, however temporal space (Huang, Ma, & Shang, 2008) in which learners and instructor interact, creates a blended pedagogy by framing interactions in both synchronous and asynchronous settings.

The term pedagogy comes from the Greek words *paid* (child) and *agogus (leader of)*, which directly translated means *to lead the child*. Thus pedagogy is situated in guidance through direction towards a pre-determined end. Pedagogy is more commonly used in reference to the methods and practice of teaching (Oxford Dictionary). For the author, pedagogy is situated in instruction design to lead the student and therefore includes what students do in the classroom and online to facilitate learning. Understanding what learning and teaching looks like in this mode helps to clarify and provide strategies for the design of blended/hybrid courses.

Articulation of pedagogical organization varies in description (little to much detail) and scope (one course to academic programs). For example, there are high-level views focusing on a general approach to organizing the course. Chatfield (2010) found two distinct ways of organizing or layering blended courses described as *frontloading* and *backloading*. Frontloading requires students to be prepared to discuss and work through course content in face-to-face class meetings. Content is presented online. In a backloaded course, face-to-face meetings are used to introduce content and place it in context for the online work that students will complete before the next class meeting. The following examples are not exhaustive but representative of the range of pedagogical approaches in blended designs.

Some institutions approach blended organization with programmatic outcomes in mind. For example, the European Community (EC) incorporates soft skills from which both online and blended course design result in a dynamic and interactive learning environment. The EC defines soft skills as abilities to complete specific work related requirements, e.g., presentation of knowledge, effective web search, project work, teamwork, and problem solving (Kantrowitz, 2005). Each of these skills requires specific pedagogical approaches intended to assist skill acquisition through learner-driven activities. Thus, active learning is a core component in this soft skill approach with many possible variations.

Related to a skill-based approach is the Chinese instructional design model of using "knowledge points" (Wang, Novak, & Shen, 2008, p. 307), to clearly define content units or skills around which a course is designed. Unlike instructional objectives designed to articulate a demonstration of learning, knowledge points are to be remembered and recalled at any future point in time. For example, in a blended computer science course, after knowledge points have been presented in class, questions are delivered to students as a formative assessment. The instructor then provides real world problems related to knowledge points and students discuss through SMS. Therefore, this approach assists students' learning through iterative practice across learning environments to reinforce core learning.

Knowledge priorities are used as the focus of a game-based learning approach illustrated by Shang, Jong, Lee, and Lee (2008). In this strategy game-based learning is combined with traditional learning in three phases where the student proceeds through the following sequence:

Phase 1: Preliminary acquisition of some high-level knowledge in specific subject domains through teacher scaffolding;

Phase 2: Active participation as game characters participate in a virtual interactive environment to construct knowledge and skills through their near real-life game-play experiences;

Phase 3: Reflection and generalization of game-based learning through teachers' debriefing. Students write a reflection after every experience and each group submits a debriefing report (p. 348).

Starting in the classroom allows priorities to be set and the instructor to present core content and explain processes. The online activities of phases two and three are active and applied. Phase three brings learning full circle by connecting what they learned didactically to their virtual experience. Such an organization is somewhat formulaic while allowing modifications across level of course and discipline.

A community of practice (CoP) approach frames some models and can be illustrated by the Guangdong Radio and TV University (GDRTVU) offering online and blended instruction for 89 schools in the region (Le, 2008). GDRTVU describes blended learning as: "a combination of multiple elements including the learner's characters, delivery ways, learning theories, technologies, and other educational resources" (p. 295). Designers modify course organization based on what is known about their learners through a character system that analyzes "physiology, psychology, sociology, geography, ICT infrastructure, eLearning skill, learning behavior, learning favor, motive and wish, and the view on [open and distance learning] and learning materials" (p. 297). A CoP approach focuses on the nature of each group of learners that changes every time the course is offered. Learning materials are made available for self-directed learning: problem-based, context-based, or case-based. Some of these learning experiences are institutionally designed self-test exercises, and some are from the Internet. Thus, virtual communities of practice are formed with participation from teachers, instructional designers, technicians, tutors, and learners and utilize the following strategies to facilitate interaction:

1. Finding protagonists;
2. Encouraging all learners to participate interaction by formative assessment;
3. Making quick responses to learners;
4. Talking between teacher and learner equally;
5. Designing value discussion topic from their work experiences;
6. Trying problem-based group collaborative learning (p. 300).

While the aforementioned high-level approaches to pedagogy are not exhaustive, they do illustrate emerging design models being used to examine effective strategies. In a separate analysis being conducted at the same time as this study, the author has identified 17 models of blended learning indicating approaches to blended learning are as diverse as classroom-based instruction (Beatty, 2005, Carmen, 2002; Chan, Lam, Yang, Mark, & Leung, 2010; Chen, 2007; Garrison & Vaughn, 2008; Chew, Jones, & Turner, 2008; Huang, Ma, Zhang, 2008; Kerres & Witt, 2003; Lee & Dashew, 2011; Littlejohn & Pegler, 2007; Martyn, 2002; Norberg, Dziuban, & Moskal, 2011; Picciano, 2009; Salmon, 2004; Sankey, 2010; University of Wolverhampton, n.d.; Valiathan, 2002; Wong, 2008; Yukawa, 2010). Thus with so much potential variation, looking broadly across reports of blended pedagogy offers an opportunity to look for patterns from practice, rather than generic pedagogical models that may come solely from classroom or 100% online course models.

METHOD

This study investigates pedagogical strategies or designs reporting success in higher education coursework as published in articles about blended and hybrid pedagogy. Specifically the research identified pedagogical patterns among blended course designs. A meta-interpretive analysis (Weed, 2005) design was used to analyze patterns across literature. This approach is used when there is little or no basis for excluding data, when "meaning in context" can reveal insights, interpretation is the basis of understanding, and when iteration drives the analysis process. Because reports of blended course design are widespread (across disciplines, journals, and contexts) and methodology is varied (both quantitative and qualitative), with little specificity regarding pedagogy, quantitative meta-analysis is not possible. Also, it was difficult to predict what patterns could be expected, except from effective practices guides (McGee & Reis, 2012.) Therefore, the author entered into the research with the following inclusion criteria; reference to the pedagogical design and higher education courses at any level.

For this study *pedagogy* includes the intentional design of instruction informing what students do to learn, tools used to support learning, and activities facilitating learning. An initial review of literature indicated the study of pedagogical designs was not a research focus across cases. Much literature focuses on one or more of the following: satisfaction of the learner (Moskal, Dzuiban, & Hartman, 2010; Partridge, Ponting, & McKay, 2011; Precel, Eshet-Alkalai, & Alberton, 2009; Olapiriyakul & Scher, 2006), learner achievement through learning styles (Choi, Lee, & Kang, 2009), technology fit for delivery mode (Lidstone, & Shield, 2010) or a specific instructional strategy, such as discussion (Hwang & Arbaugh, 2009).

In order to broaden the base of pedagogical strategies used in blended courses, non-research literature was included. Identification of target literature from publications in both subscription-based and open journals was conducted using literature search tools including ProQuest™, ERIC™, and the Directory of Open Access Journals (DOAJ). Inclusion criterion was as follows: higher education only, any discipline, research-based, non-research reporting results, and non-research reporting pedagogy. By the end of the study, the collection of literature consisted of 74 articles: 48 undergraduate levels, 23 graduate level, and three with a focus on faculty development reporting pedagogical course designs. Institutional teams, non-academic units, academic units, and individual faculty members authored the articles. Because authorship may relate to instructional priority the author did not filter in order to determine if themes persisted regardless of lens or institutional role.

Literature collection was ongoing and reported practices were analyzed using a constant comparison method to identify similarities across reports (Patton, 1990.) Initially the author wrote general descriptions of pedagogy: what the learner did, what tools were used, and what activities were implemented. From these general descriptions, categories were determined, described, and finally labeled with a descriptive title describing the nature of the practice. While there are many reports of blended pedagogy across disciplines, the point of saturation was eventually reached when no new practices emerged from newly identified articles and at this point no further articles were collected.

Once categories were clearly described and the narrative written, the author reviewed and revised in order to reduce repetition and clarify findings for the sake of consistency, discrepancy, or omission. The findings are filtered through the author's work situated primarily in instructional design. Thus, the interpretation of pedagogical reports is focused on design rather than instruction, technological management, or learner perspectives.

FINDINGS

Findings of this study indicate blended pedagogy has breadth and variation, as well as consistent patterns. It is important to note while the reported themes overlap the subtleties among categories of findings are important in capturing blended pedagogy. For example, students working in teams may be doing so to debate, inquire, create a product or develop a project. Each of the pedagogical strategies may or may not take place in class or online. The reasons for implementing a strategy in one mode or the other can provide insight. Themes indicate what is present but also what is absent in reports. Why certain information is not reported cannot be known. However, the identification of patterns indicate what is important to instructors and thus a priority in the design of blended courses. Themes include: definitions of blended design, meetings for the learner, online priority, technology with a purpose, focused e-interactions, active learning, distribution of time, pedagogical chunking, and outliers and omissions.

DEFINITIONS

Even though it was clear that reports were about blended courses, many authors omitted a definition of blended; 30 of the 74 articles included no definition. Those authors stating definitions varied. Given the variability of definitions in effective practices (MacDonald, 2008; McGee & Reis, 2012) and across sectors (Khan, 2007) omitting a definition brings into question what exactly is being described. As noted in this paper, percentages of time segments in the classroom or online mode are often used to frame blended but they do not explain how differently courses are designed. Therefore a definition helps to clarify what a blended course is and is not.

Most included a standard definition of combined classroom and online interactions (Aitken, 2011; Amaral & Shank, 2010; Banerjee, 2011; Bergtrom, 2011; Bluic, Ellis, Goodyear, & Piggott, 2011; Boyd, 2008; Choi, Lee, & Kang, 2009; Clayton, Blumberg & Auld, 2010; Dawson, 2010; Gerbic, 2009; Lopez-Perez, Perez-Lopez, & Rodriguez-Ariza, 2010; Liu, Don, Chung, Lin, Chen & Liu, 2010; Huang & Arbaugh, 2006; Skibba, 2006; Olapiriyakul, & Sher, 2006; Precel, Eshet-Alkalai, & Alberton, 2009; Vaughn & Garrison, 2005). Several authors articulated *pedagogical* definitions: Adventure Learning (Doering, Miller & Vletsianos, 2008), Carpe Diem Intervention, Active/Participative Learning and Individualization (Armellini & Aiyegbayo, 2010; Huang, Ma, & Zhang, 2008). One definition was contextual referring to blended learning in a virtual world environment (Dreher, Reiners, Dreher & Dreher, 2009).

The focus on geographical location (classroom vs. online) may limit pedagogical designs not contingent upon space or the learner's needs. Little attention was given to what happens in the classroom and its function in a blended course. A clear and coherent definition of blended must be provided to all involved in blended initiatives. Having consensus about what is meant provides parameters for both the instructor and the learner. Just as students know what internships, laboratories, and practicums involve, so should they recognize what blended means to be best prepared to be successful in both meeting modes.

MEETINGS FOR THE LEARNER

Meeting in the classroom has been a hallmark of the blended delivery mode; regardless of the definition or function, face-to-face interactions are core to the delivery model. However there are limited and mixed reports of what actually occurs in the classroom so the findings in this area are mostly general in nature. More information about what happens in the different modes is described in how courses are chunked, a separate theme.

Many advocate *no* content delivery (such as lecture) should occur in class meetings (Bergtrom, 2011) and while this is suggested by blended effective practices (McGee & Reis, 2012), some reported value for classroom-delivered content. When lectures did occur in the classroom they were offered in response to confusion or misunderstanding (Amaral & Shank, 2010), as a strategy for presenting a case (Hwang & Arbaugh, 2009), or as an introduction to content recorded and then uploaded for online access (Aitken, 2011; Behnke, 2012). Instructor scaffolding was offered as a tactic for presenting new content in the classroom using strategies such as demonstrations (Banerjee, 2011; Behnke, 2012) and guided listening (Hartwell & Barkley, 2010).

More frequently classroom activities were reported to support the learner. These tactics allowed the instructor to answer questions and clarify understanding (Choi, Lee, & Kang, 2009; Gau, 2012; Lopez-Perez, Perez-Lopez, & Rodriguez-Ariza; Ruey, 2010; Precel, Eshet-Alkalai, & Alberton, 2009; Skibba, 2006; Stricker, Weibel, & Wissmath, 2011). Others reported more generic strategies to clarify understanding such as office hours (Banerjee, 2011) and just-in-need discussions (Amaral & Shank, 2010; Behnke, 2012; Carvalho, Lustigova, & Lustig, 2009; O'Byrne, 2011). Classroom sessions also required students to direct clarification through peer-led groups (Amaral & Shank, 2010), peer instruction and questioning (Amaral & Shank, 2010; Behnke, 2012; Hartwell & Barkley, 2010; Laumakis, 2010), and collaborative work on increasingly difficult problems (Liu, et al., 2010).

For a few, classroom meetings were offered as an opportunity for re-connecting with classmates (Geer, 2009; Nguyen, 2011) because a blended environment may lack social presence (Jusoff & Khodabandelous, 2009; Sitter, Carter, Mahan, Massello, & Carter, 2009; Sorden, 2011). Social presence contributes to learning in online environments (Sung & Mayer, 2012) in knowledge sharing (Cross, 2006) and knowledge construction. Other than how content is delivered in lectures, demonstrations or structured listening, blended classroom pedagogy is vague and ill articulated. The focus in the classroom appears to be on management. However, without detailed reports of classroom activities it is not possible to draw conclusions, only pose suppositions. If classroom time is primarily spent clarifying content, directions, or course organization, the connections between the online and classroom environments will not be clear. If content is presented online but classroom time is spent reviewing or clarifying content, it may be the online component is not sufficient to support knowledge acquisition. Finally, what occurs in the class may indicate learner preparedness. Students who understand the dynamics of a blended course can actively participate without extensive instructor prompting or guidance. Those unprepared students may struggle with one or more elements of the course: the course design, independent work, or self-regulation to be prepared for both meeting modes (Holder, 2007; Park & Choi, 2009; Street, 2010; Tyler-Smith, 2006). Xu and Jaggers (2013) found that specific populations struggle to succeed in an online environment: those with lower grade point averages, Black students, younger students, and males in general. The online component may be the most challenging for blended students and from all reports it is a priority for blended course design.

ONLINE PRIORITY

Almost exclusively, reports of blended pedagogy focus on online activities and interactions. Four applications for online activities were prevalent: processing content, discussing, working in groups or collaborating, and completing assessments.

Specific strategies supported student processing content online: reading discussions, presentations (e.g. narrated Power Point™), assignments, and/or quizzes (Amarel & Shank, 2010; Bay & Smith; Banerjee, 2011; Behnke, 2012; Bergson, 2011; Carvalho & Lustigova & Lustig, 2009; Condi & Kay, 2007; Dukes, Moorland, & Scott, 2009; Ernst, 2008; Fulkerth, 2009; Gau, 2012' Geer, 2009; Glazer, 2012; Laumakis, 2010; Lee & Dashew, 2011; Lopez-Perez, Perez-Lopez, & Rodriguez-Ariza; Olapiriyaku & Sher, 2006; Muianga, 2005; Precel, Eshet-Alkalai, Alberton, 2009; Ruey, 2010; Sitter, et al., 2009; Skibba, 2006; Stricker, Weibel, & Wissmath, 2011; Nguyen, 2011; O'Byrne, 2011). Quizzes tended to be offered *for learning* to reinforce reading and provide the learner feedback about their understanding rather than as an assessment *of learning*.

Discussions were the most commonly reported online activity (Bai & Smith, 2010; Bluic, Ellis, Goodyear & Piggott, 2011; Lynch, 2010; Nguyen, 2011; Precel, Eshet-Alkalai, Alberton, 2009; Skibba, 2006; Vaughn & Garrison, 2005). Discussions primarily served as a strategy to reinforce reading assignments, however a few used discussions for teamwork, content clarification, and communication (Gau, 2012; Glazer, 2012; Loureiro-Koechli & Allen, 2010). Discussions were also used to provoke or support deeper understanding through questioning and problem solving (Liu, et al., 2010; Lovell & Vignare, 2009; Sitter, et al., 2009; Skibba, 2006).

Online group and collaborative projects were also referenced as a way for students to connect and produce products over time and outside the classroom (Armellini & Alyegbayo, 2010; Doering, Miller, & Vletsianos, 2008; Hartwell & Barkley, 2010; Liu, Don, Chung, Lin, Chen, & Liu, 2010; Lynch, 2010; Ruey, 2010) extending the face-to-face meetings to the online environment.

While effective practices recommend that assessments occur online (McGee & Reis, 2012), there was little reference to assessment location, however effective practices suggest low stakes assessments supported learning (Behnke, 2012; Bergtrom, 2011; Condie & Kay, 2007; Gau, 2012; Sitter, et al, 2009). For example, Behnke (2012) used assessment primarily to reinforce content; assessments were open book and open friend as students were encouraged to collaborate. As a strategy to prevent cheating, tests were typically set up to randomly order questions, so each student, even if collaborating, would have different answer choices. Test items often referenced source of answer (notes, presentations, readings, etc.). Gua (2012) described an assessment blueprint identifying what course content was assessed formatively and summatively as an indication to students of both function and importance of assessment.

Online activities and requirements focus on supporting the learner to process content through reading, presentations, and interaction between students. Such an approach, for most instructors, requires a course re-design from classroom-based presentation of content. Possibly, the online component is the most challenging to design and implement, and perhaps is the most daunting for those instructors for whom blended learning is a new experience. Processing content and interacting online requires students capable of working independently, have supports available to them when they need them, and technology systems to support the delivery of content and interaction between peers. However, if putting content online is limited to posting streaming lectures and setting up student-led discussions and projects, the blend is not complete. Assumptions that technology will take care of students when they are online suggest a hybrid approach rather than a blended one. In the hybrid approach connectivity with course members and course processes are turned on and off depending on the delivery mode. In a blended approach, students are experiencing the affordance of the technologies and meeting modes.

TECHNOLOGY WITH A PURPOSE

There were distinct references to the *function* of the technology to support course delivery and learning in the *online* environment with little to no reference about technology use in the classroom. Technology references indicate that it is axiomatic to the online experience in ways that were pedagogically articulated.

Technology tools, both within a course management system and through the use of external tools (e.g., phone, texting, Skype™, etc.), were a primary medium for communicating between students (Chen, 2007; Dawson, 2010; Geer, 2009; Glazer, 2012; Heckman & Annabi, 2006; Inoue, 2010; Lee & Dashew, 2011; Liu, Don, Chung, Lin, Chen, & Liu, 2010; Loureiro-Koechlin & Allen, 2010; O'Byrne, 2011; Precel, Eshet-Alkalai, Alberton, 2009; Ruey, 2010). The value of communication through technology suggests work is going on between class sessions and students accept this mode of communication, not relying on face-to-face meetings as the primary form of interaction with peers or instructor. In this way technology most likely serves as a bridge between environments.

Technology was also used to disseminate content produced by the instructor or external sources (Anderson & May, 2010; Carvalho & Lustigova & Lustig, 2009; Condie & Kay, 2007; Doering, Miller, & Vletsianos, 2008; Dukes, Koorland & Scott, 2009; Ernst, 2008; Fulkerth, 2009; Hartwell & Barkley, 2010; Laumakis, 2010: Liu, et al., 2010; Olapiriyaku & Sher, 2006). Some courses integrated technology to include student produced content, such as podcasts, wikis, and blogs (Fulkerth, 2009; Lin & Kelsey, 2010; Lopez-Perez, Perez-Lopez, & Rodriguez-Ariza, 2011; O'Bryne, 2011; Precel, Eshet-Alkalai, & Alberton, 2009; Sitter, et al., 2009).

Collaborative/group/team work was also supported in online environments (Banerjee, 2010; Doering, Miller, & Vletsianos, 2008; Dukes, Koorland, & Scott, 2009; Engstrom, 2010; Geer, 2009; Glazer, 2012; Lin & Kelsey, 2010; Liu, et al., 2010; O'Byrne, 2011; Precel, Eshet-Alkalai, & Alberton, 2009; Ruey, 2010; Skibba, 2006; Stricker, Weibel & Wissmath, 2011). In some instances students worked online to complete work, while in other situations students used technology to organize their ideas, create presentations, or collect and share references.

Finally, technology was used to support student *practice* of their learning in a variety of ways. Individual students may practice through simulations, quizzes, tutorials or games (Bai & Smith, 2010; Chen, 2007; Nguyen, 2011; Stricker, Weibel, & Wissmath, 2011). Practice may also take the form of collaborative and open exchanges as described in Ng'ambi & Brown's (2009) *Dynamic FAQ* tool. This tool is an anonymous web-based program and mobile SMS phone system through which students can consult with each other and the lecturer as they have questions or needs. Students can also search the system for answers, schedule a concept lecture or an assessed tutorial. Such a strategy provides flexibility and support as the student needs it rather than waiting for a face-to-face or online meeting.

Just having technology present does not ensure it can or will support learning. Our increasing understanding of how technology can be aligned with learning theory informs us about the function of tools, and how best to integrate them in the classroom, online, or on the go as learners have access anywhere and anytime (Olofsson & Lindberg, 2012). For the blended learner technology supports connectivity to others, access to resources, and participative activities not unlike a 100% online course. In blended courses technology is used as a support for accomplishing a specific outcome rather than engagement or social presence alone. Technology is aligned with a specific pedagogical function and thus, perhaps, is utilized more effectively and meaningfully than in courses where technology use is ancillary to course outcomes or processes. Such relevant and focused interactions are more likely to keep students engaged.

FOCUSED E-INTERACTIONS

Reports indicate blended course interactions occurring online are specific and relate to course objectives. These findings overlap those of the previous theme, however they are distinct because the intentional use of technology is described in relationship to the overall pedagogical design through specific strategies. Discussions are uniformly the most used strategy for online interactions, followed by purposeful peer-to-peer interaction.

Discussions are the most referenced form of online interaction in blended courses in effective practice guides (McGee & Reis, 2012). In this study, discussions were used for clear purposes: to build deeper comprehension of course content (Bluic, Ellis, Goodyear, & Piggott, 2011; Chen, 2007; Gau, 2012; Geer, 2009; Skibba, 2006), encourage open and critical discussion (Chen, 2007; Heckman & Annabi, 2006); and to bridge class meetings with a relevant activity (Carvalho & Lustigova, & Lustig, 2009; Condie & Kay, 2007; Engstrom, 2010; Hwang & Arbaugh, 2009; Inoue, 2010; Lidstone & Shield, 2010; Ruey, 2010; Skibba, 2006; Stricker, Weibel, & Wissmath, 2011). Discussion focus was on learner-to-learner interactions with little reference to the instructor's participation indicating learners are active and responsible for making sense of their own knowledge acquisition.

Online discussion was also used to allow students to scaffold and peer tutor each other. Group or team work was often situated in discussions, either as a strategy to support group work, or as a way to help students learn from each other (Armellini & Aly-egbayo; Behnke, 2012; Dreher, Reiners, Dreher, & Dreher, 2009; Behnke, 2012; Dukes, Koorland, & Scott, 2009; Gau, 2012; Lidstone & Shield, 2010; Liu, Don, Chung, Lin, Chen, & Liu, 2010; Muianga, 2005; Nguyen, 2011; Skibba, 2006; Stricker, Weibel & Wissmath, 2011). Such approaches enabled learner autonomy (in decision-making through contributions) and self-awareness (as their ideas are put in context with the ideas of their peers) while diminishing a feeling of aloneness that may occur when students are physically separated.

Peer-to-peer interaction was another type of interaction providing feedback to learners and helping to clarify understanding through strategies such as critiques, dyads, and study teams or groups (Carvalho & Lustigova & Lustig, 2009; Chen, 2007; Dukes, Koorland, & Scott, 2009; Engstrom, 2010; Geer, 2009; Lee & Dashew, 2011; Lin & Kelsey, 2010; Loureiro-Koechlin & Allen, 2010; Ng'ambi & Brown, 2009; O'Byrne, 2011; Ruey, 2010; Vat, 2010). Peer-to-peer interaction facilitated social presence and active learning through repeated and ongoing exchanges reinforced through classroom meetings.

The function of interaction in online learning environments has been well documented. Moore (1993) proposed that interaction impacts transactional distance between learners and instructor thereby reducing the effect of distance created by not meeting face-to-face. More recently, evidence indicates interaction provides a variety of benefits to the learner:

1. Some research indicates students learn better when they 'do' as opposed to 'receive' content. In this sense the learner is interacting with the *content* or acquiring knowledge through a *process*;
2. Interaction can decrease the sense of isolation students may experience when working out of the classroom;
3. Interaction *can* facilitate *divergent* thinking. However, if not carefully framed interaction may not support *convergent* thinking. In other words, students may get lost in too much information not consolidated or synthesized;
4. There is evidence social presence supports learning and interaction increases social presence (Swan, 2004).

In a blended course it may be crucial to maintain social presence through interaction, not just to personalize the instructor but also to connect learners across meeting modes, In this study, online interactions were purposeful and focused, but they did rely heavily on text-based interactions – there was little reference to non-text based tools, such as video-conferencing or concept mapping, for the purpose of learning. There is some evidence that seeing the person to whom you are communicating lessons transactional distance and reinforces community and presence (Kim, Kwang, & Cho, 2011). For example, the use of avatars has increased levels of trust and intimacy in online collaborations (Bente, Ruggenberg, Kramer, & Eschenburg, 2008). Students most likely use highly interactive tools (such as FaceTime™, Facebook, or Skype™) without the instructor's knowledge, thereby establishing a community relying on a much richer environment afforded by asynchronous text. These kinds of environments are much more likely to support active learning.

ACTIVE LEARNING

The reviewed literature indicated a clear use of active learning strategies either informing the overall course design or directing short-term activities. Active learning is situated in the idea that students are more likely to learn when they are aware of their *existing knowledge*, and when they are conscious of what they do *not* know (Bransford, Brown & Cocking, 2000). The use of metacognitive strategies allows students to reflect upon their developing knowledge and to monitor their own learning. Blended learning is well situated to support active learning because students are engaged both in and outside of the classroom requiring some degree of self-sufficiency and decision-making.

Most of the strategies reported were ones familiar in face-to-face classes however a blended design provides more options for active learning because students work independently or with others to direct the learning process, or complete projects outside of the classroom (Lynch, 2010). Group work was typically described as collaborative learning (Banerjee, 2011; Chen, 2007; Hartwell & Barkley, 2010; Liu & Tortellon, 2011; Liu, et al., 2010; O'Byrne, 2011; Stricker, Weibel & Wissmath, 2011). Collaborative learning requires individual team members to work independently to complete one piece of a larger project, which, when combined create a complete project. There were two strategies employed for collaborative work. First, students worked completely online to develop their component of a project, and then presented it in the classroom setting. Second, students organized in the classroom setting and finalized their part in the online environment. In either case, students worked independently of the instructor's close monitoring and managed their own schedule and activities.

Common to the campus classroom, debates, cases, and projects differed slightly in blended courses. Debates provided an opportunity for students to prepare online - individually or as a team - and then conduct the debate in a face-to-face meeting (Carvalho & Lustigova & Lustig, 2009; Gerbic, 2009; Yukawa, 2010). For some, face-to-face meetings were also used for planning, consultation with the instructor, or rehearsal. Cases were used in the classroom and online to allow students to discuss and interact as they put forth their solutions (Choi, Lee, & Kang, 2009; Glazer, 2012; Liu & Tortellon, 2011; Precel, Eshet-Alkalai, Alberton, 2009; Skibba, 2006). Projects were often used as a longer assignment in which students worked outside of class, typically coming to class for instructor support, discussions, or work sessions (Behnke, 2012; Hartwell & Barkley, 2010; Dreher, Reiners, Dreher, & Dreher, 2009; Olapiriyaku & Sher, 2006; Ruey, 2010).

Inquiry (Banerjee, 2011; Chen, 2007; Geer, 2009; Ruey, 2010; Sitter, Carter, Mahan, Massello, & Carter, 2009; Vat, 2010) and discovery learning (Inoue, 2010; Liu, Don, Chung, Lin, Chen, & Liu, 2010) were strategies for student investigations. While inquiry and discovery learning have common roots in science education they differ pedagogically. Discovery learning was originally conceptualized by Bruner (1961) as an approach to teaching in which the learner learns by doing, specifically through problem solving. For example, the blended CELL (Contributing, Exchanging, and Linking for Learning) project (Liu, et al., 2010) utilized software that recorded individual and group web-based inquiries via mobile (out of class) and shared display (in class) supporting discovery learning (Inoue, 2010). Adventure–based learning builds on discovery learning through active participation of the learner in authentic activities as they assume real world roles and access authentic tools and materials (Doering, Miller, & Veletsianos, 2008). Inquiry learning is more focused on students answering questions, either provided to them by instructors or posed by peers. In a blended context, students might be given questions to answer online, then return to class to synthesize or present findings or clear up confusing aspects of what they have learned. A combination of inquiry and discovery is evident in the Acquisition Model + Participation Model. In this approach students were given more responsibility for their learning with a high level of participation, communication, and interaction with peers (particularly in the online mode) and for monitoring their learning (Bergtrom, 2011; Dreher, Reiners, Dreher, & Dreher, 2009; Hwang & Arbaugh, 2009; Inoue, 2010; Lidstone & Shield, 2010; Muianga, 2005; O'Byrne, 2011).

Active learning engages and places responsibility on the learner within a well-defined pedagogical framework. The shift toward student ownership and self-direction indicate blended learning is learner-centered and focused on deeper learning (Carmean & Haefner, 2002). The emphasis on active learning suggests students are self-regulated, disciplined, and motivated to work independently and with limited direction from the instructor. Designing a course for active learning requires careful preparation, directions, and supports for students who may not have the experience to participate in ways expected of them. In blended courses, the use of active learning may also relate to how class meetings are structured and how frequently they occur.

DISTRIBUTION OF TIME

Many definitions of blended course delivery are in part defined by the amount of time students spend in the classroom and online, however, as indicated in this study, there is a wide range of reported distribution of classroom and online activities. Brown (2001) found blended courses ranged from between 90–10% and 10–90% distributions of face-to-face and online sessions. Allen, Seaman and Garrett (2007) suggest a range from 30% to 79% in either online or face-to-face modes. Given such variations, it is not clear if time distribution is critical to a blended course.

The most frequently reported distribution was 50% online and 50% in the classroom, or meeting in person once a week (Carvalho & Lustigova & Lustig, 2009; Choi, Lee, & Kang, 2009; Ernst, 2008; Fulkerth, 2009; Gau, 2012; Hwang & Arbaugh, 2009; Hwang & Arbaugh, 2009; Laumakis, 2010; Lopez-Perez, Perez-Lopez, & Rodriguez-Ariza, 2011; Sitter, et al., 2009; Skibba, 2006). A slight variation was reported as 35% classroom, 65% online (Inoue, 2010).

A few designs utilized flexible attendance in which students had a choice about whether to attend the face-to-face meetings. Such an arrangement is articulated in the Hyflex model (Beatty, 2010) where students make choices about where and how to interact and participate (Dreher, Reiners, Dreher, & Dreher, 2009). Typically those who used flexible attendance had students who were participating outside the local area and would never be able to attend a face-to-face meeting (Lidstone & Shield, 2010; Muianga, 2005; Precel, Eshet-Alkalai, Alberton, 2009). Even more flexible designs allowed students to proceed through online modules in any order at their own pace as they completed content. For example, Harwell and Barkley (2012) conferred points to students as they proceeded through course objectives. If students could adequately complete assessments they were allowed to skip modules. In this flexible model students chose to attend or not to attend face-to-face sessions or to work in teams. Student choice also was indicated in community of practice approaches allowing students to make decisions about amount and purpose of interaction, attendance requirements, and the process of negotiating understanding (Lidstone & Shield, 2010; Liu & Tortellon, 2011).

Other time distributions were related to the needs of the course rather than a structured schedule. Gua (2012) offered 15 scheduled meetings per semester in six lecture groups students elected to attend. Students were exposed to course content at different times but in smaller groups creating greater intimacy and convenience. Skibba (2006) utilized a varied approach with some concentrated sessions shifting to online or non-regular meetings based on class needs and consensus. The least reported classroom meeting strategies were those where classes only met three times of the semester: at the beginning, middle, and end (Ruey, 2010; Nguyen, 2011).

Reasons for frequency or schedule of meetings were not clearly articulated. It may be classroom availability, scheduling of meeting spaces, or policies regarding faculty contact with students impacted when and how frequently meetings were scheduled. Not understanding schedules may distort pedagogical designs. If institutions require instructors meet once a week then pedagogical requirements would work around meeting requirements and possibly contrive the reasoning for a class meeting. It is the author's belief that course content, student need and pedagogy should inform when and how students meet.

PEDAGOGICAL CHUNKING

A distinctive feature of blended courses is how they are organized into segments providing a form of pedagogical structure. The concept of chunking originated with George Miller's (1956) principle of the human ability to process 7+2 pieces of new information. Miller's work led to cognitive load research particularly relevant to designing instruction in general but specifically to blended course design because blended courses are segmented into well-articulated parts eventually related to each other. Chunking is evident in the concept of layering or how course components relate to each other.

Layering is discussed in different ways, however generally layers address what Derntl and Motschnig-Pitrik (2004) describe as the structural (where learning occurs and how it is connected) and dynamical dimensions (the shift on the focus on technology to learning which occurs over time) of blended learning. Derntl and Motschnig-Pitrik's Blended Learning Systems Structure (BLESS) provides a technical model to inform the layering process:

Layer 1: This layer focuses on what the learner 'sees' as they approach a *blended course* in their person-centered way of participating in educational activities. In this layer the prior knowledge and expectations are key in considering how the course is presented to the learner;

Layer 2: Derntl and Motschnig-Pitrik argue for providing clearly articulated *course scenarios* which conceptually model and visualize course content as a step toward helping students recognize course patterns, ultimately creating a course schema;

Layer 3: Layer three requires intentional and direct communication of *blended learning patterns* guided by humanistic education principles. This layer supports transparency, self-direction and peer learning through discussions, sharing content, face-to-face brainstorming, etc. These are learning processes utilized in blended courses;

Layer 4: *Web templates* are the focus of this layer as they organize content and interaction operating through the CMS and allowing course patterns to be viewed from three perspectives: participant, administrative, report. This layer does not necessarily or directly relate to pedagogy, although depending on the course content it could. For example, a course designed around research might use a process template for proposals, data collection, data analysis, drafts, and final reports. Essentially this layer builds data collection strategies into the course through which progress can be monitored and tracked;

Layer 5: The *learning platform* is layer 5. Each CMS has certain functions, elements and operational requirements determining how things work (such as discussion participation) and how they can be accessed (through the templates in Layer 4).

In Derntl and Motschnig-Pitrik's model, pedagogy is suggested but not articulated. Pedagogical layering is more straightforward and provides a broad framework for understanding the unique character of blended courses in which what the learner does must be considered in both *where they are* and *what is required* in order for learning to occur. Glazer (2010) illustrates layering in the following way:

Part 1: *Introduce case* (e.g., five roles and five teams not assigned a role) and basic concepts (covered in class);

Part 2: *Elaborate on core content.* The instructor provides an opportunity for investigation (e.g., online in private group discussions);

Part 3: *Mediate conflicts of investigation*. The instructor provides ways for students to consider areas of disagreement (e.g., role play in class but prepare online).

At the highest level, the notion of layering illustrates a general approach to chunking in which content review and rehearsal precedes face-to-face interaction (Aycock, 2012; Ernst, 2008; Gau, 2012; Glazer, 2012; Skibba, 2006). Such content review might include virtual labs, streaming lecture/podcasts, reading, and formative assessments such as quizzes over content covered. Such a strategy in itself places the responsibility on the learner to be prepared for class meetings. A new schema of how learning works is created for the learner who, in other courses, might expect the instructor covers all content in the classroom.

Even though layering occurs in different ways by different instructors, pedagogical templates can provide the basic components for a design. All of the following templates articulate location and sequence of learner activity, reflecting the active learning nature of the blended delivery model, and emphasizing learner-centeredness. Some layering approaches are general, allowing much interpretation and variability. Fulkerth (2009) focuses on the blend in thinking about how to transition between the classroom and online activities in bridging activities. He illustrates what bridging activities should accomplish in the following list:

1. **Revisit Past Learning:** The instructor reviews and reinforces what students have already learned;
2. **Integrate Current Learning Through Multiple Processes:** e.g., analysis, interpretation, translation for classmates, creating transparency;
3. **Foreshadow What Comes Next:** The instructor reviews upcoming content, thoughtful reading and summary, aimed at student and self-learning (p. 52).

Many layering techniques are specific to the discipline and clearly structured to support pattern recognition of course structure. For example, Glazer's (2012) sees three components in her courses reflecting the applied and practical nature of education:

Part 1: Introduction of a relevant case (for example, five roles replicated in each of five teams) and basic concepts are presented in class;

Part 2: Elaboration on core content with an opportunity for further investigation occurring online in private team discussions;

Part 3: In class, the instructor facilitates mediation of conflicts possible among and across team investigations. Role-play is also conducted in class, but preparation occurs online.

Ernst (2008) presents a coherent and patterned structure of his blended technology course in which students advance lockstep through a repeated sequence of events, activities, assignments and assessments:

1. Students viewed weekly online video lectures (narrated PowerPoint™);
2. After viewing video, students posed questions about the content to a discussion area;
3. After viewing the online lecture students were prompted to complete a hybrid online survey to monitor the course itself;
4. The instructor conducted weekly laboratories in part to clarify any misunderstanding and provide hands-on experience.

Other formulas focus on discrete components of the learning process – what the learner does to take in content, how they practice, and how they conclude an instructional sequence. All of these include content review with some form of active processing: watch case, write reports, access primary data (Choi, Lee, & Kang, 2009); view online lecture once a week, attend teacher directed lab once a week (Ernst, 2008); view weekly online video lecture and submit questions online through forum then meet in a class lab to clarify questions (Lopez-Perez, Perez-Lopez, & Rodriguez-Ariza, 2011); read online with weekly online and classroom discussions (Nguyen, 2011); complete teamwork online, post response to topic every three weeks and present findings in class (Geer, 2009); and, examine related websites in class, complete online learning activity, and debrief and review in class (e.g. prepare a defense, critique, etc.) (Aycock, 2012).

The amount of detail, or lack of detail, regarding pedagogical chunking raises questions about the true meaning of blended course design. In this study, online activities appear to be rich and used to support learning in a meaningful way. However, it is not clear that more value is placed on one setting or the other. In *pedagogical* chunking a relationship between the online component and the face-to-face component is evident. However, in general, more emphasis is placed on what happens online. Focusing on the online component suggests what happens in the classroom is less of a priority and is not pivotal to the learning experience. For example, Hwang and Arbaugh (2009) make it clear what happens in each location:

1. **Face-to-Face Class:** The instructor introduces the topic for the week with a short lecture and then poses questions or a short case for students to apply the taught concepts;
2. **Online:** The class is carried online in a discussion where the instructor poses questions to which students respond and work with each other in clarifying each other's discussion posts.

While illustrating pedagogical chunking, Hwang and Arbaugh's description could be interpreted as web facilitated (Allen, Seaman, & Garrett, 2007) if the authors had not claimed a blended format. Pedagogical chunking makes clearer what students are doing in both modes and how the modes are connected to support student learning.

Overall, the chunking of activities between and across modes provides unity to the course and, as often noted, releases the instructor from lecturing (Geer, 2009; Aycock, 2012). Cognitive load theory indicates learners have limited cognitive capacity during learning (Sweller, 1994). Chunking content in ways relating to existing schema and providing support for adding to or creating new schema can support learning (Sweller, Marienboer, & Paas, 1998). Sweller (1994) argues *extraneous* cognitive load distracts the learner and diminishes learning while *germane* cognitive load support schema construction. Poorly designed instruction triggers extraneous cognitive load. Thus strategies that "chunk" or layer the course in a meaningful, coherent, and consistent way are more likely to support learning while creating a 'schema' for the blended course framework. While blended courses are not layered in the same way, it is possible providing clarity, repetition, or relevance in course organization is key to making the learner's cognitive load manageable. Most important is the blend itself – pedagogical chunking has the potential to make the connections between activities meaningful and relevant in equally important ways. The range of strategies summarized here is not without exceptions, however, which may indicate potential hidden advantages or disadvantageous omissions.

OUTLIERS AND OMISSIONS

The previously reported themes suggest variations in blended course design, but there are some areas that, while not common, stand out as not following the mainstream. It also should be noted what is omitted or overlooked in reports of blended course pedagogy may be just as important as that which is described.

Assessment was superficially addressed, or not at all, in the studies analyzed. An exception was Behnke (2012) who clearly stated where and what kind of assessments were used; high stakes tests (midterm and final) occurred in class. McGee and Reis (2012) found that effective practices also downplay the placement of assessment and do not clarify how blended assessments differ from classroom or online course assessments. With an emphasis on active learning it maybe that blended courses offer more performance assessments evaluated in benchmarks rather than high stakes objective tests. Or it may be that assessments are directly translated from the face-to-face course into the blended course with little or no transformation and thus not included in reports about blended pedagogy. Effective practice guides emphasize alignment (Snart, 2010) between objectives, activities, assignments and assessments yet the literature examined did not reveal an alignment process.

While there is evidence to suggest that utilizing a blended course design shifts the nature of the course as well as the role of the instructor, this was not the case in all reports. There was one report of classroom *content* presentations by instructor (Olapiriyaku & Sher, 2006). Skibba (2006) expressed that the online component was an extension of what occurs in the face-to-face meetings, suggesting that what happens in the classroom is what was most important and perhaps better reflecting a supplemental design in which online activities supplement the face-to-face meetings.

Because most literature reports focused on online interactions, yet reported meetings in regular classrooms, it is not clear how the blend between the classroom and online environments works in general. Reports describe what happens in both modes but little is offered in expressing the blend between them. It may be what is overlooked in reports of blended pedagogy is the iteration over time as the traditional course is phased into a truly blended one. Bergtrom (2011) illustrates this process (Figure 1) as each offering of the course increasingly shifts content online.

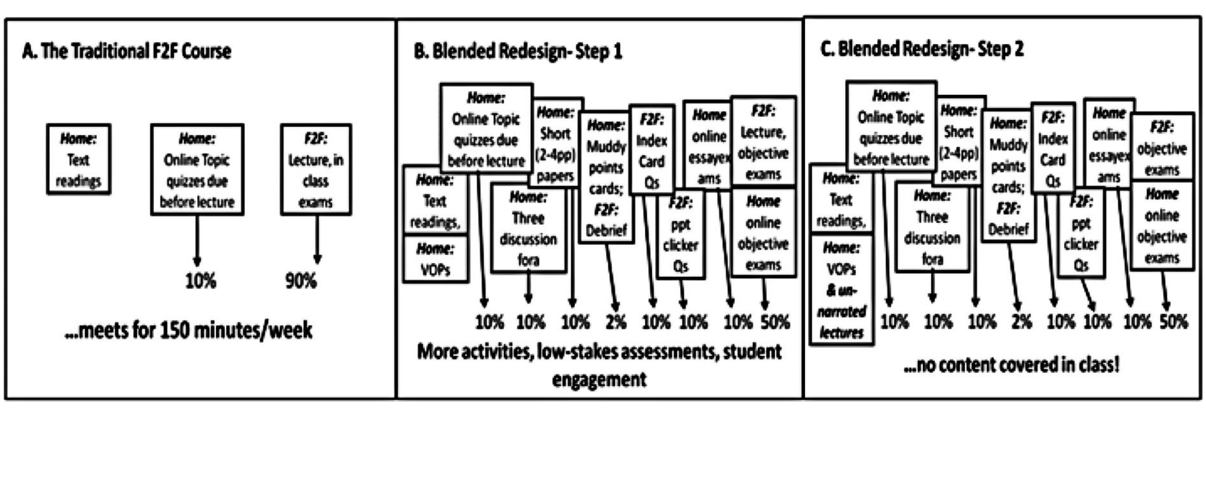
Published literature may report the first, third, fifth or other iteration of a blended course thereby presenting a different stage in a course's evolution towards a full blend. What may not be presented in blended literature is the evolution of a blended course, verifying Bonk and Graham's (2005) concept of the transformative blend that radically changes an instructor's pedagogy.

CONCLUSION

This study was conducted in order to identify characteristics of successful blended courses. Findings indicate that blended courses rely on technology for purposeful interactions, utilize a coherent course organization (indicated by pedagogical chunking), and are learner-centered as they actively engage the learner. The findings reflect principles of sound instructional design and for the most part mirror blended effective practices. Questions remain about what is not reported in the literature that may impact on the potential success of blended courses.

Interactions within a blended or hybrid course are typically technology-mediated or facilitated, with classroom sessions optionally scheduled to provide intensive work sessions. The emphasis on online interactions implies students know what to expect or are prepared

Figure 1. Shifting from F2F to blended course redesign (Bergtrom, 2011)



to interact in ways possibly not experienced in a traditional web facilitated or face-to-face course. Readiness is surely core to student success in technology rich courses and successful strategies for understanding student skills will be a useful contribution to designing successful courses.

Course organization appears to be somewhat formulaic if not tightly structured around pre-ordained schedules. Findings from this study indicate activity and/or location is the primary driver to organization. However, effective practices indicate objectives should drive how the course is blended (McGee & Reis, 2012), see Table 1. The commonly reported 50% in class and 50% online meeting distribution typically enacted as meeting once a week makes a true blend somewhat questionable and more akin to a web facilitated course in which online activities supplement classroom activities. Layering strategies make the blend more coherent by illustrating what students do when and where as relates to an overall course experience. More examples and rationales for how and why blended courses work across locations will reveal principles to guide the design of a course that is truly blended.

This study is limited because in order to identify sufficient pedagogical descriptions the author put few limits on the published literature from multiple disciplines using varied research methods (if at all) with different research questions. While this high level analysis is informative, it does not reveal deeper patterns possibly impacting pedagogical designs. For example, any of the following may impact pedagogical designs: institutional support of learner preparedness, instructor years of experience in course design or teaching, utilization of university supports, Carnegie classification (reflecting mission and priorities), and institutional policies (with requirements for interaction, assessment, class meetings, or class size). Additionally, because most reports represented disciplinary perspectives there may exist patterns within a subject area. It is not clear how instructors made decisions based on their *content* knowledge, knowledge of *pedagogy* or e*xperience* with technology (Mishra & Koehler, 2008).

Table 1. Disconnect between recommended practices and reported pedagogy

Effective Practices Recommendations (McGee & Reis, 2012)	Pedagogical Patterns
Focus on objectives to determine the blend	Focus on activity and location to determine the blend
Integration between F2F and online	Report online, F2F is a valued requirement
Varied interactivity	Pedagogical template vs. routine activity
Varied assessment	Emphasis on formative assessment

The use of technology in a face-to-face, blended, or 100% online requires different ways of conceptualizing activities and assignments within the constraints of the delivery mode, hopefully building upon the affordances of technology to best support content learning. But more is required of the instructor who designs and implements a blended course. For those faculty members who have once taught in face-to-face classrooms, shifting to a blended approach surely initiates pedagogical transformation in part through the reliance upon technology.

As reports of blended/hybrid pedagogy continued to be published articulated patterns must be captured in order to best understand how and why blended course design can be successful and allow a cohesive pedagogical model to be developed. It would be most useful if researchers and reporters answered the following questions:

1. What about the course content made it a good fit for blended delivery?
2. How were the classroom and online activities connected?
3. What determined what occurred in the classroom and what occurred online?

4. To what extent were learners prepared to participate in a blended course?
5. In what ways did the course and instructor behaviors change in the shift from classroom to blended?
6. What, if any, iterations occur contribute to a well-crafted blended course?

REFERENCES

Aitken, J. E. (2011). Blended learning for adaptation to needs. In F. U., Wang, J. Fong, & R. C. Kwan (Eds.) Handbook of research on hybrid learning models: Advanced tools, technologies, and applications (pp. 76-89). Hershey, PA: Information Science Reference.

Allen, I. E., Seaman, J., & Garrett, R. (2007). *Blending in: The extent and promise of blended education in the United States*. Retrieved June 28, 2012 from http://sloanconsortium.org/publications/survey/pdf/Blending_In.pdf.

Amaral, K. E., & Shank, J. D. (2010). Enhancing student learning and retention with blended learning class guides. *EDUCAUSE Quarterly, 33*(4). Retrieved on January 4, 2012 from http://www.educause.edu/ero/article/enhancing-student-learning-and-retention-blended-learning-class-guides

Anderson, K., & May, F. A. (2010). Does the method of instruction matter? An experimental examination of information literacy instruction in the online, blended, and face-to-face classrooms. *Journal of Academic Librarianship*, *36*(6), 495–500. doi:10.1016/j.acalib.2010.08.005

Armellini, A., & Aiyegbayo, O. (2010). Learning design and assessment with e-tivities. *British Journal of Educational Technology*, *41*(6), 922–935. doi:10.1111/j.1467-8535.2009.01013.x

Aycock, A. (2012). Teaching a survey course in anthropology. In F. S. Glazer (Ed.), *Blended learning: Across the disciplines, across the academy* (pp. 59–86). Sterling, VA: Stylus Publishing, LLC.

Bai, X., & Smith, M. B. (2010). Promoting hybrid learning through a shareable eLearning approach. *Journal of Asynchronous Learning Networks*, *14*(3).

Banerjee, G. B. (2011). Blended environments: Learning effectiveness and student satisfaction at a small college in transition. *Journal of Asynchronous Learning Networks*, *15*(1), 8–14.

Beatty, B. J. (2010). *Hybrid courses with flexible participation - the Hyflex design*. Retrieved on June 29, 2012 from http://itec.sfsu.edu/hyflex/hyflex_course_design_theory_2.2.pdf

Behnke, C. (2012). Blended learning in the culinary arts. In F. S. Glazer (Ed.), *Blended learning: Across the disciplines, across the academy* (pp. 13–30). Sterling, VA: Stylus Publishing, LLC.

Bente, G., Rüggenberg, S., Krämer, N. C., & Eschenburg, F. (2008). Avatar-mediated networking: Increasing social presence and interpersonal trust in net-based collaborations. *Human Communication Research*, *34*(2), 287–318. doi:10.1111/j.1468-2958.2008.00322.x

Bergtrom, G. (2011). Content vs. learning: An old dichotomy in science courses. *Journal of Asynchronous Learning Networks*, *15*(1), 33–44.

Bluic, A. M., Ellis, R. A., Goodyear, P., & Piggott, L. (2011). A blended learning approach to teaching foreign policy: Student experiences of learning through face-to-face and online discussion and their relationship to academic performance. *Computers & Education*, *56*(3), 556–864.

Boyd, P. W. (2008). Analyzing students' perceptions of their learning in online and hybrid first-year composition courses. *Computers and Composition*, *25*(2), 224–243. doi:10.1016/j.compcom.2008.01.002

Bransford, J. D., Brown, A. L., & Cocking, R. R. (2000). *How people learn: Brain, mind, experience, and school*. Washington, DC: National Academy Press.

Brown, D. (2001). Hybrid courses are best. *Syllabus, 75*(22). Retrieved June 29, 2012, from http://campustechnology.com/articles/2001/07/hybrid-courses-are-best.aspx?sc_lang=en.

Carmean, C., & Haefner, J. (2002). Mind over matter: Transforming course management systems into effective learning environments. *EDCAUSE Review, 37*(6). Retrieved from http://www.educause.eduirlibrarypdfERM0261.pdf

Carvalho, A. A., Lustigova, Z., & Lustig, F. (2009). Integrating new technologies into blended learning environments. In E. Stacey & P. Gerbic (Eds.), *Effective blended learning practices: Evidence-based perspectives in ICT-facilitated education* (pp. 73–104). Hershey, PA: Information Science Reference. doi:10.4018/978-1-60566-296-1.ch005

Center for Applied Special Technology (CAST). (2011). *Universal design for learning guidelines version 2.0.* Wakefield, MA: National Center on Universal Design for Learning. Retrieved April 13, 2012, from http://www.udlcenter.org/sites/udlcenter.org/files/UDL_Guidelines_Version_2.0_(Final)_3.doc

Chatfield, K. (2010). Content "loading' in hybrid/blended learning. *Sloan-C Effective Practice*. Retrieved May 12, 2012 from http://sloanconsortium.org/effective_practices/content-quotloadingquot-hybridblended-learning

Chen, S. J. (2007). Instructional design strategies for intensive online courses: An objectivist-constructivist blended approach. *Journal of Interactive Online Learning*, *6*(1), 72–86.

Choi, I., Lee, S. J., & Kang, J. (2009). Implementing a case-based e-learning environment in a lecture-oriented anesthesiology class: Do learning styles matter in complex problem solving over time? *British Journal of Educational Technology*, *40*(5), 933–947. doi:10.1111/j.1467-8535.2008.00884.x

Clayton, K., Blumberg, F., & Auld, D. P. (2010). The relationship between motivation, learning strategies and choice of environment whether traditional or including an online component. *British Journal of Educational Technology*, *41*(3), 349–364. doi:10.1111/j.1467-8535.2009.00993.x

Condie, R., & Kay, L. (2007). Blending online learning with traditional approaches: Changing practices. *British Journal of Educational Technology*, *38*(2), 337–348. doi:10.1111/j.1467-8535.2006.00630.x

Dawson, S. (2010). 'Seeing' the learning community: An exploration of the development of a resource for monitoring online student networking. *British Journal of Educational Technology*, *41*(5), 736–752. doi:10.1111/j.1467-8535.2009.00970.x

Derntl, M., & Motschnig-Pitrik, R. (2004, June 30-July 2). BLESS - A layered blended learning systems structure. In *Proceedings of the 4th International Conference on Knowledge Management*, Graz, Austria.

Doering, A., Miller, C., & Veletsianos, G. (2008). Adventure learning: Educational, social, and technological affordances for collaborative hybrid distance education. *Quarterly Review of Distance Education*, *9*(3), 249–265.

Dreher, C., Reiners, T., Dreher, N., & Dreher, H. (2009). Virtual worlds as a context suited for information systems education: Discussion of pedagogical experience and curriculum design with reference to Second Life. *Journal of Information Systems Education*, *20*(2), 211–224.

Dukes, L. L., Koorland, M. A., & Scott, S. S. (2009). Making blended instruction better: Integrating the principles of universal design for instruction into course design and delivery. *Action in Teacher Education*, *31*(1), 38–48. doi:10.1080/01626620.2009.10463509

Engstrom, R. (2010). Integrating classroom and online instruction in an introductory American government course. In Y. Inoue (Ed.), *Cases on online and blended learning technologies in higher education: Concepts and practices* (pp. 283–295). Hershey, PA: Information Science Publications.

Ernst, J. V. (2008). A comparison of traditional and hybrid online instructional presentation in communication technology. *Journal of Technology Education*, *19*(2), 40–49.

Fulkerth, R. (2009). A case study from Golden Gate University using course objectives to facilitate blended learning in shortened courses. *Journal of Asynchronous Learning Networks*, *13*(1), 43–54.

Garrison, D. R., & Vaughan, N. (2008). *Blended learning in higher education: Framework, principles, and guidelines*. San Francisco, CA: Jossey-Bass.

Gau, T. M. (2012). Combining tradition with technology. In F. S. Glazer (Ed.), *Blended learning: Across the disciplines, across the academy* (pp. 87–114). Sterling, VA: Stylus Publishing, LLC.

Geer, R. (2009). Strategies for blended learning in teacher education. In E. Stacey & P. Gerbic (Eds.), *Effective blended learning practices: Evidence-based perspectives in ICT-facilitated education* (pp. 39–61). Hershey, PA: Information Science Reference. doi:10.4018/978-1-60566-296-1.ch003

Gerbic, P. (2009). Including online discussions within campus-based students' learning environments. In E. Stacey & P. Gerbic (Eds.), *Effective blended learning practices: Evidence-based perspectives in ICT-facilitated education* (pp. 21–38). Hershey, PA: Information Science Reference. doi:10.4018/978-1-60566-296-1.ch002

Glazer, F. S. (2012). Baby steps to blended: Introduction of a blended unit to a conventional course. In F. S. Glazer (Ed.), *Blended learning: Across the disciplines, across the academy* (pp. 31–58). Sterling, VA: Stylus Publishing, LLC.

Habley, W. R., & McClanahan, R. (2004). *What works in student retention?* Iowa City, IA: American College Testing Service. Retrieved February 28, 2011, from http://www.act.org/path/postsec/droptables/index.html

Hartwell, R., & Barkley, E. F. (2012). Blended, with a twist. In F. S. Glazer (Ed.), *Blended learning: Across the disciplines, across the academy* (pp. 115–126). Sterling, VA: Stylus Publishing, LLC.

Heckman, R., & Annabi, H. (2006). Cultivating voluntary online learning communities in blended environments. *Journal of Asynchronous Learning Networks*, *10*(4), 51–66.

Huang, R., Ma, D., & Zhang, H. (2008). Towards a design theory of blended learning curriculum. In J. Fong, R. Kwan, & F. L. Wang (Eds.), *Hybrid learning and education* (pp. 67–78). doi:10.1007/978-3-540-85170-7_6

Hwang, A., & Arbaugh, J. B. (2009). Seeking feedback in blended learning: competitive versus cooperative student attitudes and their links to learning outcome. *Journal of Computer Assisted Learning*, *25*, 280–29. doi:10.1111/j.1365-2729.2009.00311.x

Inoue, Y. (2010). Reflections: Two years after implementing a blended educational research course. In Y. Inoue (Ed.), Cases on online and blended learning technologies in higher education: Concepts and practices (145-164). Hershey, PA: Information Science Publications.

Jusoff, K., & Khodabandelou, R. (2009). Preliminary study on the role of social presence in blended learning. *International Education Studies*, *2*(4), 79–83. doi:10.5539/ies.v2n4p79

Khan, B. (2007). Flexible learning in an open and distributed environment. In B. Khan (Ed.), *Flexible learning in an information society* (pp. 1–17). Hershey, PA: Information Science Publishing.

Kim, J., Kwon, Y., & Cho, D. (2011). Investigating factors that influence social presence and learning outcomes in distance higher education. *Computers & Education*, *57*(2), 1512–1520. doi:10.1016/j.compedu.2011.02.005

Laumakis, M. A. (2010). Blended learning in large-enrollment courses. *EDUCAUSE Learning Initiative.* Retrieved December 3, 2011, from http://www.educause.edu/Resources/BlendedLearninginLargeEnrollme/213766

Le, J. (2008). The strategy and practice of blended learning in open and distance learning experiences from GDRTVU. In J. Fong, R. Kwan, & F. L. Wang (Eds.), *Hybrid learning and education* (pp. 294–303). doi:10.1007/978-3-540-85170-7_26

Lee, R. A., & Dashew, B. (2011). Designed learner interactions in blended course delivery. *Journal of Asynchronous Learning Networks*, *15*(1), 69–76.

Lidstone, J., & Shield, P. (2010). Virtual reality of virtually real: Blended teaching and learning in a master's level research methods class. In Y. Inoue (Ed.), Cases on online and blended learning technologies in higher education: Concepts and practices (91-111). Hershey, PA: Information Science Publications.

Lin, H., & Kelsey, K. D. (2010). A case of using wikis to foster collaborative learning: Pedagogical potential and recommendations. In Y. Inoue (Ed.), *Cases on online and blended learning technologies in higher education: Concepts and practices* (pp. 167–182). Hershey, PA: Information Science Publications.

Liu, C. C., Don, P. H., Chung, C. W., Lin, S.-J., Chen, G.-D., & Liu, B.-J. (2010). Contributing, exchanging and linking for learning: Supporting web co-discovery in one-to-one environments. *Journal of Educational Technology & Society*, *13*(4), 126–139.

Liu, Y. H., & Tortellon, M. (2011). Blending at small colleges: Challenges and solutions. *Journal of Asynchronous Learning Networks*, *15*(1), 58–67.

Lopez-Perez, M. V., Perez-Lopez, M. C., & Rodriguez-Ariza, L. (2011). Blended learning in higher education: Students' perceptions and their relation to outcomes. *Computers & Education*, *56*(3), 818–826. doi:10.1016/j.compedu.2010.10.023

Loureiro-Koechlin, C., & Allen, B. (2010). Time, space and structure in an e-learning and e-mentoring project. *British Journal of Educational Technology*, *41*(5), 721–735. doi:10.1111/j.1467-8535.2009.00975.x

Lovell, K., & Vignare, K. (2009). MSU Medical colleges blended learning for first year science courses: Uniting pedagogy to maximize experience and real world limitations. *Journal of Asynchronous Learning Networks*, *13*(1), 55–63.

Lynch, D. J. (2010). Application of online discussion and cooperative learning strategies to online and blended college courses. *College Student Journal*, *44*(3), 777–784.

Macdonald, J. (2008). *Blended learning and online tutoring. Planning learner support and activity design* (2nd ed.). Aldershot, UK: Gower.

McGee, P., & Reis, A. (2012). Blended course design: A synthesis of best practices. *Journal of Asynchronous Learning Networks*, *16*(4). Retrieved from http://jaln.sloanconsortium.org/index.php/jaln/article/view/239

Miller, G. A. (1956). The magical number seven, plus or minus two: Some limits on our capacity for processing information. *Psychological Review*, *101*(2), 343–352. doi:10.1037/0033-295X.101.2.343 PMID:8022966

Mishra, P., & Koehler, M. J. (2006). Technological pedagogical content knowledge: A framework for teacher knowledge. *Teachers College Record*, *108*(6), 1017–1054. doi:10.1111/j.1467-9620.2006.00684.x

Moore, M. G. (1993). Theory of transactional distance. In D. Keegan (Ed.), *Theoretical principles of distance education* (pp. 22–38). New York, NY: Routledge.

Moskal, P. D., Dziuban, C., & Hartman, J. (2010). Online learning: A transforming environment for adults in higher education. In T. Kidd (Ed.), *Online education and adult learning: New frontiers for teaching practices* (pp. 54–68). Hershey, PA: IGI Global.

Muianga, X. (2005). Blended online and face-to-face learning: A pilot project in the faculty of education, Eduardo Mondlane University. *International Journal of Education and Development Using Information and Communication Technology*, *1*(2), 130–144.

Ng'ambi, D., & Brown, I. (2009). Intended and unintended consequences of student use of an online questioning environment. *British Journal of Educational Technology*, *40*(2), 316–328. doi:10.1111/j.1467-8535.2008.00899.x

Nguyen, T. T. (2011). Knowledge acquisition in a hybrid graduate teacher training program. In F. U. Wang, J. Fong, & R. C. Kwan (Eds.), *Handbook of research on hybrid learning models: Advanced tools, technologies, and applications* (pp. 317–326). Hershey, PA: Information Science Reference.

Norberg, A., Dziuban, C. D., & Moskal, P. D. (2011). A time-based blended learning model. *Horizon*, *19*(3), 207–216. doi:10.1108/10748121111163913

O'Byrne, B. (2011). Pedagogy reconsidered in a multimodal blended environment. In F. U. Wang, J. Fong, & R. C. Kwan (Eds.), *Handbook of research on hybrid learning models: Advanced tools, technologies, and applications* (pp. 299–316). Hershey, PA: Information Science Reference.

Olapiriyakul, K., & Scher, J. M. (2006). A guide to establishing hybrid learning courses: Employing information technology to create a new learning experience, and a case study. *The Internet and Higher Education*, *9*(4), 287–301. doi:10.1016/j.iheduc.2006.08.001

Olofsson, A. D., & Lindberg, J. O. (Eds.). (2012). *Informed design of educational technologies in higher education: Enhanced teaching and learning*. Hershey, PA: Information Science Reference.

Park, J. H., & Choi, H. J. (2009). Factors influencing adult learners' decision to drop out or persist in online learning. *Journal of Educational Technology & Society*, *12*(4), 207–217.

Partridge, H., Ponting, D., & McCay, M. (2011). *Good practice report: Blended learning*. Australian Learning and Teaching Council. Retrieved February 22, 2012, from http://eprints.qut.edu.au/47566/

Patel, R. (2006). *A white paper: Blended learning*. Retrieved from http://www2.rmcil.edu/learning-curve/other/blended_learning_patel.doc

Patton, M. Q. (1990). *Qualitative evaluation and research methods* (2nd ed.). Newbury Park, CA: Sage.

Picciano, A. (2009). Blending with purpose: The multimodal model. *Journal of Asynchronous Learning Networks*, *13*(1), 7–18.

Precel, K., Eshet-Alkalai, Y., & Alberton, Y. (2009). Pedagogical and design aspects of a blended learning course. *International Review of Research in Open and Distance Learning*, *10*(2), 1–16.

Ruey, S. (2010). A case study of constructivist instructional strategies for adult online learning. *British Journal of Educational Technology*, *41*(5), 706–720. doi:10.1111/j.1467-8535.2009.00965.x

Shang, J. L., Jong, M. S., Lee, F. L., & Man Lee, J. H. (2008). VISOLE: An example of hybrid learning. In R. Kwan & F. L. Wang (Eds.), *Hybrid learning and education* (pp. 348–358). doi:10.1007/978-3-540-85170-7_31

Sitter, V., Carter, C., Mahan, R., Massello, C., & Carter, T. (2009). *Hybrid course design: Faculty and student perception*. The Association Supporting Computer Users in Education 2009 conference Proceedings. Myrtle Beach, South Carolina. Retrieved April 7, 2012, from http://www.ascue.org/files/proceedings/2009/p40.pdf

Skibba, K. A. (2006, March). A cross-case analysis of how faculty connect learning in a hybrid courses. In *Proceedings of 47th Annual Adult Education Research Conference*. Minneapolis, MN: University of Minnesota.

Snart, J. A. (2010). *Hybrid learning: The perils and promise of blending online and face-to-face instruction in higher education*. Santa Barbara, CA: Praeger.

Sorden, S. D. (2011). *Relationships among collaborative learning, social presence and student satisfaction in a blended learning environment*. Retrieved July 29, 2012, from http://search.proquest.com/docview/918227102?accountid=12528

Street, H. (2010). Factors influencing a learner's decision to drop-out or persist in higher education distance learning. *Online Journal of Distance Learning Administration, 8*(10). Retrieved June 21, 2012, from http://www.westga.edu/~distance/ojdla/winter134/street134.html

Stricker, D., Weibel, D., & Wissmath, B. (2011). Efficient learning using a virtual learning environment in a university class. *Computers & Education*, *56*(2), 495–504. doi:10.1016/j.compedu.2010.09.012

Sung, E., & Mayer, R. E. (2012). Five facets of social presence in online distance education. *Computers in Human Behavior*, *28*(5), 1738–1747. doi:10.1016/j.chb.2012.04.014

Swan, K. (2004). *Interactions relationships between interactions and learning in online environments.* Sloan-C. Retrieved October 30, 2008, from http://www.sloan-c.org/publications/books/interactions.pdf

Sweller, J. (1994). Cognitive load theory, learning difficulty, and instructional design. *Learning and Instruction*, *4*(4), 295–312. doi:10.1016/0959-4752(94)90003-5

Sweller, J., van Merrienboer, J., & Paas, F. (1998). Cognitive architecture and instructional design. *Educational Psychology Review*, *10*(3), 251–296. doi:10.1023/A:1022193728205

Tyler-Smith, K. (2006). Early attrition among first time eLearners: A review of factors that contribute to drop-out, withdrawal and non-completion rates of adult learners undertaking eLearning programmes. MERLOT *Journal of Learning and Teaching, 2*(2). Retrieved June 20, 2012, from http://jolt.merlot.org/vol2no2/tyler-smith.htm

Vat, K. H. (2010). Virtual organizing professional learning communities though a servant-leader model of appreciative coaching. In Y. Inoue (Ed.), *Cases on online and blended learning technologies in higher education: Concepts and practices* (pp. 183–207). Hershey, PA: Information Science Publications.

Vaughan, N., & Garrison, D. R. (2005). Creating cognitive presence in a blended faculty development community. *The Internet and Higher Education*, *8*(1), 1–12. doi:10.1016/j.iheduc.2004.11.001

Wang, M., Novak, D., & Shen, R. (2008). Assessing the effectiveness of mobile learning in larger hybrid/blended classrooms. In J. Fong, R. Kwan, & F. L. Wang (Eds.), *Hybrid learning and education* (pp. 304–315). doi:10.1007/978-3-540-85170-7_27

Weed, M. (2005). “Meta-interpretation”: A method for interpretive synthesis of qualitative research. *Forum: Qualitative Social Research, 6*(1). Retrieved December 27, 2011, from http://www.qualitative-research.net/index.php/fqs/article/viewArticle/508/1096

Wong, A. T. T. (2008). 5i: A design framework for hybrid learning. In J. Fong, R. Kwan, & F. L. Wang (Eds.), *Hybrid learning and education* (pp. 147–156). doi:10.1007/978-3-540-85170-7_13

Xu, D., & Jaggers, S. S. (2013). *Adaptability to online learning: Differences across types of students and academic subject areas.* Community College Research Center (CCRC) Working Paper No. 54. Columbia Teachers College. Retrieved February 22, 2013, from http://ccrc.tc.columbia.edu/publications/adaptability-to-online-learning.html

Yukawa, J. (2010). Communities of practice for blended learning: Toward an integrated model for LIS education. *Journal of Education for Library and Information Science*, *51*(2), 54–75.

This work was previously published in the International Journal of Mobile and Blended Learning (IJMBL), 6(1); edited by David Parsons, pages 33-55, copyright year 2014 by IGI Publishing (an imprint of IGI Global).

Chapter 29
A Teaching Model for the College Algebra Flipped Classroom

Lori Ogden
West Virginia University, USA

Laura J. Pyzdrowski
West Virginia University, USA

Neal Shambaugh
West Virginia University, USA

ABSTRACT

A flipped classroom teaching approach has been used in the teaching of college algebra within a broader initiative for mathematics learning. The flipped classroom approach documented in this chapter utilizes multiple teaching strategies to enhance student learning. From the pilot teaching of two semesters of college algebra, a teaching model was developed using the Joyce, Weil, and Calhoun (2009) framework. The purpose of this study and chapter is to describe the design and development of the flipped classroom teaching model in terms of the design decisions, model implementation, and model evaluation over the two semesters. Student survey responses and interview results suggest that this teaching model improved student perceptions of learning college algebra. Findings reported in this study document the use of the model, while future iterations of the design and development cycle (Richey & Klein, 2007) are necessary to understand the impact of the flipped classroom model on student learning.

INTRODUCTION

According to Haver (2007), the percentage of students withdrawing or earning grades of a "D" or "F" in college algebra courses nationally is more than 45%. One explanation from Harver is that most college algebra classes focus exclusively on algebraic manipulation skills and spend little time if any on applying these skills outside the classroom. Researchers have identified factors that may contribute to high failure rates in entry-level undergraduate mathematics courses, including a

DOI: 10.4018/978-1-4666-8246-7.ch029

student's background knowledge, self-efficacy, perception of the usefulness of mathematics, and motivation (Cardetti & McKenna, 2011; Hall & Ponton, 2005; Thomas & Higbee, 1999). College algebra is often referred to as a "gateway course," one that students must pass before they are allowed to enroll in other courses. Undoubtedly, passing or failing college algebra influences a student's career choices and a student's career trajectory. Changes must be made in the delivery of college algebra in an effort to enhance a student's self-efficacy, motivation, and perception of mathematics, ultimately leading to a rise in student performance.

Bandura (1997) defined self-efficacy as the personal belief in one's ability to be successful at specific tasks or to achieve a specific goal and that an individual relates their self-efficacy to past experiences. For example, in an academic context the nature of a student's experience in a high school mathematics class, positive or negative, might impact how that student feels about his ability to succeed in a mathematics course in college. Hall and Ponton (2005) found that when a student related academic achievement to their personal capability and exerted effort, their mathematics self-efficacy increased.

The National Council of Teachers of Mathematics (NCTM, 2000) associated effective teachers of mathematics with a strong commitment to their students as learners of mathematics and their capability of using a variety of pedagogical and assessment strategies. NCTM (2000) further acknowledged that "students will be served well by school mathematics programs that enhance their natural desire to understand" (p. 21). Ideally, students enter school with knowledge from their cumulative past experiences, both personally and academically, so teachers must design instruction that elicits a student's need to further his understanding and deepen his existing knowledge (Garrison, 2010). Since students' self-efficacy, past experiences, and needs and desires are different from those of their peers, mathematics educators must use a variety of instructional strategies to engage students, elicit their natural desire to learn, and to reinforce the notion that their learning is possible. Walter and Hart (2009) conducted a teaching experiment where students were invited to work together on tasks that were carefully designed to elicit a mathematical need and found that a conceptually-driven classroom elicits a student's intellectual passion and motivates the student to learn, again reinforcing the idea that teaching strategies can impact students' perceptions of learning.

A pedagogical approach called flipping the classroom could provide instructors of college algebra an opportunity to address the factors that may contribute to high failure rates in entry level undergraduate mathematics courses; specifically, self-efficacy, perception of the usefulness of mathematics, and motivation. The subsequent sections of this chapter will describe the design, implementation, and evaluation of a flipped classroom teaching model used to teach undergraduate students college algebra at a land-grant university in the eastern United States.

BACKGROUND

Teaching Context

Innovative teaching in college algebra has been an ongoing aim at a land-grant university in the eastern United States, and the flipped classroom framework is one step in the continuum of ongoing improvement. One of the goals of the department of mathematics is to incorporate online learning components into entry-level mathematics courses. The department now has an 80-seat and a 120-seat instructional computer laboratory, which enables targeted courses such as college algebra to have dedicated weekly seat-time for all enrolled students. In a given fall semester, there are approximately 1500 on-campus students enrolled in college algebra. The undergraduate mathematics courses share an overarching goal of improving student learning, conceptual understanding, and abilities to apply mathematics to solve problems via the use of technology. In addition to meeting multiple times a week for a lecture, college algebra students make use of online, interactive applet computer laboratories, which focus on conceptual understanding, problem solving, and the application of mathematics, as well as online homework assignments for skill acquisition. Faculty members are also charged with conducting research to support change in instruction, curriculum development, and assessment. This project has led instructors to implement a flipped classroom framework to determine its effects on students' self-efficacy, understanding, and performance in college algebra.

The flipped classroom approach has been used in classrooms on a number of college campuses over the last several years; however, there may be some confusion as to what a flipped classroom approach is and what it is not. For example, Lage, Platt, and Treglia (2000) implemented what they called an inverted classroom approach in an undergraduate economics course. In their model, students were asked to read about an assigned topic before class. Videos were made available outside class for students to view in two different formats, while face-to-face class time was used for "hands on" experiments. They found that students generally preferred the inverted classroom to a traditional lecture. One student said, "I learned more than I ever thought I would in a new, creative, and inspiring way" (Lage et al., 2000, p. 35). Videos were not made mandatory for students, but preparing for the face-to-face class via reading the text was. A flipped classroom approach to teaching is not just the implementation of instructional videos but a pedagogical design that replaces what typically takes place during a face-to-face lecture (passive transfer of knowledge) with engaging activities and assigns the lecture as homework for students to complete autonomously outside of class. However, the mere implementation of instructional videos, albeit effective, does not imply a classroom flip. Videos can be produced for a myriad of reasons including remediation, review, homework solutions, or supplemental lectures (Azedevo, 2012, Green, Pinder-Grover, & Millunchick, 2012, Rose, 2009, Toto & Nguyen, 2009). Green et al. (2012) successfully implemented screencasts into their introductory engineering class, but not in the form of what is traditionally known as a flipped classroom approach. Two types of screencasts were made available to students, optional videos that provided homework solutions and optional videos that provided mini-lectures. Although students who watched the videos found them to be helpful, the researchers did not indicate that videos were used to replace a traditional form of instruction. A flipped classroom approach uses video to bring engaging activities into the classroom without losing the necessary lecture component of the course. The flipped classroom approach can help instructors provide their students with a solid knowledge base through at-home instruction and an opportunity to apply that knowledge in engaging classroom activities.

Pedagogy: Framing the Flipped Classroom Teaching Model

Although the idea behind the flipped classroom is not new, there are few formal and comprehensive studies focused on this pedagogy. Preliminary results from a number of studies have indicated positive results. For example, instructors at one university chose to implement pre-existing video lectures into one of their engineering courses. After watching videos at home, students were expected to apply the knowledge gained from the videos by participating in discussions and activities in class. Preliminary data indicated that students in the flipped classroom outperformed their traditionally taught peers on the midterm exam (Azedevo, 2012). Another variation of the flipped classroom was piloted in a junior level engineering course at another university. Unlike the previous approach, instructors at this university authored their own videos. Although a similar classroom format was followed, student feedback regarding the teaching approach indicated that students felt the video lectures were effective in teaching them the material, but that the classroom activities were disorganized and caused some to students fall off task (Toto & Nguyen, 2009). The student feedback suggested that simply implementing video lectures outside of class is not enough to impact student learning. What replaces the lecture during face-to-face class time is integral to the success of the flipped classroom teaching approach. The flipped classroom can take many different forms and can be modified to meet the specific needs of students.

Flipping the classroom can provide an opportunity for teachers to design a classroom environment that addresses students who may be averse to learning mathematics. Stage and Kinzie (2009) suggested that reform efforts are never a universal fix and cautioned "reform must be tailored to individual classes and be consonant with the instructors' strengths and subject matter and students' needs" (p. 103). In essence, the flipped classroom approach is a teaching approach that uses multiple teaching strategies to enhance student learning, but like any other approach must be carefully studied over time to reach its full potential.

The Flipped Classroom Teaching Model

The use of the flipped classroom teaching strategy would benefit from being situated within a formal teaching model to provide an explicit description of the full range of procedures and conditions needed to successfully implement the model, teaching decisions, and results of using the model. The flipped classroom approach was documented as an integrated teaching model, acknowledging multiple teaching approaches, including in-class cooperative learning, mentored laboratory activities, and online teaching videos (see Figure 1).

The integrative model was documented using the Joyce, Weil, and Calhoun (2009) framework, which includes the following components:

- Syntax or procedures for using the model,
- The social system describing student and teacher roles and relationships,
- Principles of reaction from students and subsequent decisions from teachers,
- The support system necessary to provide the conditions for efficient and effective model implementation, and
- The instructional (direct) and nurturant (indirect) effects of the model.

Syntax

The syntax or procedural flow of this course is based on research conducted on two case studies and includes three phases for each delivery of the course. The phases are:

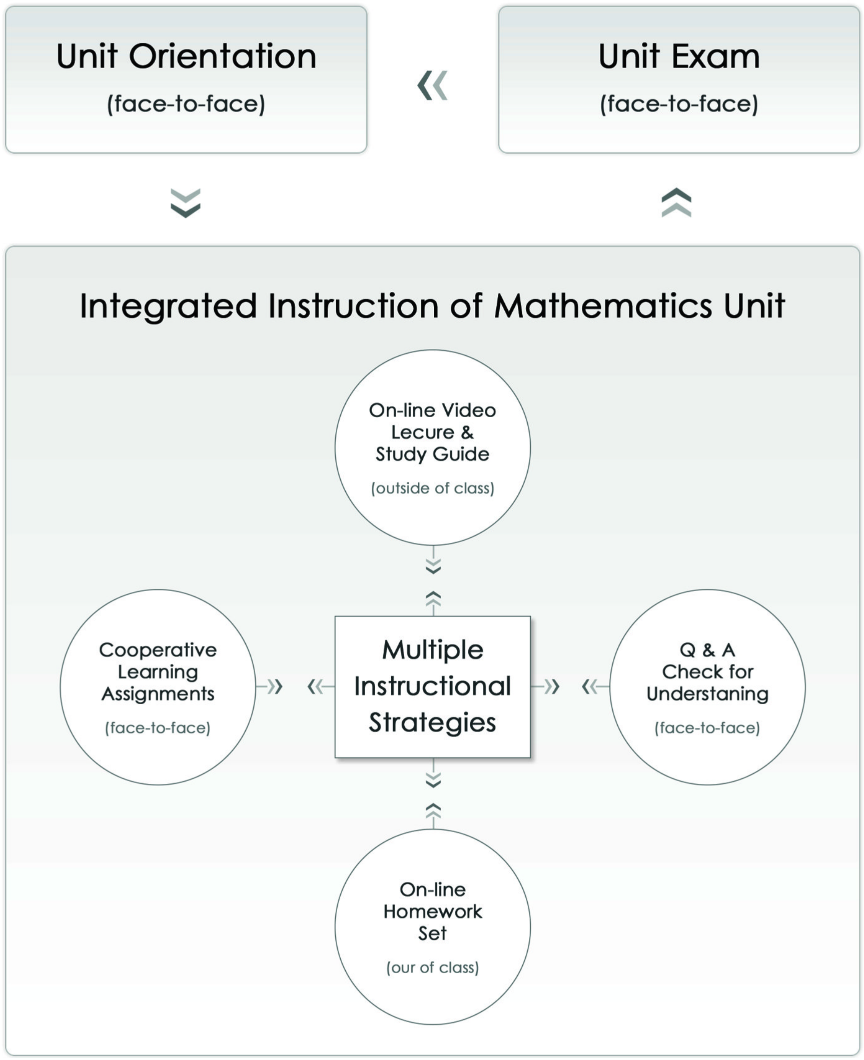
- Orientation to the mathematics unit;
- Instruction of the mathematics unit, which consists of the following:
    - On-line video instruction and study guide completion outside of class,
    - Question and answer session face-to-face,
    - Online homework outside of class,
    - Cooperative learning assignments face-to-face in the classroom or in the computer laboratory; and
- Unit exam assessment face-to-face.

The sequence of phases one through three is illustrated in Figure 2. The following syntax description is based on the instruction of one of five units taught in a college algebra class that meets for 50 minute class sessions, five days a week.

Phase 1: Orientation to Mathematics Unit

Phase one of the teaching model begins with the instructor introducing the algebra unit to be studied over the next cycle of the course and briefly describing each section of material to be covered within the unit. Each student is given a

Figure 1. The flipped classroom teaching model



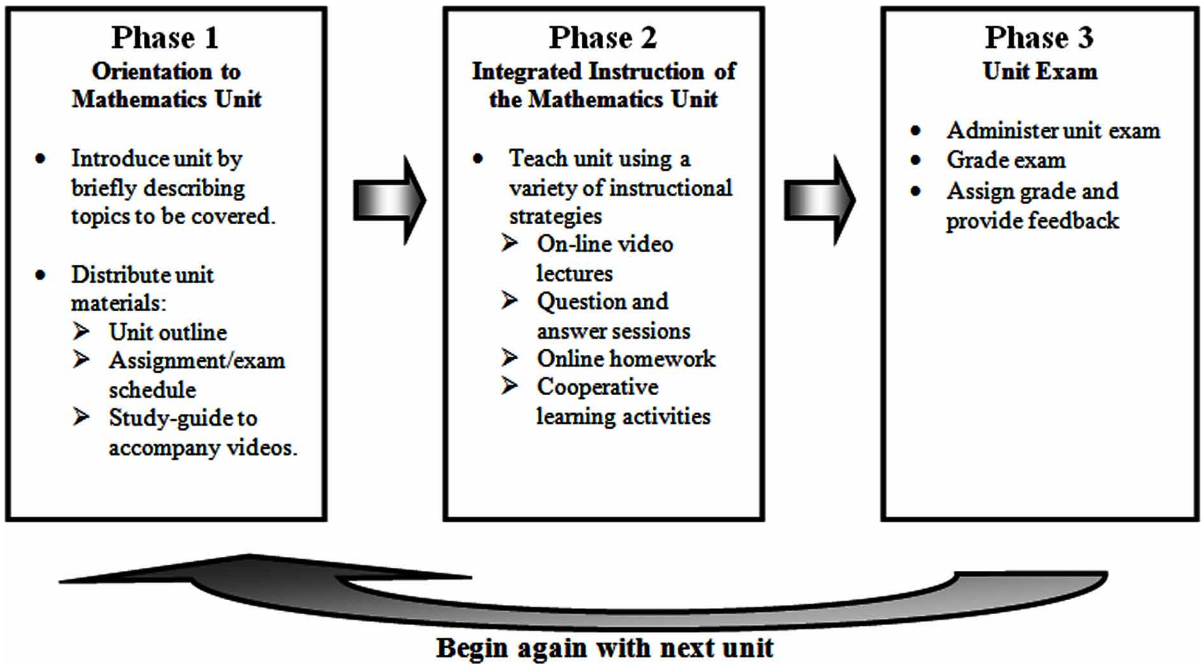
packet of materials that includes an outline of the unit detailing the pace at which material will be covered, a schedule of assignments and activities and their respective due dates, the exam date for the unit, and a "fill in the blank" study-guide for each video lecture to be assigned for the unit.

Phase 2: Integrated Instruction of Mathematics Unit

The second phase begins a cycle of instructional strategies, which include:

- On-line video lectures with accompanying study guide for completion by each student autonomously outside of class;
- A question-and- answer session which takes place during face-to-face class time;
- Online homework assignments, which are assigned for students to complete autonomously outside of class; and
- Cooperative learning assignments, which are assigned for students to complete cooperatively with peers during face-to-face class sessions.

Figure 2. Sequence of phases



A more detailed description of each strategy follows.

On-line video lectures/study-guide: Students are assigned a video lecture to view outside of class. Each video of 10-40 minutes in length includes a lecture explaining a new concept or skill. As students watch the video, they fill in the study guide for that lecture. The study guide helps students take notes by providing a structure that facilitates their organization of ideas. For example, the study guide provides students with partial definitions and places for students to "fill in the blank," boxes for students to copy steps for solving problems, and spaces for students to work problems autonomously. The instructor can use this study guide as evidence that the students watched the video prior to coming to class and may choose to collect the study-guide to check for completion and/or walk around the room documenting student completion on a check sheet. In addition to checking for completion of the study-guide, the instructor can administer a short quiz to check for student understanding of the topic covered in the video lecture. Any points awarded are totaled and contribute to the students' participation grade, which is 10% of their final grade.

Question and answer session: This session enables the student to guide the instruction. Students are given the opportunity to ask questions on material covered in previous videos, face-to-face classes, or on line homework assignments. This strategy gives students the authority to request instruction in areas of issue to them. The instructor notes specific topics where students appeared to be having trouble, so that these areas can be incorporated into future group assignments and/or video lectures to further check for understanding.

Online homework assignments: Students individually complete assignments outside of class. These assignments are online and contain 10-25 questions depending on the topic. Question formats vary from open response to multiple-choice and focus on procedural knowledge such as solving equations. The online homework system offered students various "learning aids." If a student does not know how to solve a problem, he or she may click on one of three buttons for additional help, including "view an example," "help me solve this," and "textbook." "View an example" shows the student a worked problem (step by step) similar to the question being asked of him. "Help me solve this," asks the student to complete individual, successive steps until the problem is solved correctly. If a student enters a step incorrectly, the computer provides feedback and gives the student another opportunity to answer the question. If the student answers again incorrectly, the system tells the student the answer, but gives the student the opportunity to try a different but similar problem. The "Textbook" option takes the student to the section of the textbook related to the question being asked.

The instructor can set due dates for assignments as well as the number of attempts that each student has to answer individual homework questions correctly. The rationale behind setting the number of attempts on homework questions is to provide students with multiple opportunities to work through problems, solicit help when necessary, and re-work problems after receiving help. Each problem in the assignment is scored (some questions have multiple parts so partial credit is given) by the computer and the individual student earns a grade out of 10 points for each assignment. The scores are totaled and scaled to a maximum of 150 points or 15% of the final grade.

Cooperative assignments: Two types of cooperative assignments are implemented throughout the course. Laboratory assignments are implemented in the computer laboratory once a week. In-class problem sets are implemented intermittently during the regular face-to-face class meeting. For laboratory assignments, students work in groups of two or three in a computer laboratory on interactive assignments, which use technology and student activities to emphasize writing and student collaboration. The instructor and two or three "student mentors" (undergraduate and graduate mathematics students) walk around the laboratory to support students and answer questions. With seven computer laboratory assignments, points are awarded for the ability to do and communicate mathematics, as well as students' ability to manage their time and follow directions. The laboratory scores are totaled and scaled to a maximum contribution of 150 points or 15% of their final grade.

In-class problem sets are assigned during regular class time. Students are placed in groups of two to four students. A problem set of 5-10 questions is worked on collaboratively. Students are asked to help each other and refer to their notes before asking the instructor for help. All students must work the problems on a separate sheet of paper; however, the instructor randomly selects the paper to be turned in for the group. Each group assignment is graded and contributes to the students' participation grade or 10% of their final grade.

Phase 3: Unit Exam

The third phase of the teaching model is the administration of the unit exam. In this course there are five units of material and five unit exams. Unit exams are given in the computer laboratory during class time. Each unit exam is worth 80 points. All points from the five unit exams sum to 400 points, which makes up 40% of the students' final grade. In addition to the unit exams, there is a comprehensive final exam worth 200 points or 20% of the students' final grade.

Social System

Typically, college algebra has been taught with the professor as the "sage on the stage," the transmitter of knowledge and students passively receive that knowledge, memorize it, and regurgitate it on an exam (King, 1993, p. 1). The flipped classroom teaching model places the instructor in more of a facilitator's role, so that the students can take center stage. The instructor is responsible for orienting students with each unit, creating video lectures, maintaining the online homework system, supporting a cooperative learning environment, and assessing student performance. Students are responsible for preparing for class by viewing video lectures and completing online homework assignments. In class they must be prepared to ask questions and collaborate with their peers on a variety of assignments.

Principles of Reaction

The reactions of the instructor vary as the instructional components of the course change. When students are engaged in cooperative activities, the instructor's primarily role is that of a facilitator – listening, directing, and helping students work together to find solutions. During a question-and-answer period, the instructor must be prepared to answer questions on a variety of topics as well as re-teach topics with which students are having trouble. The instructor must also monitor student progress in the online homework system and use data from that system to identify areas of difficulty for students.

Students must take responsibility for their learning and must be able to maintain the course schedule suggested by the instructor. They must complete the online homework assignments and view the video lectures when assigned so that they are prepared for face-to-face class activities. During question and answer sessions, students must be prepared to ask questions regarding homework problems or video lectures and during cooperative activities students must be prepared to work with other students and to contribute to the work of their group in a meaningful way.

Support System

The model goes beyond the traditional roles of teachers and students in an effort to facilitate a change in the learning environment; that is, to promote an active learning environment. If the instructor chooses to create his own videos, he will invest a great deal of time organizing, developing, and producing videos for the online environment. For example, in this study, approximately two to three hours was needed to produce 30 minutes of video for one lecture. A skill set including screencasting, uploading, and editing video is essential. Many students are not used to this type of instructional approach, and the instructor must have patience with his students as they transition into an active learning environment. The instructor must consider students' different reactions and abilities to become active participants. Asking questions and working collaboratively with others may make some students uncomfortable but also require some time to develop in students who are not familiar with this form of teaching.

RESEARCH: STUDYING THE COLLEGE ALGEBRA FLIPPED CLASSROOM

Studying the design of the flipped classroom and its implementation will be described along with results and subsequent design revisions to the model. The specific development history of the course will be summarized and results from the pilot testing will be reported, providing a summary of how the course and underlying teaching model developed over time. A research framework provides structure so that the teaching model is continually studied as it is used and serves to establish and build on a knowledge base for users of the model. A research design also provides users of this model with a systematic development approached organized around the development phases of design, implementation, and evaluation over time.

Research Framework

The design and development cycle (Richey & Klein, 2007) provided the framework for the study of the teaching of college algebra across two iterations of the course (Fall Semester 2012, Spring

Semester 2013). The framework provides a way to organize the reporting of design decisions and research findings throughout each of these two cases, as well as a way to facilitate continued and consistent study of the model by its users so that the knowledge base of the model will continue to grow and evolve. According to Richey and Klein (2007), the major phases of the design and development cycle include:

- *Design decisions* for each delivery of the course.
- *Implementation* of the design decisions.
- *Evaluation* of the model.

The report is organized into three sections:

- Methodology,
- Findings, and
- Discussion.

The methodology section includes descriptions of the research design, study participants, data sources and collection procedures, data analysis procedures, and research limitations. The findings section summarizes student learning, the teaching decisions in each case and how those findings impacted the evolution of the flipped classroom teaching model. The discussion section outlines the instructional (direct) and nurturant (indirect) effects of the model on the students, conclusions and implications for future design, implementation, and evaluation of this flipped classroom teaching model.

Research Design

This section describes the design and development of a flipped classroom teaching model in terms of the design decisions, model implementation, and model evaluation across two deliveries of a college algebra course. The following research questions guided this study:

- How did the flipped classroom approach to teaching change over time?
- How does a flipped classroom approach to teaching college algebra affect students' perceptions of their learning of mathematics?

A multiple case study approach was used to report this research in an effort to elucidate how and why the flipped classroom model has changed overtime. Yin (2008) summarized the uses of case studies as a research method and included the following recommendation made by Schramm (1971) that "the essence of a case study…is that it tries to illuminate a decision or set of decisions: why they were taken, how they were implemented, and with what result." Miles and Huberman (1994) define a "case as a phenomenon of some sort occurring in a bounded context" (p. 25). Each case in this study was defined as one course delivery, which was documented in terms of the design decisions, implementation, and evaluation of the flipped classroom teaching model.

Participants: Case one was a fifteen week, fall semester, college algebra course with an enrollment capacity of forty students and case two was a fifteen week, spring semester college algebra course with an enrollment capacity of forty students. Both courses met for 50 minute sessions, five days a week and were taught by the same instructor (i.e. first author). Participants included students enrolled in the sections of the college algebra course being studied. Nothing in the schedule of courses indicated that any of the sections of college algebra were being studied or that any section would be taught differently from any other section listed. Students enrolled themselves in various sections of college algebra based on their QRA (quantitative reasoning assessment) or placement exam score and their personal schedules, not by any pedagogical preference or knowledge of a research study taking place. Prior to the beginning of the Fall 2012 semester, approval from the university's Institutional Review Board (IRB) was granted to implement student surveys and interviews as a means to study the design, implementation and evaluation of the flipped classroom teaching model. Forty-five undergraduate students agreed to participate in the study and signed consent forms. Of those forty-five students, 27 were freshman, 16 were sophomores, 1was a junior, and 1 was a senior. Student majors varied. Participants included forty-five students and the instructor of record. The instructor has taught college algebra seven times over the last 15 years and has taught high school algebra in the public schools for three years.

Data sources and collection procedures: The data sources and collection procedures to study the teaching model are organized around the design and development cycle (Richey & Klein, 2007).

Model design: Data were collected to describe the design decisions for each delivery of the course. Data sources for design decisions included the course syllabus, instructor journal, and a syllabus addition. The course syllabus identified course objectives, instructional materials, assessment, and course sequence as it was defined for all sections of the course. The teacher journal recorded the instructor's observations and thoughts regarding course design.

Model implementation: Data were also collected to describe the implementation of the design decisions. Data sources for the model implementation included a teacher journal and student surveys. The teacher journal recorded daily reflections regarding her thought process throughout model implementation. The journal included reflections regarding classroom observations and summaries of student interactions with other students, the instructor, and/or course materials. Anonymous student surveys were sent to all participants via email two to three times throughout the semester. Each survey consisted of 10 questions. Survey question formats included Likert scale items, as well as short answer/free response items. Questions addressed both student perceptions of their learning as well as their opinions regarding the implementation of the various instructional components, which included lecture videos, face-to-face class time, cooperative laboratories, and online homework assignments.

Model Evaluation: Data were collected to describe student perceptions of their learning and of the instructional approach used to teach the course. Data sources for model evaluation included student surveys, student interviews, and course evaluations. Anonymous student surveys were sent to all participants via email two or three times throughout the semester. Survey question formats included Likert scale items as well as short answer/free response items. Questions addressed both student perceptions of their learning as well as their opinions regarding the implementation of the various course components: lecture videos, face-to-face class time, cooperative laboratories, and online homework assignments. Course evaluations included Likert scale questions (both university-developed and instructor-developed) to record student perceptions of instruction, the instructor, and materials. Student interviews were conducted after the Fall 2012 semester concluded. Students were randomly chosen to represent a range in course performance: one student from each of three grade bands as follows:

- A+ or A,
- B+, B, C+, or C,
- D+, D, F, or W (withdrawal before final grade awarded).

Three students (2 male, 1 female) agreed to be interviewed early in the Spring 2013 semester. One student received an A, one a C, and one a D. Interviews were semi-structured and ranged from 20-30 minutes in length. The interviews were conducted in person, tape-recorded and transcribed. Interview questions targeted student perceptions of the flipped classroom teaching model, how this model impacted their learning, as well as suggestions for improving the course.

Data analysis framework and procedures: Design decisions were analyzed by describing participants, course sequence, learning tasks, instructional strategies, and assessment strategies. Model implementation analyzed student performance and student responses to the varied instructional strategies reflected in the flipped classroom model. Evaluation of the teaching model analyzed student perceptions of their learning and student perceptions of the teaching approach. Data analysis consisted of data reduction or "the process of selecting, focusing, simplifying, abstracting, and transforming the data" (Miles & Huberman, 1994, p. 10) and display of the reduced data so that conclusions can be drawn (Miles & Huberman, 1994). Details of data analysis are described.

Syllabus, syllabus addition, teacher journal: The syllabus provided the course description as well as a description of the components of the course that were to remain intact as the flipped classroom teaching model was designed and implemented. Design decision notes from the teacher journal were collected and categorized by course sequence, instructional strategies, and assessment. A syllabus addition was developed and given to students after the last two unit exams in case one and at the beginning of each unit during case two. The addition was used to identify any changes made to course sequence, instructional strategies, and assessment strategies.

Student surveys: Survey responses were collected online. Mean scores were calculated for Likert scale-type questions and open–ended responses were coded according to student perceptions regarding: the flipped classroom instructional approach, different instructional components (e.g. online homework, video lectures/study-guide, cooperative laboratories, group work, question/answer sessions), and student learning in the class.

Student interviews: Interviews were transcribed and coded based on three categories, student perceptions regarding the flipped classroom instructional approach, different instructional components (e.g. online homework, video lectures/study-guide, cooperative laboratories, group work, question/answer sessions), and their learning in the class.

Course evaluations: Survey responses were collected online. Mean scores were calculated for Likert scale-type questions and open–ended responses were coded according to student perceptions regarding: the flipped classroom instructional approach, different instructional components (e.g. online homework, video lectures/study-guide, cooperative laboratories, group work, question/answer sessions), and student learning in the class.

Research limitations: Multiple data sources were collected and analyzed to check for the agreement of one data source with another. For example, both surveys and interviews were used to provide a picture of how students perceived the flipped classroom model instructional approach as well as their learning. However, the survey response rate was low and made it difficult to generalize results. In future iterations of this research, an effort should be made to increase survey response rate. The surveys could be given during class so that students do not have to complete the survey on their own time.

Personal bias must always be considered when an instructor studies her own teaching. The researcher's personal involvement with the course increased the possibility that recorded observations in the teacher journal highlighted specific incidents while ignoring others. In addition, the instructor of the course was also the interviewer. Although interviews did not take place until after the semester had ended and final grades had been awarded, it is possible that students did not feel as though they could be honest about their thoughts and feeling regarding the course when they were being interview by their instructor. The second author reviewed the student comments' for their trustworthiness, based on her familiarity of the course and students.

Original Design of Course

Math 126: College algebra is a department-coordinated course. There are three variations of Math 126 offered through the department of mathematics at this land-grant university in the eastern United States. A different professor coordinates each variation; however, all three variations (126A, 126B, and 126C) use the same cooperative laboratories and take the same final exam. A summary of the basic structure of each course and the criteria for student placement in each course will follow. In general, all students take the QRA (Quantitative Reasoning Assessment) for placement in a mathematics course. Students are only allowed to take the QRA twice. If they score below 10, students must take the pre-collegiate mathematics workshop (a non-credit course offered by the math department) before they are permitted to enroll in any 126 class.

Math 126A: There are approximately 10-12 sections offered each semester. Each section enrolls up to forty undergraduate students. The class meets five days a week, four days in lecture and one day in laboratory. Students are placed into 5-day College Algebra by scoring 10 out of 25 on the Quantitative Reasoning Assessment QRA (Math Placement Exam) or by taking the pre-collegiate mathematics workshop.

Math 126B: There are three sections offered each semester. Each section enrolls approximately 200 students. The class meets four days a week, two days in lecture, one day in recitation (Q&A), and one day in laboratory. Students are placed into 126B by scoring 11 or 12 out of 25 on the QRA or by taking the pre-collegiate mathematics workshop.

Math 126C: There are three sections offered each semester. Each section enrolls approximately 200 students. The class meets three days a week, two days in lecture and one day in laboratory. Students are placed into 126C by scoring 12 or higher on the QRA or by taking the pre-collegiate mathematics workshop.

The specific goals of all sections of Math 126 emphasize algebraic, graphical, and numerical approaches to study the understanding and use of concepts such as function; mathematical application problems; solving equations and inequalities in one variable using multiple representations; graphing equations and functions; lines, parabolas, and circles; higher order polynomial, rational, radical, absolute value, exponential and logarithmic functions; and systems of equations and matrices. To accomplish course goals, each class incorporates interactive laboratories which use technology and student activities that emphasize writing and student collaboration. Students work in pairs or triads on the laboratories and in class exercises in order to develop mathematical communication skills.

The version of college algebra studied for the purpose of this chapter was Math 126A: 5-day college algebra. In each of the two cases, 40 students met in an auditorium classroom Monday, Tuesday, Thursday and Friday. The classroom was equipped with 40 student seats and instructional aides, and included one computer that can project onto a screen and several rolling chalk boards. The class met each Wednesday in a computer laboratory where students worked cooperatively on interactive laboratories that focused on conceptual understanding and application. The computer laboratory can accommodate 120 students and is equipped with 120 student computers and a podium with a computer for the instructor. There are several screens positioned around the laboratory so that the instructor can project his/her screen throughout the laboratory. Two sections of Math 126A meet in the laboratory at the same time; however, the two sections are separated so that when students work cooperatively, they are working with students that are in their face-to-face class.

Components of Math 126A common to all 12 sections:

- **Participation:** 100/1000 points. Students may earn up to 100 participation points. Each instructor may choose to use sign-in sheets, short participation quiz/work sheets, and/or other activities to generate participation points.
- **Online Homework:** 150/1000 points. Students are required to complete homework assignments online. Homework assignments correlate to the sections covered in the textbook.
- **Laboratories:** 150/1000 points. There are seven computer laboratory assignments. Laboratory assignments should be completed with a partner in the laboratory during scheduled laboratory time. Laboratory points are awarded for the ability to do and communicate mathematics as well as the ability to manage time and follow directions.
- **Exams:** 400/1000 points. There are five tests given throughout the semester on Wednesdays in the laboratory during class time, each is worth 80 points. The exams include pencil-and-paper questions and online multiple-choice questions.
- **Final Exam:** 200/1000 points. There is a comprehensive final exam given at the end of the semester. The same final exam is given to all variations of Math 126.

Findings

Case 1: Fall 2012

Case one was a 15-week course offered during the Fall 2012 semester. Forty students were enrolled in the class, which met five days a week for 50 minutes each day.

Design

The Math 126A course coordinator was supportive of the initiative to incorporate a flipped classroom pedagogical design into Math 126A, however, Math 126A is a department coordinated course. The coordinator decided that the major components of the course should be the same for all sections of the course. Any grades that were to be collected specific to video lectures and accompanying assignments could only be reflected in the course component of student participation (100/1000 points). All students were to use the same online homework assignments and interactive computer laboratories and exams.

As all components of the course were to remain intact, the challenge was to design a flipped classroom approach that incorporated both video lectures and online homework assignments. Traditionally, a classroom flip involves lectures, which are assigned for students to view at home. Homework assignments are assigned and completed during class time. Since the required online homework assignments could not be completed in class (because the class does not meet in a computer laboratory), the design had to be modified to use both video lectures and online homework while still affording students face-to-face class time for non-traditional learning activities. All components of the course remained intact, but videos were assigned as homework approximately two times per week and brief one-two questions quizzes were administered during the first five minutes of class when a video was assigned for homework the night before.

Implementation

The first implementation of this flipped classroom approach was a hybrid, a mix of a traditional lecture and a flipped classroom. Since the instructor/researcher was developing and producing videos while teaching the course, it was not possible to produce a video for every section of material. Sections were strategically chosen for video production. Two sets of videos were developed and implemented each week. As documented in the teacher journal, approximately two to three hours were required to produce 30 minutes of video. An outline suggesting the pace of instruction was given to each instructor at the beginning of the semester. The outline provided a day-to-day schedule suggesting the sections of material to be taught each of the five days the class met. Some of the longer sections of material to be taught were allotted two days on the schedule. The instructor/researcher chose these sections for video production, so that the section could be started in class through a class lecture and finished at home using a video lecture, freeing up the second face-to-face meeting for something more engaging for the students (i.e. group work or question/answer). Typically, 30 minutes of video was produced for one lecture using a screencast product. Videos were uploaded for students to watch online. Since the online site required videos to be under 15 minutes in length, some sections required the production of multiple videos. For example, for section 6.1 Composite Functions, one 14 minute video was produced, but for section 6.4 Logarithmic Functions, three videos were produced (8, 14, 8 minutes). Periodically, the instructor administered a one or two question quiz at the beginning of class to assess who watched the videos and to check for understanding of the material taught on the videos.

Multiple components of the course (participation, online homework, laboratories) were integrated into each week of instruction. An example week was designed as follows:

Monday: Face-to-face: group work (6.1)
Homework: online homework 6.1
Tuesday: Face-to-face: Lecture 5.1 and R.6
Homework: online homework 5.1 and R.6
Wednesday: Laboratory-Quadratic Functions
Homework: watch Videos (5.2)
Thursday: Face-to-face: Q&A (5.1 and 5.2)
Homework: online homework 5.2
Friday: Face-to-face: group work (5.1, R.6, 5.2)
Homework: watch Videos (5.3)

Group work was assigned, collected and graded, and the grade was applied to the participation component of the course (10% of final grade). Cooperative laboratory worksheets were collected and graded, and the grade was applied to the laboratory component of the course (15% of final grade). Participation points were awarded to all students that attended on designated question and answer sessions. Online homework assignments were graded electronically, and the grade was applied to the online homework component of the course (15% of final grade).

Evaluation

Nine students responded to an anonymous survey administered online during the fifth week of the semester. When asked to rank order the components of the course (online lecture videos, face-to-face class time, computer laboratories, and online homework assignments, quizzes), six out of nine students ranked face-to-face time as the most helpful, while three of the nine ranked the videos most helpful. Five of nine students ranked videos as second most helpful and three of nine ranked face-to-face second most helpful. All nine respondents said that they were satisfied with the design of the online videos and all nine respondents said that they were satisfied with the use of face-to-face time. Students were asked to respond to four open-ended questions. The questions included the following: How do you feel about watching lectures online at home and working on problems in class? What suggestions do you have that might make the videos more helpful? What suggestions do you have that might make the face-to-face time more helpful? What would have helped you better prepare for the last test? Two themes emerged due to the frequency of their occurrence throughout the open-ended responses: the opportunity to self-pace and the freedom to ask questions.

Opportunity to self-pace: Students felt that the videos provided an opportunity for them to slow the instruction down to meet their individual needs. For example, one student wrote that “I feel the on-line videos are extremely helpful. It’s nice to sit down and take it at my own pace." Another student wrote: "It [videos] gives me the chance to learn the material at my own pace." Students also liked being able to play, rewind, and re-play the video lectures. One student wrote: "I feel that watching the videos at home helps me learn because I can stop and replay the video so that it reworks the problem in case I didn't understand the first time."

Freedom to ask questions: Students also felt that the videos afforded them the opportunity to ask questions during the face-to-face meetings. For example, one student wrote the following: "I enjoy this because the class has time to get all of [our] questions asked instead of people being left confused." Another student wrote that "I can bring in problems that I didn't understand and she can explain them to me face-to-face."

When asked for suggestions for improving the instruction of the class, students suggested using different colored pens throughout the videos and providing deeper explanations in the videos. One student wrote that the videos were helpful but "extremely time consuming."

The survey was repeated during week 10. Six students responded to the survey. Responses to the open-ended questions supported the same two themes as the first survey, including the opportunity to self-pace and freedom to ask questions. Regarding pace, one student wrote: "I can continue to go over the videos until I fully understand what they're teaching me. Another student wrote, in regard, to asking questions: "we get to choose the problems that are troubling us and do them [in class face-to-face]," while another student wrote that "I wish there was a video for every section."

At the end of the semester university course evaluations were administered anonymously online. Ten students responded. When students were asked to rate their learning in the course (very little, some, more than average, quite a lot), six rated their learning as "quite a lot" and four rate their learning as "more than average." When asked if the video lectures helped them to understand the material, eight students responded "always," one responded "frequently," and one responded "rarely." The overall rating of the course was 4.7 out of five points.

Three student interviews were conducted during the spring 2013 semester in an effort to gain deeper insight into student perceptions regarding their learning with respect to the instructional approach used in the course. Based on their high frequency of occurrence throughout the interview transcripts, three themes were identified: interconnectedness of instructional components, more time for student questions, and instructor qualities.

Interconnectedness of instructional components: Although one student may favor one instructional strategy over another, all three students mentioned the various components worked together to foster student leaning. For example, when asked, "Which component was most helpful in terms of helping you learn?" one student said, "You can't really take one or the other, because yes, you have the videos and it's like having class at home, but then if you don't understand any of it, you need the class to ask. So they kind of go hand and hand. You can't have one without the other." Another student who earned a D in the course and was retaking the class with another instructor at the time of the interview said with regard to the flipped approach, "I definitely learned more, definitely had a better understanding with the group work, the videos, the study-guides, I learned it, it was all right there, it was up to the students still, but you provided all that the student needs to be successful."

More time for student questions: Another emergent theme was that more time was allotted for student questions. Students frequently responded that they liked being able to ask questions in class regarding material with which they that they were having trouble. One student said that "In a normal class, the teacher is just preaching at you…with the videos you can watch them and then you ask questions…you had a class where you could actually ask questions."

Instructor qualities: Instructor qualities emerged as a third theme during student interviews. The interview transcripts revealed that students felt that the flipped classroom approach could only be as effective as the instructor using it. For example, when asked if he would recommend a flipped college algebra class to friend over a traditional class one student said, that he would only if he knew that the instructor he had would teaching the class. He went on to say that "The way [she] set up the class, it was enjoyable, I felt that it was not hard to succeed, all of the tools were there, it was interesting, a good time, she interacted with the students." Another student said, "She was so enthusiastic, so helpful, so nice…I feel that personality really does matter when your teaching because it effects people." Table 1 summarizes case one findings.

Case 2: Spring 2013

Case two was a 15 week course offered during the spring 2013 semester. Forty students were enrolled in the class. The class met five days a week for 50 minutes each day.

Design

Design decisions for case two were the same for case 1 as the course coordinator requested that all components of the course remained intact. In addition to the videos implemented in case one (approximately two per week), new videos were produced and implemented throughout the semester. Videos were available for nearly all sections of material to be covered throughout the course. Also, various "learning aids" offered inside the online homework package were made accessible to students. For example, if a student did not know how to solve a problem on the online homework assignment, they were able to click on one of three buttons for additional help, the buttons were "view an example," "help me solve this," and "textbook." "View an example" would show the student a worked problem (step by step) similar to the question being asked of them. "Help me solve this" would ask the student to complete individual, successive steps until the problem is solved correctly. "Textbook" would take the student to the section of the textbook related to the specific question being asked.

Table 1. Case 1: Summary of findings

Design: ● Develop and assign at least two videos per week. ● Write and administer one to two question quizzes in class after video lecture assignments. ● Assign online homework on nights when no video lecture is assigned. ● Develop and assign group work at least once per week. ● Facilitate cooperative laboratories activity once per week. ● Hold question and answer sessions in class at least once per week.
Implementation: ● Longer sections of material were strategically chosen for video development. ● Two to three hours were required to produce 30 minutes of video. ● Videos were uploaded to an online site for students to view. ● One to two question quizzes were administered in class after video lecture assignments. ● Group work was collected and graded. ● Cooperative laboratory worksheets were collected and graded. ● Participation points were awarded to students who attended in-class question and answer sessions.
Evaluation: ● Students felt that the videos provided them an opportunity to self-pace instruction. ● Students felt that the videos gave them more time to ask questions in class. ● Students felt that the instructional components of the course worked together to foster their leaning. ● Students felt that the teaching approach could only be as effective as the teacher using it.

Implementation

Since a video was available for use with the instructions of most sections of material, a "truer" flipped classroom approach could be implemented in case two. Multiple components of the course (participation, online homework, laboratories) were integrated into each week of instruction. An example week was designed as follows:

Monday: Face-to-face: group work (6.1)
Homework: Watch Videos R.6 and 5.1
Tuesday: Face-to-face: Q&A (R.6 and 51)
Homework: Watch Videos 5.2 (part 1 and 2)
Wednesday: Laboratory-Quadratic Functions
Thursday: Face-to-face: Q&A (5.2)
Homework: Watch Videos 5.2 (part 3)
Friday: Face-to-face: group work (5.1, R.6, 5.2)
Homework: Watch Videos (5.3)

Assigned group work was collected and graded and the grade was applied to the participation component of the course (10% of final grade). Cooperative laboratories were collected and graded. The grade was applied to the laboratory component of the course (15% of final grade). Participation points were awarded to all students that attended class on designated question and answer sessions. Online homework assignments were graded electronically and the grade was applied to the online homework component of the course (15% of final grade).

Reflections documented in the teacher journal suggested that the instructor made the decision to create "soft" deadlines for online homework assignments. All online homework assignments were set at the beginning of a unit and the due date was set for all assignments specific to that unit for the morning of the unit test. This decision was made in an attempt to accommodate individual student schedules and provide students the opportunity to ask questions regarding homework assignments and subsequently the opportunity to revisit assignments and make corrections. Students took responsibility to complete the online homework assignments after the section was covered via video, question/answer sessions, or in-group work.

A calendar (syllabus addition) was given to students at the beginning of each unit to specify when to watch videos, formats of each face-to-face sessions, and a suggested pace for completing the online homework.

Evaluation

Nine students responded to an anonymous survey administered online during the fifth week of the semester. When asked to rank order the components of the course (online lecture videos, face-to-face class time, computer laboratories, and online homework assignments, quizzes), four out of nine students ranked face-to-face time as the most helpful, and four students ranked the online homework assignments as most helpful. No one ranked the videos most helpful. On the other hand, six of nine students ranked videos as second most helpful, one ranked the online homework as second most helpful and one student ranked face-to-face second most helpful. All nine respondents said that they were satisfied with the design of the online videos and all nine respondents said that they were satisfied with the use of face-to-face time. Students were asked to respond to four open-ended questions. When asked about their feelings regarding the flipped classroom instructional approach, only one theme emerged due to the frequency of its occurrence throughout the open-ended responses and this theme was the opportunity to self-pace.

Opportunity to self-pace: Students felt that the videos provided an opportunity for them to slow the instruction down to meet their individual needs. For example, one student wrote, "I greatly enjoy being able to review lecture material at my own pace via the online lecture videos. It allows me to clarify any questions I may have and provides motivation to be prepared for the next day's activity."

In addition to the opportunity to self-pace theme, students made several different suggestions regarding the flipped classroom approach. The suggestions included the following: provide more examples for students to try on their own along with solutions during the videos, give general explanations regarding course material rather than focus on specific questions during the face-to-face meeting, and provide a study-guide with solution set prior to the unit test.

The survey was repeated during week 10 and five students responded. When students were asked to indicate their level of agreement with the following statement, "The lecture videos that I watched outside of class helped me learn the material," all five students agreed. When they were asked similar questions regarding the face-to-face sessions, all five students agreed that the face-to-face sessions helped them learn the material. When students were asked to rank order the components of the course with regard to their helpfulness, students either chose face-to-face class session (four students) or online homework (one student). Few students thoughtfully responded to the open ended questions and as a result no themes emerged. One student responded "I think the face to face class time is effective when learning the material" and another said "I think the videos are fine as they are." See Table 2 for a summary of case two findings.

Cross-Case Analysis

Design and Implementation

Modifications across both cases included the following:

- A video was produced and implemented for every section of material.
- Soft deadlines were introduced for the online homework assignments, allowing students to complete assignments at their own pace and to rework problems after they received help from the instructor.
- Learning aids from the online homework package were made accessible to students. For example, if a student did not know how to solve a problem on the online homework assignment, they were able to click on one of three buttons for additional help, the buttons were "view an example," "help me solve this," and "textbook."
- A calendar (syllabus addition) was distributed to students at the beginning of each unit, providing due dates videos/study-guides and suggested pacing for online homework assignments

Table 2. Case 2: Summary of findings

Design: • Develop at least two videos per week to add to existing video library. • Assign videos from case one and newly developed videos so that most sections of material have an accompanying video lecture. • Assign online homework. • Enable learning aids offered inside the online homework system. • Develop and assign group work at least once per week. • Facilitate cooperative laboratories activity once per week. • Hold question and answer sessions in class at least once per week.
Implementation: • Soft deadlines were introduced for the online homework assignments. • A calendar detailing the pace of the course and assignment due dates was distributed at the beginning of each unit. • Group work was collected and graded. • Cooperative laboratory worksheets were collected and graded. • Participation points were awarded to students who attended in-class question and answer sessions.
Evaluation: • Students felt that the videos provided them the opportunity to self pace instruction.

Evaluation

Student's perceptions of their learning via the Flipped Classroom Teaching Model across both cases are summarized.

Overall teaching approach: When students were asked to rate their overall learning in the course on the university course evaluations, the mean rating was 4.6 out of five. Students attributed their learning to course components working together. For example, one student said, "Sometimes when doing my homework I did not know what to do so, I would refer to my notes and still be confused, but then, I would refer to the videos and watch you [the teacher] do the steps and then go back to the homework and know how to do it."

Freedom to ask questions: Another student described why he felt that he learned more in the flipped classroom environment rather than a traditional environment, "It's just with a normal class, the teacher is just preaching at you, at least that is how it feels, but with the videos, you can watch them and then ask questions, [face-to-face time] was dedicated to what you didn't know, so you learned, it wasn't a teacher just teaching everything and saying they think you know something you don't, you have time to ask about what you don't know." Students felt that being able to ask questions helped them learn because face-to-face class time was devoted to their satisfying their individual needs.

Opportunity to self-pace: Students also felt that they learned more watching video lectures at home because the online lectures gave them the opportunity to work at their own pace. One student wrote that "Watching the lectures online at home help me learn the material because I can continue to go over the videos until I fully understand what they're teaching me."

Discussion

The purpose of this study and chapter was to describe the design and development of a flipped classroom teaching model in terms of the design decisions, model implementation, and model evaluation across two deliveries of a college algebra course. This chapter illustrates how the flipped classroom approach to teaching changed over time and how a flipped classroom approach to teaching college algebra affected students' perceptions of their learning of mathematics.

The first research question addressed in this chapter was: How did the flipped classroom approach to teaching change over time? The instructor/researcher developed videos while teaching both cycles of the course. Because she was able to reuse many of the videos developed during the first iteration, the number of videos available to students during the second iteration nearly doubled. Videos were assigned to students approximately two times per week during case one and nearly four times a week in case two. As a result, the homework expectation increased for students during the second iteration of the course. During case two, students were assigned video lectures to view at home and online homework assignments to complete at home almost every night. Soft deadlines for the online assignments were introduced to allow students to complete the online homework assignments at their own pace. Learning aids in the online homework system were made available to students during case two. The learning aids provided immediate assistance to students working on homework assignments by providing a worked example, a step-by-step solution, or the passage in the textbook that addresses the types of exercises presented in the assignment. To help students stay organized, a calendar (syllabus addition), which provided due dates and suggested pacing for learning tasks and assignments, was distributed at the beginning of each unit.

The second research question addressed in this chapter was: How does a flipped classroom approach to teaching college algebra affect students' perceptions of their learning of mathematics? Findings reported in this study are preliminary and subsequent iterations of the design and development cycle (Richey & Klein, 2007) are necessary to document a clearer picture of the flipped classroom model and its impact on student learning. However, student survey responses and interview results suggested that this teaching model improved student perceptions of college algebra. These findings confirm results from Stage and Kinzie (2009) who found that students are more enthusiastic with respect to learning when they are taught by innovative instructional techniques.

Students felt that the online instructional videos provided an opportunity to control the pace of instruction. For example, one student wrote, "I greatly enjoy being able to review lecture material at my own pace via the online lecture videos. It allows me to clarify any questions I may have and provides motivation to be prepared for the next day's activity." Self-regulated learners view learning as a process that they can control, that is; a process that they have ownership of, in addition; self-regulated learners take responsibility for what they know and have the strategy skills to learn what they do not know (Zimmerman, 1990). The flipped classroom model enabled students to take control of the learning process.

In addition to controlling the pace of instruction, students perceived the flipped classroom model as student-centered. Students felt that having the freedom to ask questions helped them learn because face-to-face class time was devoted to satisfying their needs. One student said, "It [face-to-face time] was dedicated to what you didn't know, so you learned, it wasn't a teacher just teaching everything and saying they think you know something you don't, you have time to ask about what you don't know." Garrison (2010) encouraged teachers to design instruction that elicits a student's need to further his understanding and deepen his knowledge. The flipped classroom teaching model can be used to elicit this need by providing student's an opportunity engage in the learning process and the freedom to ask for help.

Some findings differed from case one to case two with respect to emergent themes from student surveys. In case one, students overwhelmingly cited the freedom to ask questions during class as one of the major benefits to the flipped classroom approach, however; this theme did not emerge during case two. One possible reason could be the learning aids made available on the online homework system in case two. Perhaps, students asked fewer homework questions in class because they used the help buttons in the online homework system. One concern might be that students are simply memorizing a procedure rather than learning the underlying mathematical concepts when using these learning aides.

Another possible reason that students asked fewer questions in class during the spring semester might be that students were not keeping up with the online homework or video assignments, and as a result were not prepared to ask questions in class. Students were only asked to watch videos twice a week during case one but asked to watch videos nearly every night in case two; therefore, assigning online homework and video lectures as homework may be too much for students to complete at home on their own.

Model Effects: According to Joyce, Weil, and Calhoun (2009), the effects of any learning environment can be instructional (direct) or nurturant (indirect). Since student learning was not evaluated in this study (to be addressed in subsequent deliveries), the instructional effects cannot be legitimately articulated in this chapter. However, the nurturant effects of the Flipped Classroom Teaching Model, which have a bearing on students' motivations and attitudes towards learning algebra, are discussed.

Nurturant effects: Two nurturant effects surfaced from the flipped classroom teaching approach. First, students appeared to exhibit better self-regulative skills. When asked about the flipped classroom teaching approach, one student said, "It gave you the tools to learn…it was up to the students, but you provided all that the student needs to be successful." The flipped classroom teaching approach led some students to take responsibility for their learning. In a course known for large numbers of students earning D's, F's or withdrawing from the course and poor student attitudes, it was remarkable to hear students taking the blame for their own lack of effort. When asked "What would have helped you better prepare for the last test?" several students took responsibility for themselves. For example, one student said, "Mainly extra studying. I think we are given enough resources and practice that we should be responsible for the outcomes." Another student said: "Low test scores (like my own) were brought on by the student. We have everything we need."

Another nurturant effect appeared to be that students began to relate success to learning and not just good grades. Goal orientation theorists advocate interventions that design classroom learning environments such that achievement is defined as mastery-oriented rather than performance-oriented (Ames & Archer, 1988). For example, a goal-oriented approach to learning focuses achievement on mastering a task, the learning process, and self-improvement whereas a performance-oriented approach to learning emphasizes normative standards or getting the highest grades. Ames and Archer (1988) found that when a mastery goal-oriented approach was perceived by students, students reported using more learning strategies, enjoying their class, and a willingness to tackle challenging problems. The flipped classroom teaching approach provides the instructor the opportunity to focus the learning environment on mastery-oriented learning rather than performance-oriented learning.

SUGGESTIONS AND RECOMMENDATIONS

It is important to continue the design and development of the flipped classroom teaching approach as a systematic approach prompts the instructor/researcher with being clear on learning outcomes and teaching decisions, as well as identifying data sources that answer research questions. Subsequent cases and delivery of the college algebra course using the flipped classroom model will document student learning and require that across the design and development cycle, student learning is analyzed. Although the two case studies reported in this chapter suggest some interesting findings, further study is necessary.

Assigning video lectures and online homework assignments may be too much for students to complete at home autonomously and some teaching adjustments may be needed. Since the online homework is a component of this departmental course and must remain intact, sections of course material could be re-evaluated to determine which sections of material are most conducive to flipping. The flipped classroom teaching strategy may not need to be implemented daily, but strategically during the week so that some face-to-face class sessions can be devoted to engaging activity.

Suggestions for future consideration include the following: re-assessing the use of the learning aids in the online homework system, re-evaluating the amount of homework given to students on a daily basis, and considering whether some topics are more conducive to flipping than others.

FUTURE RESEARCH DIRECTIONS AND CONCLUSION

The flipped classroom teaching model shows promise for the learning of college algebra. Results from the two case studies suggest that students feel as though they can control the learning environment. Students liked that their questions were the focus of face-to-face class time and that they could view video lectures at their own pace, or outside of class, at a time convenient for them. These student perceptions may be crucial conditions for students to engage and ultimately to master concepts and applications.

Student learning was not evaluated in this study. The instructional effects of a flipped classroom teaching model for college algebra will be addressed in subsequent iterations of the course and could include the understanding and using functions; mathematical application problems; solving equations and inequalities in one variable; using multiple representations; graphing equations and functions; lines, parabolas, and circles; higher order polynomial, rational, radical, absolute value, exponential and logarithmic functions; systems of equations and matrices.

This chapter documents the challenges of designing, implementing, and evaluating a flipped classroom teaching approach. The design and development cycle forces one to be more systematic in teaching decisions and to evaluate during the teaching the impacts of the teaching. The case studies provided examples of preliminary designs that positively impacted student's perceptions of their learning. This research study can help guide instructors who are considering using the flipped classroom teaching approach in their own classrooms and the challenges that such an approach requires of a college instructor.

REFERENCES

Ames, C., & Archer, J. (1988). Achievement goals in the classroom: Students' learnin strategies and motivation processes. *Journal of Educational Psychology*, *80*(3), 260–267. doi:10.1037/0022-0663.80.3.260

Azedevo, A. (2012, October 17). *Wired campus: San Jose State U: Says replacing live lectures with videos increased test scores*. Retrieved on January 23, 2013 from http://chronicle.com/blogs/wiredcampus/san-jose-state-u-says-replacing-live-lectures-with-videos-increased-test-scores

Bandura, A. (1997). *Self-efficacy: The exercise of control*. New York, NY: Freeman.

Cardetti, F., & McKenna, P. J. (2011). In their own words: Getting pumped for calculus. *PRIMUS (Terre Haute, Ind.)*, *21*(4), 351–363. doi:10.1080/10511970903228984

Garrison, J. (2010). *Dewey and eros: Wisdom and desire in the art of teaching*. Charlotte, NC: Information Age Publishing.

Green, K. R., Pinder-Grover, T., & Millunchick, J. (2012). Impact of screencast technology: Connecting the perception of usefulness and the reality of performance. *Journal of Engineering Education*, *101*(4), 717–737. doi:10.1002/j.2168-9830.2012.tb01126.x

Hall, J. M., & Ponton, M. K. (2005). Mathematics self-efficacy of college freshman. *Journal of Developmental Education*, *28*(3), 26–33.

Haver, W. (2007). Renewal of college algebra. In V. Katz (Ed.), *Algebra: Gateway to a technological future*. Mathematical Association of America. Retrieved from http://www.maa.org/algebra-report/Algebra-Gateway-Tech-Future.pdf

Joyce, B., Weil, M., & Calhoun, E. (2009). *Models of teaching* (8th ed.). Boston, MA: Allyn and Bacon.

King, A. (1993). From sage on the stage to guide on the side. *College Teaching*, *41*(1), 30–35. doi:10.1080/87567555.1993.9926781

Lage, M., Platt, G. J., & Treglia, M. (2000). Inverting the classroom: A gateway to creating an inclusive learning environment. *The Journal of Economic Education*, *1*, 30–43.

Miles, M. B., & Huberman, A. M. (1994). *Qualitative data analysis: An expanded sourcebook*. Thousand Oaks, CA: SAGE.

National Council of Teachers of Mathematics. (2000). *Principles and standards for school mathematics*. Reston, VA: Author.

Richey, R., & Klein, J. D. (2007). *Design and development research: Methods, strategies, and issues*. New York, NY: Routledge.

Rose, K. K. (2009). Student perceptions of the use of instructor-made videos in online and face-to-face classes. *Journal of Online Learning and Teaching*, *5*(3), 487–495.

Schramm, W. (1971). *Notes on case studies of instructional media projects*. Washington, DC: Academy for Educational Development.

Stage, F. K., & Kinzie, J. (2009). Reform in undergraduate science, technology, engineering, and mathematics: The classroom context. *The Journal of General Education*, *58*(2), 85–105. doi:10.1353/jge.0.0038

Thomas, P. V., & Higbee, J. L. (1999). Affective and cognitive factors related to mathematics achievement. *Journal of Developmental Education*, *23*(1), 8–24.

Toto, R., & Nguyen, H. (2009). Flipping the work design in an industrial engineering course. In *Proceedings of the 39th ASEE/IEEE Frontiers in Education Conference*. San Antonio, TX: IEEE.

Yin, R. K. (2008). *Case study research: Design and methods* (4th ed.). Thousand Oaks, CA: SAGE.

Zimmerman, B. J. (1990). Self-regulated learning and academic achievement: An overview. *Educational Psychologist*, *25*(1), 3–17. doi:10.1207/s15326985ep2501_2

ADDITIONAL READING

Bergmann, J., & Sams, A. (2008). Remixing chemistry class. *Learning and Leading with Technology*, *1*, 22–27.

Bergmann, J., & Sams, A. (2012). Before you flip, consider this. *Phi Delta Kappan*, *94*(2), 25–26.

Bergmann, J., & Sams, A. (2012). *Flip your classroom*. Eugene, OR: Inte.

Berrett, D. (2012). How ‘flipping’ the classroom can improve the traditional lecture. *The Chronicle of Higher Education*, 12.

Bonwell, C. C., & Eison, J. A. (1991). *Active learning: Creating excitement in the classroom*. Washington, DC: School of Education and Human Development, George Washington University.

Concannon, F., Flynn, A., & Campbell, M. (2005). What campus-based students think about the quality and benefits of e-learning. *British Journal of Educational Technology*, *36*(3), 501–512. doi:10.1111/j.1467-8535.2005.00482.x

Gagne, M., & Shepherd, M. (2001). Distance learning in accounting: A comparison between a distance and a traditional graduate accounting class. *T.H.E. Journal*, *28*(9), 58–60.

Hill, J. R., Song, L., & West, R. E. (2009). Social learning theory and web-based learning environments: A review of research and discussion of implications. *American Journal of Distance Education*, *23*(2), 88–103. doi:10.1080/08923640902857713

Johnson, G. M. (2006). Synchronous and asynchronous text-based CMC in educational contexts: A review of recent research. *TechTrends*, *50*(4), 46–53. doi:10.1007/s11528-006-0046-9

Schaffhauser, D. (2009). The Vod Couple. *T.H.E. Journal*, *36*(7), 19–23.

Spiceland, J. D., & Hawkins, C. P. (2002). The impact on learning of an asynchronous active learning course format. *Journal of Asynchronous Learning Networks*, *6*(1), 68–75.

Tucker, B. (2012). The flipped classroom. *Education Next*, *12*(1), 82–83.

KEY TERMS AND DEFINITIONS

Active Learning: Learning that involves active student participation in classroom activities.

Blended Learning Environment: A learning environment that utilizes both online and face-to-face learning activities.

Cooperative Learning Activities: Activities designed to promote student collaboration to reach a common goal.

E-Learning: Learning that involves student use of electronic and often online resources.

Flipped Classroom: A teaching strategy where lectures (which typically take place inside the classroom) are assigned as homework so that class time can be used for engaging activities.

Inverted Classroom: A synonym for flipped classroom.

Screencasts: Screencast or screen capture is the digital recording of any activity taking place on the computer screen.

This work was previously published in Promoting Active Learning through the Flipped Classroom Model edited by Jared Keengwe, Grace Onchwari, and James N. Oigara, pages 47-70, copyright year 2014 by Information Science Reference (an imprint of IGI Global).

Chapter 30
Blended Learning Support for Undergraduate Students' Research and Writing Skills Development

Asako Yoshida
University of Manitoba, Canada

ABSTRACT

In this exploratory study, a subject librarian and a writing instructor investigated the potential of designing blended learning around research paper assignments in the context of two foundational courses in the Faculty of Human Ecology at the University of Manitoba, Canada. The objective was to explore alternative, more embedded learning support for undergraduate students. The significance of blended learning support was situated in the broader literature of the teaching and learning practices in higher education. In this case study, descriptions of blended learning support for facilitating student learning, and of the main barrier to its implementation are provided. Based on what was learned in the exploratory study, the chapter provides working guidelines for designing and developing blended learning support, mainly drawing from Butler and Cartier's (2004) research on academic engagement.

INTRODUCTION

The on-going development in Information and Communications Technology provides affordances to explore the designing of more meaningful and student-centered learning environments in higher education. The idea of developing student-centered learning environments can be applied to supporting undergraduate students' research and writing skills in many undergraduate programs. Blended learning, "the thoughtful integration of classroom face-to-face learning experiences with online learning experiences," (Garrison & Kanuka, 2004, p. 96)[1] has the potential to be an alternative to the primarily lecture-based traditional writing-intensive courses in many undergraduate programs. The project that will be discussed in this chapter was conceived as a learning project and initiated by a subject librarian and a writing instructor, to explore an alternative more integrated model, by

DOI: 10.4018/978-1-4666-8246-7.ch030

embedding blended learning in a specific course context in collaboration with course instructors. The project involved designing blended learning around research paper assignments in the context of two different foundational undergraduate courses in the Faculty of Human Ecology at the University of Manitoba in Canada. This case study explores blended learning—primarily focusing on its pedagogical issues—as the means for offering students alternative learning environments that may be more conducive to supporting and scaffolding development of their research and writing skills. Because this was initiated neither by the course instructors nor by the faculty-level planners, there was a question of the extent to which the course instructors would welcome the collaboration. Furthermore, this study was not intended or meant to redesign the courses that were essentially conceived and designed as traditional, face-to-face classes. The study, however, started with the intention of the librarian and the writing instructor to investigate a better way of supporting the development of students' research and writing skills with an open attitude of "see what's going to happen." The project thus became an exploratory study because we looked for the opportunity to enhance student learning while we prepared to make necessary adjustments to honor the original course syllabi and the course instructors' teaching. The students who are coming into higher education are increasingly diverse not only in their research and writing skill levels, but also in their prior experiences before their entrance to the undergraduate programs. We were interested in the potential of blended learning support to broaden the learning opportunity for an increasingly diverse undergraduate students body.

The exploratory study was shaped largely in response to two different course circumstances and resulted in two different outcomes: in the first course, the blended learning support aspects of the course integrated well into the rest of the course while the integration did not work well in the second course. The objectives of this chapter are:

1. To situate the original intention of the exploratory study in the broader literature addressing the teaching and learning practices in higher education.
2. To present a case study of blended learning support by comparing and contrasting the two different course circumstances.
3. To describe student learning experiences from the exploratory study using the results of the surveys and semi-structured interviews with student volunteers as well as the observations and insights that emerged from the study.
4. To describe the key potential of blended learning support in facilitating student learning and to offer designing guidelines, drawing mainly from Butler & Cartier's (2004) and Nelson's (1990) research.

BACKGROUND

How the learning opportunities are created or arranged for students in higher education are traditionally dictated by the specific roles or service functions assigned to teaching faculty, librarians or writing instructors, respectively. Also there is some variation in how the learning support functions on campus are organized, whether they are managed under one administrative unit or managed separately under multiple administrative units.[2] The course instructor has authority over the course content, while librarians and writing instructors are often asked to parachute into the class to address the information literacy skills or writing skills. Alvarez (2007) points out the "institutional disconnect" inherent in the traditional support model in which librarians and writing instructors support research and writing skills of students "in parallel lines" (p. 27) – by separating students supports into the pedagogy of research and the pedagogy of writing. Although it is traditional to teach research and writing skills as two separate sets of skills within higher education, both skills are intricately connected and interwoven around a given academic task. We thus embarked on an exploratory study to investigate the potential for implementing blended learning support as a means to create an alternative learning environment in which undergraduate students can assess the academic task at hand more productively, and in which "situated learning" (Lave & Wenger, 1991) can take place.

Teaching and Learning Environment for Research Paper Assignments

The initial attraction to the notion of blended learning emerged from the experiences of the subject librarian who was offering a library session for a long-established foundational course in the Faculty of Human Ecology. She came to note, after supporting the course for many years, that the description of research paper assignments and the instructions given in the course were not sufficient to guide students. The assignment was to develop and construct students' own "definition" of Human Ecology, drawing from course readings and other academic sources. The Faculty of Human Ecology offers a number of different undergraduate programs in reference to the broader highly interdisciplinary area of study identified as "Human Ecology." The assignment was, in fact, a reflective paper for students to shape and define their own perspective about Human Ecology, drawing from their own personal aspiration or orientation to the particular program area they were individually pursuing in the Faculty. They were asked to do this by incorporating academic sources they located in the literature. Many students, however, often caught up in the words, "the definition" included in the assignment sheet, were mistakenly guided to look for some "official" definition in the literature without taking into consideration their own perspective or experience.

The particular instance of undergraduate research paper assignment was described as an example. In general, however, it seems a common practice in higher education to rely mainly on the explicit descriptions of research paper assignments for everyone: instructors, students and support professionals alike. It had been a regular practice for the subject librarian to discuss the nature of research paper assignments with the course instructors before conducting her library sessions. In the past, the discussions with the foundational course instructors about research paper assignments were often limited to simply referring to the explicit descriptions of the assignments provided in the assignment sheets. Although students seemed to need some fundamental support in understanding their assignments better, this practice inherently emphasized the end products as opposed to the learning processes involved in producing the final papers. Brown, Collins, and Duguid (1989) view this common practice in higher education as the result of assuming the traditional pedagogy of didactic education: "a separation between knowing and doing, treating knowledge as an integral, self-sufficient substance, theoretically independent of the situations in which it is learned and used" (p. 32). Entwistle, McCune and Hounsell (2003) indeed confirm the common experience of lower undergraduate students: "Much of the academic discourse remains implicit within the early years of undergraduate students, and so students can be left confused about what exactly is being required of them to earn good grades" (p. 4). The traditional practice in higher education seemed almost designed to fail students at the time when they can be guided to build the foundation for their future studies.

What are the other barriers to make more productive learning experiences around research paper assignments for undergraduate students? The Canadian study of all undergraduate writing assignments given during one school year at one small, liberal arts college attests to the difficulty of students in interpreting what exactly is expected in the writing assignments that are identified as "papers" or "essays" (Graves, Hyland & Samules, 2010). The primary difficulty associated with the undergraduate written assignments, according to the study, is the labeling of diverse tasks included under the category of written assignments. They found that "definitions and meanings across the many different labels are unlikely to be consistent" (p. 310). More importantly, although the explicit information about the "paper" or "essay" task is provided in the syllabus or assignment sheet, students are often not well versed in interpreting those, nor are they purposefully directed to the implicit and social-contextual dimensions of the academic task definition (Hadwin, 2006; Haggis, 2007). These "hidden" aspects of the assignment are often left out of the syllabus or the assignment sheet for discussion. Although such information may be provided face-to-face in the class meetings, without clear guidance or support available, students tend to interpret what is expected in "research papers" or "essays" in their own terms with their limited experiences (Bereiter & Scardamalia 1987; Gordon 1990; Hammann 2005; Perry, 1998).

Guiding students through the complex processes involved in completing higher education research papers poses a challenge for many instructors. Elanders et al (2012) observe that it is not unusual for course instructors to experience difficulty in specifying what constitutes good student writings. Haggis (2006) argues that the complex processes "can only be described, discussed, compared, modeled and practiced" but "cannot be 'delivered' " (p. 532). As an example, she explains the importance of analyzing with students what an essay question is addressing by discussing its complexity from various angles "rather than closing it down, or predetermining the student's answer" (p. 532). In response to the common problem of making the complex academic task a more productive learning experience for undergraduate students, Bass and Eynon (2009) provide a powerful impetus for adopting new pedagogies in higher education: making the invisible visible for student learning. Bass and Eynon refer to the notion of "expertise" to explain the pedagogical advantages of new media environments in higher education. They emphasize that the new emerging pedagogies associated with the use of the new media allow novice learners to explore and experience intrinsic and intermediate processes with intricate layers of learning as practiced by the experts. They also argue that the new emerging pedagogies associated with the use of new media in turn creates the opportunity for the novice learners to incorporate the accompanying dispositions of the experts as their own.

The Approach to Facilitating Information Literacy

When students are not connected appropriately to the tasks at hand in a research paper assignment, the tasks will not lend themselves to facilitating the students' information literacy skills. The librarians as a professional group refer to the Information Literacy Competency Standards for Higher Education (ACRL, 2000) to guide and facilitate students' information literacy skills. However, following Lava and Wenger (2009), any general abstract presentations pertaining to human skills in the form of principles or standards, such as the ACRL Standards, are "meaningless unless they can be made specific to the situation at hand" (p. 33). According to them, these Standards are akin to "so-called general knowledge" and they have "power [only] in specific circumstances" (p. 33). In other words, we can only facilitate students' information literacy skills as they work through assignments to understand and address the tasks that they are being expected to learn in a given course context. Only in an actual working context can students assess the relevancy and use of the information sources they found. The approaches taken by Zamel and Spack (1998) in understanding how students acquire academic literacies may be useful in situating students' information literacy skills and writing skills development. Drawing from research on second language acquisition, Zamel and Spack argue that academic literacies also have to be perceived "not as an end in itself, but rather as a means for understanding and constructing knowledge" (p. x). The important point would be for students to be able to engage in meaning-making of their own to address the subject matter or the topic they are studying. Information literacy has to be part and parcel of students' intellectual processes. Facilitation of the information literacy skills as identified in the Competency Standards, therefore, should not be left as purely technical skills to be measured. Instead, facilitation of information literacy has to be situated in "student-centered learning environments where inquiry is the norm, problem-solving becomes the focus, and thinking critically is part of the process" (ACRL, 2000, para 14). Furthermore, the learning in higher education has to take place in the academic practice of a chosen discipline. This means to learn "how to do the learning in that subject—how to think, question, search for evidence, accept evidence, and put evidence together to make an argument that is acceptable in that discipline" (Haggis, 2006, p. 532).

Student Approaches to Learning Research and Writing Skills

What is the evidence in the literature addressing how students are coping or adjusting to the new set of learning strategies that is required for completing undergraduate research paper assignments? The studies investigating how students approach research paper assignments attest to the importance of appropriate guidance for students to complete their writing assignments. Limberg (1999), for example, identified three different understandings of information seeking and information use among high school seniors who worked on the identical research assignment. Her research indicated that their different approaches to the assignment resulted in different learning outcomes. For one group of students, research meant looking for "facts" to answer a series of discrete questions, and for another group of students, it meant uncritically gathering enough information to formulate a balanced position; for others, it meant critically assessing information sources, different values, and biases underlying different stances and perspectives represented. Similarly, Hayes and Nelson (1988) identified two distinct approaches used by students completing writing assignments across the campus in their study at an American, four-year research university. Based on their research, Hayes and Nelson characterized the approaches as "content-driven" versus "issue-driven," or "low-investment" versus "high-investment." These different understandings about the objectives of the writing assignments produced very different learning processes and products: "In the first case students would set out to reproduce information found in sources, and in the second they would transform source material to produce original syntheses or conclusions" (para 78).

The above two differing approaches towards research paper assignments of undergraduate students, identified by Hayes and Nelson (1988), are also recognized by other education researchers (Dobozy, 2011; Morton & Säljö, 1976a, 1976b; Roscoe & Chi, 2007; and Scardamalia & Bereiter, 2006) using different labels to characterize students' qualitatively different learning approaches to academic tasks. For example, Morton and Säljö (1976a, 1976b) used the terms "surface" and "deep" learning approaches, and Scardamalia and Bereiter (2006) used "knowledge telling" and "knowledge transforming."

Some researchers point out the pedagogical shift needed in educational institutions in order to properly facilitate students to be more productive learners. For example, Dobozy (2011) critically addresses the institutional barriers in schools that encourage students to rely on "teachers' knowledge telling approaches" (p. 36). The support for reflective knowledge building in education, rather than knowledge telling, has been addressed for some time as a critical issue for raising the new types of learners for the 21st century (Barr & Taggs 1995; Roscoe & Chi 2007; Scardamalia & Bereiter 2006).

Blended learning thus can be viewed as one of the methods to explore and develop the alternative learning environments in higher education to engage students in "knowledge transforming" and reflective knowledge building experiences.

From a Pilot Study to the Exploratory Study

Our experiences of the exploratory study will be presented as a case study in planning, designing, and delivering blended learning support around the first research paper assignment in the two different undergraduate foundational courses.

How the exploratory study came to be is somewhat complex. The study of blended learning support in the context of two undergraduate foundational courses was not what we originally planned. The collaboration of the subject librarian and the writing instructor started as a response to the call for a proposal for the 2011 Summer Session Innovation Fund from the University's Extended Education. The Innovation Fund was aimed at encouraging the developing of innovative blended learning projects to be delivered with 2011 summer courses. The initial idea was to do a pilot project in one well-established foundational course in the Faculty of Human Ecology that the subject librarian supported. The course we targeted was offered every year in the fall as a regular-semester course and additionally as a summer session course for many years. The opportunity to do a pilot project during the summer session made a lot of sense because it would provide a good learning ground for the experiment while the class size was small and easy to handle. The idea of supporting students in blended learning also had the potential for bringing the course instructor, the librarian, and the writing instructor into a common pedagogical planning space for designing the support for students around research paper assignments. It was also hoped that the pilot project would establish some basis for future collaboration in modifying and adjusting for the bigger, regular-semester class in the fall. We invited the Faculty to collaborate with the project. After receiving the grant and getting support from the Dean of the Faculty and respective Heads of the Library and the Academic Learning Centre, we proceeded with and completed the project.

The initial idea of doing the pilot project during the summer session in 2011 (from now on identified as "the summer 2011 course"), however, was quickly revised right after we had completed the project when we found out that the summer session had become the last run of the long-established course. A brand new foundational course was then scheduled to start in the following winter semester (January to April 2012; from now on identified as "the winter 2012 course") replacing the long-established course. Based on the success with the summer 2011 course project, we decided to proceed with another blended learning project. This time, however, the winter 2012 course had a set of different course circumstances: 1) the large class size of a regular-semester course, 2) different course content and topics, 3) a different set of research and writing assignments, and 4) a new course instructor with whom to collaborate. In order to continue with the experimentation, we received support from another internal grants program of the University, the Teaching & Learning with Technology Grants Program from the University Teaching Services.

The two blended learning projects thus together became an exploratory study instead of the pilot project we initially conceived. The study gave us an opportunity to explore ways to integrate blended learning support situated around research paper assignments in the context of two different foundational courses. These undergraduate courses were originally conceived for traditional, face-to-face, primarily lecture-based classroom environments in the same Faculty.

The Exploratory Study: Different Administrative Frameworks

The different administrative circumstances associated with the two courses in the exploratory study influenced the planning and delivering of blended learning support. Each course in the exploratory study was designated as a second year course that was required to complete a degree in the programs offered in the Faculty. The courses had the same value of "3 credit hours."[3] This meant a total of 36 hours was allocated for students to complete each course.[4] Although the credit value of the courses was the same, the summer 2011 course met twice a week for 7 weeks. On the other hand, the winter 2012 course met three times a week for 12 weeks. The summer 2011 course was small with a total of 11 students completing the course, while the winter 2012 course had a bigger class of approximately 130 students at the beginning of the semester and 114 students completing the course.

The different dynamics in the respective courses due to the class size may have influenced the way students experienced their learning in the course, and, in turn, their experience of the blended learning support. For the summer 2011 course, for example, the course instructor occasionally used the library's computer lab to have students work on the research paper assignments to provide a break from the otherwise, long hours of sitting in the same classroom during the days when they had a class. In the lab, the students discussed some of the issues they were encountering with research paper assignments by referring to the online course guide materials that were developed as a part of the blended learning support. This kind of in-class activity in the small class setting might have helped to make a better synergy between the face-to-face and online activities. The instructor for the winter 2012 course also referred to the online course guide as a useful reference when students asked questions about the assignment. In the winter 2012 course, however, even a minor discrepancy between the instruction given by the instructor in the class and what was included in the online course guide created some confusion among the students. We learned from the winter 2012 course that in a large class, careful coordination between class instructions and the instructions presented in the online guide becomes more important, especially when the librarian and the writing instructor are involved as collaborators in providing blended learning support. Furthermore, in a large class, flexible communications and facilitations to guide students become essential.

Another important difference between the two courses was the content covered. The two courses were designated as writing intensive courses in the Faculty involving two research paper assignments. Roughly half of the course grade was derived from the assignments. The remaining portion of the course grade in both courses was generated from two examinations covering the course content. For the summer 2011 course, the course content was the history and development of Human Ecology as the overarching area of study in the Faculty represented by a number of multidisciplinary programs. On the other hand, the winter 2012 course was a research methods course covering the main three clusters of research methods in social sciences.[5] Some students indicated in the online survey we conducted after the completion of the course that the subject matter of the winter 2012 course was rather dry and somewhat difficult to relate to, while we did not receive a similar response about the summer 2011 course from the students. In sum, the different nature of the course content in addition to different class size might have influenced how students experienced their learning in the course as a whole and in turn how they experienced the blended learning support.

The Planning and Developing of Blended Learning Support

There were some significant differences between the summer 2011 and winter 2012 courses in the planning, and in our attempt to incorporate blended learning support around their research paper assignments. The instructor for the summer 2011 course was teaching the same course for the second time after teaching the course in the previous fall semester. Since the course was a long-established foundational course in the Faculty, the subject librarian was very familiar with the course and its assignments. The writing instructor also had some familiarity with the course assignments, having supported the students from the same course over the years in her capacity as a writing instructor at the Academic Learning Centre of the University. Having the prior knowledge about the course assignments made a big difference during the planning discussions with the course instructor. A total of five meetings were held prior to the start of the summer 2011 course. We discussed the general idea of incorporating blended leaning components into the course to support and scaffold students as they worked on the various research and writing steps that were involved in research paper assignments. During these meetings, the task definition of the first assignment was substantially discussed, clarified and verified, together with the coordination of the course schedule, a review of course progression and key dates, and other administrative matters. The discussion was not always specifically related to the planning and designing of blended learning. For example, the instructor shared her passion for the use of "personal narratives" and "personal voice" in social sciences research. This angle was in fact very relevant to our thinking about guiding students along the research paper assignment of the course. This same point also resonated with the main purpose of designing blended learning support to connect students to the objectives of assignment. In the research paper assignment for the course, students were asked to elaborate on their orientation or relationship to Human Ecology as a broader disciplinary area represented by the Faculty using and incorporating academic and research sources. In addition, having the experiences of the students who took the same course in the past, especially having the sense of "disconnect" to the assignment among the students, made the subject librarian well prepared for the planning. The delivery of the blended learning in the summer 2011 course went very smoothly without any particular incidents.

The winter 2012 course, in contrast, was being offered for the first time, as a brand new course. Everyone, including the course instructor, was new to the course. We had to work with the new set of research paper assignments. In addition, for the subject librarian and the writing instructor, working on the winter 2012 course meant establishing a new working relationship with the new course instructor. Two preparatory meetings were held before the course started; these were followed by e-mail communications. In the planning meetings, the course coordination pertaining to the course coverage and its progression, key dates, and other administrative matters, became the priority for our discussions. We did not have the time for a thorough analysis of the task definition of the assignment as we had with the summer 2011 course. Furthermore, during the planning meetings, we had some difficulty in clearly situating or connecting the topic assigned in the first research paper assignment to its course content covered. We could not clarify its pedagogical purpose, but that would have been essential in developing some consensus among the collaborators to coordinate and guide students around research paper assignment.

In the winter 2012 course, the blended learning aspects of the course were in effect being segregated from the rest of the course instead of being integrated into the course during the planning stage with the course instructor. This was partly due to lack of time allocated for proper planning, but more importantly, due to the course syllabus, which focused on the course content rather than guiding or facilitating student learning or learning processes related to the assignments. Although the course was designated as a writing intensive course, research paper assignments were treated as separate activities from the rest of the course, according to its syllabus. This misalignment may be the real-life administrative constraint that binds many instructors who need to teach a large-size undergraduate course, and who often do not have adequate time to modify the syllabus and adjust classroom activities accordingly. Sessional course instructors, in particular, are often required to teach according to the syllabus that is provided to them. The winter 2012 course thus became fundamentally incompatible with the orientation of blended learning support as we originally envisioned, and we were rather restricted in our effort to incorporate blended learning support into the course already in its planning stage.

The Blended Learning Support and Its Delivery

In this section, how we structured the blended learning components in the summer 2011 and winter 2012 courses will be discussed.

Despite the different administrative frameworks associated with these courses, the basic structure of blended learning for both courses consisted of two basic components: 1) an online course guide that was developed using Springshare's Libguides platform[6]; and 2) an online interactive space that was established using the discussion board module on the University's Learning Management System (LMS). The objective of developing the online course guide was two fold: 1) to provide guiding instructions and materials to help students connect to the purpose of the writing assignments; and 2) to develop and gather all the useful resources in one online location that students could refer to when needed. For the summer 2011 course, for example, in addition to the instructional pieces related to the task and steps involved in each assignment, the online course guide included a library database search tool, the instruction on how to search relevant journal articles, writing tips, the resources for APA citation and formatting style, and links to course readings. Separate tabs in the online course guide's navigational bar organized the different resources covered and made it easy to browse the online course guide. The guide also contained a list of due dates for all the interactive exercises in the course, and it was seamlessly linked to the course site on the LMS. The course site's navigation bar easily linked back to the online course guide. Thus, students could go back and forth between the guide and the course site on the LMS seamlessly and easily. On the discussion board, students were given instruction at each stage to post their draft pieces and then to give feedback to two peers of their choice from the class or from their assigned group.[7] They were asked to provide feedback on peers' postings highlighting the effectiveness of the peers' pieces. For instance, was the piece a good example of an outline or an annotated bibliography according to the instruction provided? The discussion board was used with three pedagogical purposes in mind for students: 1) to have a wider audience than the instructor or the grader of the paper; 2) to experience the variation in writing styles or effectiveness in their peers' posts; and 3) to reflect on their own writing style or skills.

In addition to the online course guide and the online interactions on the discussion board, the subject librarian provided an in-class library session in each course demonstrating the use of a library tool to search and browse relevant sources according to research purpose of each assignment. For the summer 2011 course, since the class was small, half of the class time was allocated to a hands-on session. For the winter 2012 course, on the other hand, because of the large class, a question-and-answer period followed at the end of the librarian's demonstration. The specifics of the blended learning structures developed for the respective courses are provided as Table A and Table B in Appendix.

The Variation in the Blended Learning Support

There were some variations in how we structured blended learning support between the two courses. Since the summer 2011 course was small in size, the blended learning components kicked off with a simple, warm-up exercise of interviewing a peer in the classroom about his or her connection to Human Ecology. Students were then asked to write a paragraph introducing the peer and post it on the discussion board. The research paper for the summer 2011 course was, as earlier described, to write student's own definition of Human Ecology. In the winter 2012 course, on the other hand, the students were asked to study, reflect and write about their own perspective on "the determinants of health," which is a policy and research discourse that is relevant to all fields covered in the Faculty of Human Ecology. The students were specifically asked to do this by comparing and contrasting two differing approaches or examples of "the determinants of health" that they found and identified in the literature. The blended learning components for the winter 2012 thus started with a 4-day class-wide brainstorming session using Twitter after a brief instructional session by the subject librarian on how to conduct the Twitter session. The students were asked to type and share their own personal meanings of "health" up to 140 characters at a time, at least twice during the 4-day period. The streaming of the Twitter feeds was posted on the online course guide to be monitored by everyone. This brainstorming exercise was designed to given students a warm-up leading to the main topic of the research paper assignment.

For the research paper assignment in the winter 2012 course, the students were asked to study, reflect and write about their own perspective on "the determinants of health," which is a policy and research discourse that is relevant to all fields covered in the Faculty of Human Ecology. The students were specifically asked to do this by comparing and contrasting two differing approaches or examples of "the determinants of health" that they found and identified in the literature.

Another important variation in the winter 2012 course was the incorporation of the Online Writing Tutor, a free service available from the Academic Learning Centre on a voluntary basis to all students at the University. The students were asked to submit a draft thesis statement with an outline to the Tutor, and received quick feedback within 24 hours. The writing instructor provided in-class instruction on thesis statements and explained how to use the Online Writing Tutor for the assignment. There was also a minor variation in how we used discussion board posting in the winter 2012 course. In the summer 2011 course, the students shared their research and writing processes by mainly posting their draft pieces for their peers' feedback. For the winter 2012 course, the students were also asked to post the final version of the introductory section of the paper for the peers' feedback as their final step in the assignment. The objective was to re-enforce their understanding of the role of the introductory section in research papers.

The Alignment and Misalignment of Blended Learning Support

Aligning the face-to-face classroom and online activities with the broader learning objectives of the course, more specifically with the purpose of research paper assignment, should be the core activity for developing blended learning support and the focus of the collaboration (Biggs, 1996; Biggs & Tang, 2011; Garrison & Vaughan, 2008). In the exploratory study, however, the librarian and the writing instructor initially had only a vague understanding of how to implement alignment. The original idea of how to structure blended learning support in the course, instead, was mainly drawn from the knowledge of the long-established foundational course in the Faculty as a prototype. The summer 2011 course definitely had an advantage of developing blended learning around its assignment. The original assignment already had sequentially broken-down research and writing activities into mind mapping, outlining, and creating an annotated bibliography, and submitting a draft and final paper. This gave us a prototype of sorts to guide students, first with the purpose of the research paper assignment, then with the sequentially broken-down steps of research and writing processes. For the summer 2011 course, we spent some time working on the paper assignment itself by clarifying its objectives and purpose in order to include some useful guidance in the online guide. In addition, we included the video clips of three recent graduates from the Faculty whom we interviewed as additional materials to help students connect to the assignment at more personal level. In the video clips, the recent graduates talked about the work they do in their respective fields highlighting some personal accounts of their connection to Human Ecology. Preparation for the rest of the blended learning support for the assignment involved developing specific instructions to guide online activities on the discussion board and related tips and resources in the online course guide. For the summer 2011 course, we did not experience any misalignment issues during the delivery of the blended learning support.

For the winter 2012 course, on the other hand, since we did not have enough time to discuss the assignment in detail during the planning meetings, we relied, to a large extent, on the explicit information provided in the assignment sheet to develop blended learning components. For this reason, important questions, such as what is the purpose of the assignment, what exactly students are supposed to "compare and contrast" about "the determinants of health" as described in the assignment sheet, for example, remained somewhat vague. As we previously discussed about the planning for the winter 2012 course, there was not much room to integrate blended learning aspects properly into the course. We simply rewrote the original description of the assignment provided in the assignment sheet by breaking it down into easier steps and provided them as a guide for the assignment in the online course guide. We also included links to a number of different references to "the determinants of health" from government, intergovernmental and academic sources on the Internet. We could not, however, develop additional materials or opportunities to connect students to the purpose of the assignment.

Similarly, specific online activities we provided in the winter 2012 were developed somewhat separately, with inadequate time for planning properly to align or coordinate with the course instructor. This inadvertently led to some confusion among the students. For example, when students were asked to post a draft paragraph of their initial understanding of "the determinants of health" on the discussion board, as a subsequent step after the brainstorming session, many students were confused as to what were expected in the paragraph. Some students ended up repeating what they produced during the brainstorming session. Although no guidance was in place after the brainstorming session due to lack of coordination to bridge these separate activities, the students ideally could have been guided through the form of class discussion in reference to their research readings to help them orient with "the determinants of health." Questions such as "Why 'the determinants of health' was used in the course assignment?" or "What is the overarching role or relevancy of such a policy and research discourse in their fields?" might have been helpful for students as an introduction to "the determinants of health."

Another major confusion in class occurred when the subject librarian conducted a library session for the class. She demonstrated how to use keywords to formulate search strategies in order to effectively search and browse potential sources using a library database tool. Since the main coverage of the winter 2012 course was three key clusters of research methods in social sciences, she demonstrated ways to search and browse the tool using "determinants of health" as the key search term, combining with another term associated with a research method of choice, and any additional term representing a topic of choice.

It turned out, however, that the course instructor wanted students to approach "the determinants of health" at a general conceptual level and addressing research methods was not the focus of the assignment. After the confusion occurred due to the subject librarian's different interpretation of the assignment, the course instructor used separate class time to clarify what were specifically expected in the assignment using her PowerPoint slides. The subject librarian followed up by setting up a search feed of the articles related to the policy and research discourse in the online course guide to ease the confusion.

When we reviewed the planning and delivery of the blended learning support in the winter 2012 course, we found that the support should have been aligned more closely to how the course instructor was going to introduce and discuss the assignment and facilitate students in the class. The two effects of the misalignment described for the winter 2012 course, in turn, highlighted the gap between the original intention of designing blended learning support and the pedagogical orientation embedded in the course syllabus and its associated teaching practice. There is no doubt that we required substantial time to negotiate the gap and to ensure that there was thorough coordination among the collaborators in order to guide students. Garrison and Vaughan (2007) emphasize "reconceptualize[ing] and redesign[ing] the entire course" (p. 106) as an important first step for planning blended learning that is not simply "a juxtaposition of new technology and old pedagogy" (Levey, 2006, as cited in Garrison & Vaughan, 2007, p. 7). This essentially requires a higher-level commitment, probably at the Faculty level, to providing more student-centered learning environments to support undergraduate research and writing skills development. Unfortunately, this was beyond the scope of the exploratory study we embarked on.

Student Learning Experiences in the Exploratory Study

We were interested in the way students experienced blended learning support in the exploratory study. We conducted to this end: 1) a class survey targeting the entire class population at the end of the respective courses, 2) semi-structured interviews recruiting the student volunteers at the end of each course, and 3) two focus groups[8] with a total of 7 students who had taken the same course as the summer 2011 course during the previous 4 years.

For the summer 2011 course, the paper-and-pencil survey was conducted in the class on the last day of the course. For the winter 2012 course, a web link to an online survey was made available for the students to participate for the duration of a week after the completion of the course. We recruited 7 and 14 student volunteers to participate in the interviews for the summer 2011 course and the winter 2012 course, respectively.[9] All students we interviewed for the summer 2011 course were in their 2nd year of their undergraduate program; on the other hand, we interviewed a mixed group of students for the winter 2012 course: four 4th year students, five 2nd year students, and five 3rd year students in their respective program in the Faculty. The objective of the focus groups was to make a general comparison, if any, of the learning experiences of the students in the summer 2011 course with those students who had taken the same course without blended learning support.[10] For the summer 2011 course, the experiences of locating relevant research sources for the assignment by the students were drawn both from the survey results, the annotated bibliographies posted on the discussion board, and some observations made during the library session; there was no equivalent set of data to draw from for the winter 2012 course.

Table 1. Methods used to gather student learning experiences

Course	Class Survey		Interviews	Focus Groups
	No. of Students	% of Response		
Summer 2011	11	100%	7 Students*	7 Students
Winter 2012	42	36.9%	14 Students**	N/A

*All 2nd year students. **Five 2nd year students, five 3rd year students, and four 4th year students.

Table 2. Results of a survey question: how do you rate your overall learning experience in the course on the scale of 1 to 5?

Rating Course	1	2	3	4	5
Summer 2011	0	0	1 (9.1%)	2 (18.2%)	8 (72.7%)
Winter 2012	3 (7.69%)	7 (17.95%)	12 (30.77%)	14 (35.9%)	3 (7.69%)

(The number of students who rate a scale of 1 to 5 with a corresponding percentage of the respondents in the parentheses)

Overall Learning Experiences of the Courses

In this section, we will first summarize the survey results of how students evaluated their learning experiences in each course. Then, we will describe how students experienced blended learning support in the respective courses drawing from the survey and interview results, focusing on their experiences with the online course guide and the discussion board activities. In addition, students' experiences of locating relevant sources for the assignment in the summer 2011 course, and their experiences of the Online Writing Tutor in the winter 2012 course will be discussed. A summary of the research methods used to explore how students experienced respective blended learning supports is shown in Table I.

The surveys designed for the summer 2011 course and for the winter 2012 course reflected corresponding blended learning support designed and delivered; as a result, they were not identical. However, both surveys shared one common question, which asked students to rate their overall learning experience of the course on a scale of 1 to 5. The comparison of the responses to the question thus indirectly indicated the general different class dynamics that existed in the two courses. The different class dynamics were possibly due to the difference in the class size or the different course content as they were previously discussed. For the summer 2011 course, all 11 students who completed the course (100%) participated in the survey and the majority rated either 4 or 5 as their overall learning experience of the course. Specifically, eight students rated 5 (72.7%), two students rated 4 (18.2%) and the remaining one student rated 3 (9.1%). For the winter 2012 course, of the 114 students completed the course, 42 (36.8%) students responded to the survey. The responses to the same question spread much more widely for the winter 2012 course: 3 (7.14%) respondents rated 5, and the rest of the respondents, 14 (33.34%), 12 (28.57%), 7 (16.67%), 3 (7.14%) rated 4, 3, 2, and 1, respectively, with 3 (7.14%) not responding to the question. Table II summarizes the results.

The Online Course Guide

In general, many students from both courses found it very useful to have all the reference and instructional materials in one place on the online course guide, and indicated that the guide assisted them working on the assignments. Many students referred back and forth to the online course guide in order to orient themselves to the assignment; as one student from the summer 2011 course indicated, "Whenever I was confused, I would go there." Although there were no additional instructions or materials given for the assignment in the online course guide for the winter 2012 course, some students still appreciated having the guide to the assignment as we had provided in the online guide. The online survey results from the winter 2012 course indicated that the APA resources tab was the most frequently used and ranked as the most useful resource in the online course guide. (See Table A and Table B in Appendix for the resources provided for respective courses). The students also found the instructions about thesis statements, and other writing tips in the online course guide to be useful. There were a few students who were not particularly keen to use the online resources for both courses; one student in the summer 2011 course, for example, indicated that she preferred to use a handbook instead.

The Students from the Summer 2011

The majority of the students from the summer 2011 course had positive learning experiences with the blended learning support designed around the research paper assignment. Some students also strongly expressed, both in their interviews and survey, their appreciation of the course content—the history of Human Ecology—and of the research paper as a vehicle for expressing their personal voices. One student realized that the research and writing processes are "not just putting in random filler." Another student learned to connect ideas: "Before I didn't connect ideas … I just stated them and went on to the next point." In comparison to the learning experiences of the students who participated in the focus groups, the students in the summer 2011 course seemed to have gained more positive learning experiences. The students in the summer 2011 course clearly appreciated learning the significance of the APA style and its role and function in the research and academic writing in their fields.[11] One student, for example, emphasized the importance of keeping her own voice while working in the APA style. This was a sharp contrast to the strongly expressed dissatisfaction by half of the focus group participants, who had previously taken the same course without blended learning support. They found that they were overly penalized by losing marks on some technical APA style details, and that the intellectual benefits of the assignments in the course were rather low. The students who took the course previously had also dealt with the same steps involved in working on the assignment, such as mind mapping and outlining, but submitted each draft piece they had worked on at every stage of their writing processes; and each piece was individually graded towards their marks. The reason for the dissatisfaction expressed in the focus groups is largely a matter for speculation. Some students may have inadvertently viewed or experienced the research and writing steps including APA formatting and style rules as somewhat separate, segregated activities, rather than experiencing these steps as comprising the various negotiating processes for completing the paper. For the summer 2011 course, in order to incorporate blended learning support, all the writing steps designed in the assignment were converted into participatory marks from the original graded marks. This was perhaps more successful in presenting the idea to the students that these sequential steps are important research and writing processes.

The use of the discussion board module of the LMS in sharing and giving feedback among the students created an alternative learning environment to the class lectures. One student appreciated the arrangement: "Anything that takes you away from lectures and note-taking." This structure probably also contributed to giving students the sense of connections between the sequential tasks involved in completing their papers. The interactions on the discussion board at various stages of research and writing processes indeed had some positive effects on their learning. Five students out of the eleven students we interviewed for the summer 2011 course specifically expressed how sharing their draft pieces, giving feedback, getting feedback, or reading the feedback given to others, had some positive effects on them. The following comments highlight specific effects experienced by the students:

- "Reading other people's bib's helped a lot because other people find better sources than you."
- "You never ever get to look at other people's material … you see how other people learn and write … you saw this online." The same student also pointed out the act of commenting on their peers' strengths itself had positive effect on her.
- One student shared that her peers' outlines were written in the reverse order of hers. In addition, she saw the value in the detailed approach of others: "For the future, my outline will be a lot more detailed."
- Reading the peers' comments and questions gave one student reminders and good ideas: "You started formulating your own ways."
- Receiving positive feedback from one's peers gave another student confidence: "You seldom hear feedback from other people."

Although one student indicated that she did not experience any significant learning effects from the interactions on the discussion board per se, she articulated the importance of sharing her own drafts with the peers. For her, the confidence in her own writing increased and it brought home to her that there was a broader audience than just "the prof." One student, however, was dismissive of online discussion activities: "No one actually read [the posts] … they just did it for the marks."

Identifying and Browsing Relevant Sources for Assignment

The benefit of clearly understanding the purpose of the assignment among the students in the summer 2011 course was evident when the subject librarian conducted a library session. It offered a database search demonstration followed by a hands-on session in the computer lab in the library. During the hands-on session, the students searched individually, without any difficulty, using some of the database searching and browsing methods the librarian demonstrated. Based on the annotated bibliographies the students posted on the discussion board, they showed amazingly diverse collections utilizing a variety of sources, thereby reflecting different, unique perspectives the students were working on. In the survey, the students were asked to rate their success in finding relevant sources in terms of what they accomplished in the paper. Five and six students (45.5% and 54.5%) rated either 4 or 5 out of a scale of 1 to 5, respectively. Five students left some comments in the open comment section of the survey question and indicated that they appreciated the usefulness of the library search tool in locating research and academic sources. One student, however, did not learn anything new from the library session.

The Students from the Winter 2012 Course

Despite the confusion associated with the misalignment of the face-to-face and online activities in the winter 2012 course, the blended learning support offered some diverse learning experiences among the students. In some respect, having the confusion regarding the assignment at the beginning might have created a space for students to engage in some problem solving to clarify the task demands of the assignment.

According to the student interviews, potential negative influences from the misalignment were minimal. Of the 14 students we interviewed, 2 students specifically indicated that having two sources of information about the assignment at the beginning brought some confusion regarding what was actually being expected in the assignment. In the end, however, the interactions with the Online Writing Tutor helped them resolve the confusion and brought them back to be "on the right track" with the assignment. In spite of the initial confusion, the same two students seemed to have gained some positive learning experiences. Both students highlighted in their interviews the importance of doing an outline for the paper properly as a means to bring about and develop a sense of control and self-regulation in their writing activities. One student commented that it was associated with having "a better control of time." The other student indicated her appreciation of the Tutor's feedback to her outline by elaborating that outlining meant "being responsible for my own work" and "always going through what I'm writing to see what I'm doing … do a self-check." She further extended her comment by indicating that having a sense of ownership in her writing is important and this was what she learned in the course.

The Online Writing Tutor support in the winter 2012 course definitely played an important role in salvaging and mitigating the confusion among the students that had arisen from the misalignment aspects of the blended learning support. Eight students strongly indicated that the feedback they received from the Tutor had positive effects on their work on the assignment. Four of those students were redirected to the original assignment sheet after being pointed out by the Tutor that their drafts were "not on the right track." One student, for example, exclaimed, "I could've failed if I didn't have that feedback." Five students we interviewed indicated that they benefitted from a specific suggestion given by the Tutor. One student, for example, received a useful suggestion for setting up her "compare and contrast" in the paper. She referred to the suggestion "quite a few times" as she worked out on the paper. Two other students were directed to revise their thesis statements and outlines. The Tutor pointed out that theirs were too broad and general and needed to be narrowed down. Another student realized the importance of aligning his thesis statement to the body of the paper: "The paragraphs are really involved in [*sic*] the next paragraphs." Two 4th year students who did not appreciate the online activities offered in the course contacted the writing tutor on their own after they received the feedback from the Online Writing Tutor; one contacting the tutor on the phone, the other meeting in a face-to-face session to clarify the "why?" and "how?" of thesis statements and the organization of the paper for the assignment.

The interactions on the discussion board influenced students' learning in a variety of degrees. Ten out of the fourteen students we interviewed from the winter 2012 course expressed some positive effects on their learning. For example, four students tried harder and edited carefully before posting their pieces because they had to share their draft pieces on the discussion board. One student said: "With this experience, I was more challenged to express myself really well. Peer influence impacted greatly because you feel that these are my peers and I've got to show them what I know. And so it impacted my work." Another student indicated: "You want to present yourself in the best way possible." In her case, her extra efforts rewarded her by getting more attention from the members of her group on the pieces she posted. Some students appreciated the asynchronicity of the discussion board. It allowed them to work at home or it gave them a comfortable zone to interact. For example, one student stated: "It by-passed that awkwardness. It's a bit more comfortable."

For some students, viewing the peers' postings provided them with some other learning opportunities. For example, it helped students to situate their writing skills among the peers as one student said: "You could tell who didn't necessarily care. … I've been in that boat where I have no clue. … It gives you a sense of where you're sitting in the class." It also gave some students the opportunity to identify different approaches made or different angles taken by their peers for the same assignment: "Reading what other people wrote was really nice because people approached it in a different way than I would have." For another student, viewing the variation in her peers' approach helped in her meaning-making and in setting a direction to her paper; she further related her learning experience of blended learning support by referring to how she came to be more "independent" as an undergraduate student during her third year when she began taking more responsibility in her schoolwork. Viewing the posting of their peers allowed some students to also identify a good example or model. One student, for example, recognized a good writing style used among her peers and identified it to be "simple, and basic and to the point"; this allowed her to simplify her draft by taking out some "thesaurus words."

Two 4th year students did not find any usefulness in the online interactions. One of them indicated that because she is not accustomed to use an outline in her paper, "it felt like an extra step." Both of them, however, thought that more of the conversational discussions in the class rather than online activities would have worked better for them. They referred to how they appreciated the group discussion in class led by the writing instructor for the 2nd paper assignment.

During the interviews, some students reflected on their development and growth as academic writers. The interviews with the students definitely reminded us of the diversity in where students are with their learning needs and readiness about academic writing. Two students reflected on the various research papers that they had written in their undergraduate career so far and concluded that having more practice would be vital if they were to improve their own research and writing skills. Two other students indicated that the blended learning aspects of the course greatly influenced them in reflecting on their writing styles that they carried forward from their high school years. One student from this group shared how well he did and received a good mark on the assignment. He shared how successfully he negotiated through the feedback he received from the Online Writing Tutor and his peers on the discussion board, and by clarifying the assignment objective with the course instructor. He then pondered his readiness to adopt a more "mature," university style English that he observed among his peers on the discussion board. At the end of the reflection, he reasoned that his high school style would not work at some point as the audience was expanding for him. In addition, one international student shared how she was growing as a foreign student since she first arrived at the University of Manitoba three years ago and how she came to feel more comfortable studying in the "Canadian" environment. For her, her English grammar was her primary concern. During her interview, she expressed a need for more examples, for models of good papers, and for her grammar to be corrected by the writing tutor.

In conclusion, despite the misalignments of the blended learning support, students actively looked for cues or clues to understand what was being asked in the assignment by monitoring whether they were on "the right track" with assignment at various stages. The feedback the students received from the Online Writing Tutor—in some cases, more directly from the tutor—and through the interactions on the discussion board, gave them some tangible cues or clues to go back to their draft and work it through. In fact, four students in the interviews suggested having "an open forum for problem-solving and discussion" beyond the interactions that were already included in the blended learning support. One student alluded to the missing aspect of the blended learning support by pointing out that she needed more help during the class in clarifying what was being specifically asked to compare and contrast in the assignment. The same student also wished that the Writing Tutor's feedback was more descriptive and detailed. Her comments seem to resonate with the lack of a clearer purpose of the assignment with which we struggled during the planning and developing of the blended learning support.

The Key Potential of Blended Learning Support

Blended learning support, if it is properly integrated into courses, has the potential to develop learning environments that are more conducive to engaging students in the complex processes of completing research paper assignments. Blended learning support has the potential, more specifically, to create learning spaces to allow students to "make sense" of the complex processes by reflecting on their own learning, and to guide their own learning as they work on assignments. In the student interviews, some students clearly indicated or implied that they were learning to self-regulate and work through academic writing processes. In both courses—although time management was not specifically highlighted as a theme among the student learning experiences—some students shared their increasing awareness of time management when they work on research paper assignments. Time management is often taught in the first year university orientation course as an aspect of student academic life. It seems that the blended learning support helped some students to be aware of time management as a means to gain a sense of control over their work especially after realizing that more time is needed for working through the multiple steps involved in research paper assignment.

Blended learning support was successfully integrated into the summer 2011 course and made the assignment's purpose and its connection to the course content more visible to the students. The overall positive learning experiences with the course as a whole came through both during the student interviews and from the survey results. Success of the summer 2011 course is largely due to the fact that all the collaborators, including the course instructor, were quite familiar with the course and its assignments prior to the project. We also allocated more time for having open discussions around the course and the assignment during the planning stage. Another important factor for success was that the original course syllabus already included the feature for facilitating writing processes; this made the conversion to blended learning support easier. It was, however, the experiences from the winter 2012 course—where we encountered the problems during the planning and delivery phases—that encouraged us to look for a guiding framework and some designing principles for blended learning support. Having such a framework and guiding principles would be beneficial for the collaboration among course instructors and support professionals to align and coordinate online and face-to-face elements of a course.

A Guiding Framework for Blended Learning Support

Butler and Cartier (2004) provide a useful guiding framework for thinking through the designing of learning environments that facilitate student engagement in any academic work. Central to their framework is students' self-regulatory activities—that is, how students monitor their own thinking processes and guide or regulate their own activities to achieve the objectives of academic work in a given learning context and environment. Butler and Cartier provide five interacting phases of student engagement to cultivate students' self-regulatory activities in any academic tasks including undergraduate research paper assignments:

- **Task Interpretation:** To carefully decipher the requirements of the research paper assignment.
- **Planning:** Setting objectives and selecting approaches for managing the writing task.

- **Enacting:** Implementing selected strategies.
- **Monitoring:** Keeping track of progress in relation to objectives.
- **Evaluating:** Generating feedback for oneself on how thing went.

Butler and Cartier's (2004) framework of student engagement situates students' task interpretation of academic work as the key learning activity: It "sets [their] learning in motion and establishes directions for learning" (p. 1743). In the framework, students' task interpretation is viewed as "a joint function of students' metacognitive knowledge about tasks, their conceptions about the nature of academic work, and how well students actively and strategically focus attention on deciphering task demands" (p. 1743). Butler and Cartier's framework places the task analysis of a given academic work in the broader preparatory analysis required for developing blended learning support. This helps to avoid the pitfall of losing focus of what the instructor wants students to learn in the process. Defining and understanding the requirements for the assignment and what the instructor wants students to learn in the assignment are essential aspects of planning and developing blended learning support. Research shows, however, that a tightly defined or detailed guideline to the point of providing a template for research paper would be counterproductive. In this situation, students often end up producing acceptable papers with minimal time and effort taking shortcuts without engaging in the kind of thinking processes or negotiations required in producing "deeper" learning outcomes (Nelson, 1990). The implication of applying the Butler and Cartier's framework for designing blended learning support therefore is to intentionally guide students' learning processes and self-regulatory activities with explicit instructions.

Butler and Cartier (2004) further identify three interrelated areas for students to understand and manage their own learning when they are working with complex academic tasks. Some examples of how students responded to the cues and clues generated by the blended learning support in the winter 2012 course partially correspond to the three areas identified by Butler and Cartier. Identification of these three areas is useful for guiding blended learning designers and developers to think through the interrelated elements they have to work on. The first area is *task purpose*, which refers to students' understanding or interpretation of the goal or the purpose of the assignment. (Here, the research paper assignments.) The second area is *task structure*. Referring to our example of research paper assignments, students need to have a grasp of the basic structure of research papers they were asked to produce. The third area is *task components*. Butler and Cartier use the knowledge of good writing as an example for task components by referring to "four interlocking and recursive stages, namely planning, drafting, editing and revising" (p. 1739).

Biggs (1996) and Biggs and Tang (2011) advanced "constructive alignment" as an important designing principle for a course and as a means to ensure quality learning in higher education. Butler and Cartier (2004) similarly recommend that various design elements of learning environments have to be thought through by aligning the connections between the activities, task components presented, the instructions provided, and how tasks or the final products are graded. Some key guiding questions and points provided by Butler and Cartier for designing learning environments are also useful for designing blended learning support around research paper assignments:

- Clarify the goals for students' learning. What do you hope they get out of the research paper assignment?
- What do students need to do to accomplish the goals?
- What tasks are to be chosen for guiding students?

- Do the tasks selected contribute to students' understanding about the nature of the academic work?
- Do the tasks selected actually foster intended learning outcomes? "How do learners have to think? What do they have to know? How do they have to perform?" (Jonassen et al, 1999, p. ix, as cited in Butler & Cartier, 2004).
- Provide explicit instructions to promote students' self-regulating activities.
- Promote students' active reflection on processes for completing the research paper.
- Coordinate evaluation or assessment to match task purposes.
- Promote students' self-evaluation.

Blended learning support definitely has the potential for enhancing the "quality of learning" (Biggs, 1996; Biggs & Tang, 2011). The blended learning model can improve students' learning environments by aligning situational factors that the course instructor or course designer has control over. According to Nelson (1990), students draw from two categories of resources to interpret their writing assignments: 1) individual or personal variables; and 2) situational or context-specific variables. The individual or personal variables include students' past experiences with writing assignments or the subject matter addressed in the course, and their familiar strategies to deal with similar assignments. On the other hand, the situational or context-specific variables refer to the learning environments of the course. Specifically, Nelson lists "the criteria used to evaluate products, the quality and frequency of feedback, and the nature of the instructions and other explicit support materials students receive for completing assignment" (p. 391). Nelson found in her research that "students actively interpret the assignments they receive, and that students often rely on implicit cues to determine what counts in completing tasks" (p. 391) as the chapter's case study noticed, in particular with the winter 2012 course.

The Barrier to Implementing Blended Learning Support

Integrating blended learning support by successfully aligning online and in-class activities is a challenge for existing traditional undergraduate foundational courses, especially if the research paper assignment's relationship to the course content is not inherently obvious as presented in the syllabus. The challenge is perhaps inherent in the fundamental gap between the assumption of blended learning support, and the assumption of the traditional face-to-face, lecture based classroom-teaching practices. The former focuses on student learning and learning processes while the latter focuses on the course content and the end product. This pedagogical difference was discussed in Barr and Tagg's (1995) influential article *"From teaching to learning: A new paradigm for undergraduate education."* In the article, they advanced the general pedagogical shift in higher education to "*Learning Paradigm*" from its traditional practice of "*Instructional Paradigm*." With the "*Learning Paradigm*," they envision the purpose of higher education to be "create[ing] environments and experiences that bring students to discover and construct knowledge for themselves" and "to make students members of communities of learners that make discoveries and solve problems" (p. 15). The teaching practice associated with the traditional "*Instructional Paradigm*" emphasizes teaching course content, but is not exactly geared towards student learning, learning processes and discoveries. This paradigm thus is the major barrier to the implementation of the blended learning support we originally envisioned in the exploratory study.

FUTURE RESEARCH DIRECTIONS

In our exploratory study, we were basically on our own to work on the blended learning support projects except when we consulted on and off with the LMS manager to get his technical support. It would have been very helpful if there had been a community of practice on campus to go to and get some feedback, or just to share what we were doing or hearing about the other similar projects on campus. How might we create the campus environment or culture or a community of practice through which new ways of teaching and learning are shared or encouraged to further explore? How might higher education institutions leverage faculty initiatives or grassroots collaborations to manage the changing landscape of teaching and learning practices? These are among the many questions related to developing and shaping the right institutional environment and culture for supporting more student-centered learning environments.

The March 2013 issue of *the Internet and Higher Education* devotes its entire issue to different perspectives addressing the blended learning policy and implementation. For example, Garrison and Vaughan (2013) document two instances of blended learning initiatives, which were developed by using the Practical Inquiry model and the Community of Inquiry framework,[12] respectively, at two different Canadian higher education institutions. They conclude that committed collaborative leadership that can offer "a clear vision, specific action plans, teaching recognition, and the resources to make this happen" (p. 26) is essential to make significant change in teaching and learning practices on campus. Bohel Carbonell, Dailey-Herbert, and Gijselaers (2013), on the other hand, document the bottom-up approach used at a midsized European university. At their university, problem-based learning (PBL) curricula already constitute the cornerstone of the teaching and learning practices. Their project was to incorporate blended learning into their courses in three years. The already-established PBL curricula certainly gave their university an advantage for incorporating blended learning in terms of their readiness for student-centered teaching and learning practices. They still state, however, that a common vision and "high levels of commitment from administrators and faculty" (p. 33) had to be in place in order to successfully incorporate blended learning into their PBL curricula. The case study showed that the bottom-up approach was essential in making a difference in their learning environments by mobilizing the faculty's own initiatives, planning, and development on the ground. The bottom-up approach thus had to be supported in the context of having a common vision with the institutional commitment at their university.

With the increased affordances of Information and Communication Technology, and as more wireless devices are being integrated into our lives and society at large, it increasingly becomes crucial for higher education institutions to manage change by leveraging the affordances created for shaping student-centered teaching and learning practices. Within this context of change, potent areas of research include: new ways of organizing or conceptualizing courses or programs to broaden the learning opportunity for an increasingly diverse student body; original ways of evaluation and assessment; creative uses of interactive and social networking tools to facilitate student learning; and innovative ways of collaborating across different administrative units on campus to effectively incorporate the potential of blended learning.

CONCLUSION

This chapter presented an exploratory study of designing and delivering blended learning support around research paper assignments in the context of two different undergraduate foundational courses that were offered in the Faculty of Human Ecology at the University of Manitoba in Canada. Blended learning support has potential in creating better learning environments to engage students in guiding their own learning as they work on research paper assignments. In addition to what was learned in the exploratory study, working guidelines for designing and developing blended learning support were offered in the chapter, drawing mainly from Butler and Cartier's research (2004). A shared vision and corresponding institutional support, which are initiated and backed at the leadership level in higher education, are critical in order to ensure proper planning and development of blended learning support as part of the undergraduate curriculum development.

ACKNOWLEDGEMENT

The author would like to acknowledge Ms. Kathy Block, the writing instructor, whose collaboration was indispensable in carrying on and completing the exploratory study. Numerous conversations she had with Ms. Block before, during and after the respective blended learning projects were essential in shaping the direction of the exploratory study. The author would like to specially thank Ms. Lenora Wiebe and Mr. Walter Roberson for generously going through the entire chapter at its draft stage and providing valuable editorial feedback. She also would like to acknowledge Dr. Monique Dumontent and Ms. Block for their valuable editorial feedback.

REFERENCES

Alvarez, B. (2007). *A new perspective on reference: Crossing the line between research and writing*. Paper presented at Shifting Points of Reference and New Directions in Higher Education 5th Reference in the 21st-Century Symposium. Retrieved from https://www1.columbia.edu/sec/cu/libraries/bts/img/assets/9337/Columbia%20 paper.pdf

American Library Association (ACRL). (2000). *Information literacy competency standards for higher education*. Chicago: Association of College & Research Libraries. Retrieved from http://www.ala.org/acrl/standards/informationliteracycompetency

Barr, R. B., & Tagg, J. (1995). From teaching to learning — A new paradigm for undergraduate education. *Change: The Magazine of Higher Learning*, *27*(6), 12–26. doi:10.1080/00091383.1995.10544672

Bass, R., & Eynon, B. (2009). Capturing the visible evidence of invisible learning: Synthesis essay for the difference that inquiry makes: A collaborative case study on technology and learning from the visible knowledge project. In *The difference that inquiry make: A collaborative case study of technology and learning, from the visible knowledge project* (pp. 4 – 29). Washington, DC: Center for New Designs in Learning and Scholarship (CNDLS). Retrieved from https://blogs.commons.georgetown.edu/vkp/files/2009/03/bass-revised-2.pdf

Bereiter, C., & Scardamalia, M. (1987). *The psychology of written composition*. Hillsdale, NJ: L. Erlbaum Associates.

Biggs, J. (1996). Enhancing teaching through constructive alignment. *Higher Education*, *32*(3), 347–364. doi:10.1007/BF00138871

Biggs, J., & Tang, C. (2011). *Teaching for quality learning at university* (4th ed.). New York, NY: Open University Press.

Bohle Carbonell, K., Dailey-Hebert, A., & Gijselaers, W. (2013). Unleashing the creative potential of faculty to create blended learning. *The Internet and Higher Education*, *18*, 29–37. doi:10.1016/j.iheduc.2012.10.004

Brown, J. S., Collins, A., & Duguid, P. (1989). Situated cognition and the culture of learning. *Educational Researcher*, *18*(1), 32–42. doi:10.3102/0013189X018001032

Butler, D., & Cartier, S. (2004). Promoting effective task interpretation as an important work habit: A key to successful teaching and learning. *Teachers College Record*, *106*(9), 1729–1758. doi:10.1111/j.1467-9620.2004.00403.x

Dobozy, E. (2011). Constrained by ideology: Attitudinal barriers to undergraduate research in Australian teacher education. *E-Journal of Business Education & Scholarship of Teaching*, *5*(2), 36–47.

Elander, J., Harrington, K., Norton, L., Robinson, H., & Reddy, P. (2006). Complex skills and academic writing: A review of evidence about the types of learning required to meet core assessment criteria. *Assessment & Evaluation in Higher Education*, *31*(1), 71–90. doi:10.1080/02602930500262379

Entwistle, N. J., McCune, V., & Hounsell, J. (2003). Investigating ways of enhancing university teaching-learning environments: Measuring students' approaches to studying and perceptions of teaching. In E. D. Corte, L. Verschaffel, N. Entwistle, & J. van Merriënboer (Eds.), *Powerful learning environments: Unravelling basic components and dimensions* (pp. 89–107). Oxford, UK: Elsevier Science.

Garrison, D. R., Anderson, T., & Archer, W. (2000). Critical thinking in a text-based environment: Computer conferencing in higher education. *The Internet and Higher Education*, *2*(2-3), 87–105. doi:10.1016/S1096-7516(00)00016-6

Garrison, D. R., Anderson, T., & Archer, W. (2001). Critical thinking, cognitive presence and computer conferencing in distance education. *American Journal of Distance Education*, *15*(1), 7–23. doi:10.1080/08923640109527071

Garrison, D. R., & Kanuka, H. (2004). Blended learning: Uncovering its transformative potential in higher education. *The Internet and Higher Education*, *7*(2), 95–105. doi:10.1016/j.iheduc.2004.02.001

Gordon, C. (1990). Changes in readers' and writers' metacognitive knowledge: Some observations. *Reading Research and Instruction*, *30*(1), 1–14. doi:10.1080/19388079009558029

Graves, R., Hyland, T., & Samuels, B. M. (2010). Undergraduate writing assignments: An analysis of syllabi at one Canadian college. *Written Communication*, *27*(3), 293–317. doi:10.1177/0741088310371635

Hadwin, A. (2006). Optimizing learning environments. *Learning & Teaching Center Currents*, *2*(3), 1.

Haggis, T. (2006). Pedagogies for diversity: Retaining critical challenge amidst fears of dumbing down. *Studies in Higher Education*, *31*(5), 521–535. doi:10.1080/03075070600922709

Hammann, L. (2005). Self-regulation in academic writing tasks. *International Journal of Teaching and Learning in Higher Education*, *17*(1), 15–26.

Hayes, J. R., & Nelson, J. (1988). *Technical report 16: How the writing context shapes college students' strategies for writing from sources*. Berkeley, CA: National Center for the Study of Writing and Literacy. Retrieved from http://www.nwp.org/cs/public/print/resource/602

Hyland, T., Samuels, B. M., & Graves, R. (2010). Undergraduate writing assignments: An analysis of syllabi at one Canadian college. *Written Communication*, *27*(3), 293–317. doi:10.1177/0741088310371635

Lave, J., & Wenger, E. (1991). *Situated learning: Legitimate peripheral participation*. Cambridge, UK: Cambridge University Press. doi:10.1017/CBO9780511815355

Leadley, S., & Rosenberg, B. R. (2005). Yours, mine, and ours: Collaboration among faculty, library, and writing center. In J. K. Elmborg & S. Hook (Eds.), *Centers for learning: Writing centers and libraries in collaboration* (pp. 61–79). Chicago: Association of College and Research Libraries.

Limberg, L. (1999). *Experiencing information seeking and learning: A study of the interaction between two phenomena*. Retrieved from http://informationr.net/ir/5-1/paper68.html

Marton, F., & Säljö, R. (1976a). On qualitative differences in learning l: Outcome and process. *The British Journal of Educational Psychology*, *46*(1), 4–11. doi:10.1111/j.2044-8279.1976.tb02980.x

Marton, F., & Säljö, R. (1976b). On qualitative differences in learning ll: Outcome as a function of the learner's conception of the task. *The British Journal of Educational Psychology*, *46*(2), 115–212. doi:10.1111/j.2044-8279.1976.tb02304.x

Nelson, J. (1990). This was an easy assignment: Examining how students interpret academic writing tasks. *Research in the Teaching of English*, *24*(4), 362–396. doi:10.2307/40171173

Perry, N. E. (1998). Young children's self-regulated learning and contexts that support it. *Journal of Educational Psychology*, *90*(4), 715–729. doi:10.1037/0022-0663.90.4.715

Roscoe, R. D., & Chi, M. T. H. (2007). Understanding tutor learning: Knowledge-building and knowledge-telling in peer tutors' explanations and questions. *Review of Educational Research*, *77*(4), 534–574. doi:10.3102/0034654307309920

Scardamalia, M., & Bereiter, C. (2006). Knowledge building: Theory, pedagogy, and technology. In K. Sawyer (Ed.), *Cambridge Handbook of the Learning Sciences* (pp. 97–118). New York: Cambridge University Press.

Zamel, V., & Spack, R. (2012). *Negotiating academic literacies: Teaching and learning across languages and cultures*. New York, NY: Routledge.

ADDITIONAL READING

Bass, R. (2012). Disrupting ourselves: The problem of learning in Higher Education *EDUCAUSE Review*. Retrieved from http://www.educause.edu/ero/article/disrupting-ourselves-problem-learning-higher-education

Brown, J. S. (2002). Learning in the digital age. In *The Internet and the University: 2001 Forum* (pp. 65-86). A joint project of the Forum for the Future of Higher Education and EDUCAUSE]. Retrieved from http://net.educause.edu/ir/library/pdf/ffpiu015.pdf

Christensen Hughes, J., & Mighty, J. (2010). *Taking stock: research on teaching and learning in higher education*. Kingston, Ontario: School of Policy Studies, Queen's University, McGill-Queen's University Press.

Cullen, R., Harris, M., & Hill, R. R. (2012). *The learner-centered curriculum : Design and implementation* (1st ed.). Hoboken, NJ: Wiley.

Entistle, N., McCune, V., & Hounsell, J. (2002). Approaches to studying and perceptions of university teaching-learning environments: Concepts, measures and preliminary findings. *Enhancing Teaching and Learning Environments in Undergraduate Courses Occasional Report, 1*. Retrieved from http://www.etl.tla.ed.ac.uk/docs/etlreport1.

Garrison, D. R., & Vaughan, N. D. (2008). *Blended learning in higher education: Framework, principles, and guidelines*. San Francisco: Jossey-Bass.

Haggis, T. (2006). Researching the student experience in the Humanities and Social Sciences: The implications of difference. *Academy Exchange, 4 (Summer), 20- 21*. Retrieved from http://www.heacademy.ac.uk/assets/documents/resources/publications/exchange/ web0160_academy_exchange_issue_4.pdf

Harris, M. (2010). *Leading the learner-centered campus an administrator's framework for improving student learning outcomes* (1st ed.). San Francisco: Jossey-Bass.

Rorabaugh, P., & Stommel, J. (2012a). Hybridity, pt. 1: Virtuality and empiricism. *Hybrid Pedagogy: A digital Journal of Learning, Teaching, and Technology.* Retrieved from http://www.hybridpedagogy.com/Journal/files/Hybridity_1.html

Rorabaugh, P., & Stommel, J. (2012b). Hybridity, pt. 2: What is Hybrid Pedagogy? *Hybrid Pedagogy: A digital Journal of Learning, Teaching, and Technology.* Retrieved from http://www.hybridpedagogy.com/Journal/files/Hybridity_2.html

Rorabaugh, P., & Stommel, J. (2012c). Hybridity, pt. 3: What Does Hybrid Pedagogy Do? *Hybrid Pedagogy: A digital Journal of Learning, Teaching, and Technology.* Retrieved from http://www.hybridpedagogy.com/Journal/files/Hybridity_3.html

KEY TERMS AND DEFINITIONS

Constructive Alignment: An important principle for designing teaching and learning activities and it was advanced by Professor John B. Biggs. The principle utilizes a constructivist understanding of how learning takes place and encourages the designers of learning environments to align the learning activities to the intended learning outcomes.

ENDNOTES

1 Garrison and Kanuka (2004) write, "Blended learning is both simple and complex" (p. 96). The quote referred to as its definition is their simple definition of blended learning. They acknowledge that implementing blended learning is enormously complex in its implementation: "the challenge of virtually limitless design possibilities and applicability to so many contexts" (p. 96).

2 At the University of Manitoba, where this exploratory study took place, its Library Administration manages all library units across two campuses in addition to all the hospital libraries in Winnipeg, the city where the University resides. The Academic Learning Centre, on the other hand, is administered under Student Affairs, a separate umbrella administrative unit of the University. In comparison, at the University of Washington, Bothell, a number of academic support units including the campus library, the Writing Center and information systems are under one administrative unit, Academic Services (Leadley & Rosenberg, 2006).

3 This means 3 class hours are being covered each week during a fall or winter regular semester.

4 During the regular terms, the foundational course traditionally included a weekly lab time with a teaching assistant to go over technical aspects of preparing research papers. During the summer sessions, the instructor incorporated the additional lab hours into the class time. In the exploratory study, blended learning replaced those additional lab hours.

5 The course covered qualitative, quantitative, and mixed methods in social sciences research.

6 Many academic libraries adopted Springshare's Libguides platform to manage library subject guides to support their constituencies. The Libraries at the University of Manitoba began subscribing to the Libguides in the early 2011 and subsequently officially introduced their subject guides on the Libguides platform in September 2011. The platform was a better option at the time than developing the entire blended learn-

ing support on the University's Learning Management System, in terms of its ease of use for developing and managing the online course guides.

7 During the summer 2011 course, the class was small and shared the same discussion board, while during the winter 2012 course students were assigned into 8 different groups.

8 Those 7 students who were recruited for the focus groups took the same course during the four different course offerings: fall 2007, summer 2009, fall 2009, and fall 2010. There were three different instructors involved in teaching these courses. Half of the students who participated in the focus groups expressed some negative experience of the course assignments that mainly focused on technical matters such as the APA style and the topic of plagiarism. They indicated that they were rather "nitpicked" about the details of the APA style and evaluated the intellectual expectation of the research paper assignments to be rather low. During the focus group meeting, they still expressed some frustration they experienced with the marks deducted for some formatting or punctuation matters related to the APA style.

9 All the research instruments and procedures used for the exploratory study were reviewed and approved by the Research Ethic Board, Fort Garry Campus, University of Manitoba, prior to conducting the survey and interviews for the respective blended learning projects. The first 45-minute focus group took place with 5 students in May 2011 and another one with 2 students in September 2011. We conducted interview sessions with the students from the summer 2011 course during the summer months and September in 2011. We conducted the interview sessions with the students from the winter 2012 course during the months of April and May 2012.

10 The students in the focus groups had extra lab hours if they took the course during a fall term; or additional class time if they took the course in a summer session. Refer to #4 note.

11 It is also important to document here that in the summer 2011 course, the instructor discussed and guided students in the class about the APA citation and formatting style.

12 Refer to Garrison, Anderson, and Archer for both the Practical Inquiry model (2001) and the Community of Inquiry framework (2000).

This work was previously published in Practical Applications and Experiences in K-20 Blended Learning Environments edited by Lydia Kyei-Blankson and Esther Ntuli, pages 341-368, copyright year 2014 by Information Science Reference (an imprint of IGI Global).

APPENDIX 1

Table 1. The blended learning support structure for summer 2011 course

Assignment	"In this paper, you will research the definition of Human Ecology and develop a personal, reflective definition. You will discuss your personal definition as it relates to definitions of others and use academic sources to draft your paper." (From the Assignment Sheet of the summer 2011 course.)
Course Context	This foundational course covers the history of Human Ecology and teaches research & writing skills.
Online Interactions	• **Interviewing a Peer:** Students interviewed a peer in class about his or her connection to the chosen field in the Faculty of Human Ecology, such as why s/he is pursuing a program in the Faculty or what might be his/her career aspiration. • **Developing a Paragraph:** Students developed a paragraph summarizing the peer's connection to Human Ecology and posted on the discussion board. • **Developing a Draft Outline:** Students developed a draft outline of their paper using an online mind mapping/ outlining tool and posted on the discussion board. • **Reviewing Postings by Peers:** Students reviewed the draft outlines by peers and responded to two postings that they found effective as outlines. • **In-class Library Session**: The librarian demonstrated how to search a library database tool for browsing and identifying relevant sources for the paper, followed by a hands-on session. • **Developing a Draft Annotated Bibliography:** Students developed a draft, annotated bibliography for the paper and posted on the discussion board. • **Reviewing Posting by Peers:** Students reviewed draft annotated bibliographies that were posted by peers and they responded to two postings that they found effective as annotated bibliographies. • **Submitting Draft Paper:** Students submitted their draft paper to the instructor and received her feedback. • **Submitting Final Paper**
Resources Included in Course Guide	**Paper #1:** • "At the Beginning of Constructing Your Paper": a write-up describing what is being expected in the paper. • Video clips of three recent graduates from the Faculty discussing who they are, what they currently do, their connection to the Faculty and their career aspirations. **Resources for:** • Mind Mapping • Outlining • Gathering Relevant **Sources:** • Writing Tips and Exercises • Integrating Sources in Writing • APA Citing and Formatting Guide • List of Readings • Library Database Search Box • Contact Information

APPENDIX 2

Table 2. Blended learning support structure for winter 2012 course

Assignment	**"**In this paper, you are asked to develop and construct your definition of "the determinants of health" by analyzing and incorporating the definitions by others. You are asked to do this by drawing on 6 academic sources." (From the Assignment Sheet of the winter 2012 course.) Students were also asked to use their own words to include summaries of the definitions of others, comparing and contrasting of these definitions, and explaining their personal definition of "the determinants of health."
Course Context	"An introduction to research designs, methods and techniques, as well as the practice of disseminating results, in the context of selected determinants of health. Applications in natural and social sciences will be presented. Skills related to presenting research findings will be taught." (From the course description for the winter 2012 course.)
Online Interactions	• **In-class Twitter instructional session.** • **Brainstorming by Tweeting Twice:** Students were asked to brainstorm what "health" means to them, what one needs to be healthy, or what factors have to be in place to be healthy, during a 4 day period. • **Constructing & Posting a Draft Paragraph:** Students were asked to write a paragraph on their understanding of the concept, "the determinants of health," drawing on the class discussions and course readings. • **In-class library session:** The librarian demonstrated how to search, browse and locate relevant sources for the paper. • **In-class instructional session:** The writing instructor provided instruction on thesis statements and showed how to use the Online Writing Tutor. • **Developing a Draft Outline and a Thesis Statement:** Students were asked to submit a draft thesis statement with an outline to the Online Writing Tutor. • **Posting the Introductory Paragraph and Reviewing Peers:** Students were asked to post their introductory paragraph from the completed paper on the discussion board, then to reply to two peer submissions that they thought were effective as introductory paragraphs.
Resources Included in Course Guide	**Paper #1:** • Paper #1: Assignment Sheet and a general guide to the research paper #1. • "Twittering Instructions": For brainstorming using Twitter and the Twitter live streaming feeds during the brainstorming period. • "Understanding What You are Developing & Constructing": A basic structure expected for the paper was explained. • "Time Management": A timetable of due dates and working with various parts of the paper • "A Feed from the Literature" **Other Resources:** • "Locating Relevant Sources": A reminder for the importance of adequately understanding the purpose of locating the sources, and a summery of what were demonstrated in the in-class library session. • "Analyzing Sources": The instruction on comparing and contrasting the information located in the sources. • "Integrating Sources" • "Using APA" • "Writing Tips" • "Contact Information"

Chapter 31
Blended Learning for Learners in SMEs

Sabine Moebs
Dublin City University, Ireland

ABSTRACT

While blended learning seems to be quite suitable for Small and Medium Sized Enterprises (SMEs), take-up of this learning method is not implemented at the level it could be. This chapter investigates aspects that encourage learners in European SMEs to choose blended learning for professional development. The results indicate how the take-up of blended learning by SME learners can be improved. Research has explored the field further and blended learning has become a more mainstream form of learning. A revisit of case studies with stakeholders of Blended Learning in SMEs looks at changes indicated by research and explores Blended Learning in progress. A comparison between European and African SMEs looks at differences and commonalities that might affect blended learning. The final section outlines a vision of how blended learning is feasible under challenging conditions, including inadequate funding, limited computer or Internet access, poor infrastructure, diversity of learner groups, and differences in learning culture.

INTRODUCTION

Small to Medium-Sized Enterprises (SMEs) are often innovative, but are also under great economic pressure, which is a threat to ongoing learning activities even though continuous training and learning is necessary to stay competitive. E-learning is not in high demand with SMEs although one would expect that it is extremely suitable to a learning demand at short notice (Wood & Watson, 2002), which is typical for SME learning.

Blended learning, a mix of online and face-to-face (F2F) learning, can combine the positive aspects of both, classroom-based learning and e-learning environments (Bonk & Graham, 2006). Blended learning can then provide an alternative to e-learning and might have the potential to better meet SME learners' needs. A mix of learning styles and different dimensions of learning at course level can further increase the usage of blended learning opportunities as a suitable way for training in SMEs and thereby increase or keep up the competitiveness of these companies.

DOI: 10.4018/978-1-4666-8246-7.ch031

The main goal of this chapter is to provide an overview of blended learning, followed by an outline of a vision of how blended learning is feasible under challenging conditions, including inadequate funding, limited computer or Internet access, poor infrastructure, diversity of learner groups, and differences in learning culture.

BLENDED LEARNING

Blended learning describes a learning environment that either combines teaching methods, delivery methods, media formats, or a mixture of them all. The term blended learning is very complex and ambiguous; therefore, the next paragraphs aim to give a comprehensive overview of the different definitions, dimensions, and success factors for blended learning. The following text provides more detail on blended learning topics.

Definitions of Blended Learning

In the literature, the term blended learning is used to describe for example the integrated combination of traditional off-line methods of learning with intranet, extranet Web-based or Internet-based online approaches (Garavan & O'Donnell, 2003). To accentuate the fact that the concept is learner-centered, blended learning can be described as a combination of delivery methods that have been selected and fashioned to accommodate the various learning needs of a diverse audience in a variety of subjects (Mc Sporran & King, 2005). Blended learning combines classroom-based learning with computer-mediated instruction (Graham, 2006; The eLearning Guild, 2006), but it also mixes various event-based activities, including F2F classrooms, live e-learning, and self-paced learning (Valiathan, 2002). More recently the concept of time-based blended learning has been introduced (Norberg, Dziuban & Moskal, 2011). Here the focus is on a mix of synchronous and asynchronous activities. Synchronous activities can be online or in the classroom

The differentiation in skill-driven, attitude-driven, and competency-driven learning as different forms of blended learning looks at the focus of the learning. Skill-driven learning combines Self-paced learning and support mechanisms to develop certain knowledge and skills. Attitude-driven learning aims at developing specific behaviour by mixing different event types and delivery media. Competency-driven learning targets workplace related competencies and provides performance support tools, knowledge management resources, and mentoring (Valiathan, 2002).

The availability of pedagogical expertise, as well as learning delivered through videoconferencing and video streaming in combination with F2F collaboration, is a blend described by the Advanced Broadband Enabled Learning (ABEL) program in Canada (Murphy, 2007). Oliver and Trigwell (2005) dismiss definitions that consider a combination of e-learning with traditional learning, the combination of online learning with F2F learning, the combination of different media, the combination of contents, the combination of theories and learning, the combination of learning objectives, and finally combined pedagogies. They came to the conclusion that blended learning misses the learner's perspective and recommend the variation theory of Bowden and Marton (1998) for the development of blended learning courses to improve learning.

Another approach uses the mix of learning theories towards blended learning, combines cognitivism, constructivism, and performance support which transforms it into a very practical approach defining live events, self-paced learning, collaboration, assessment, and performance support materials as the key ingredients of blended learning (Carman, 2005).

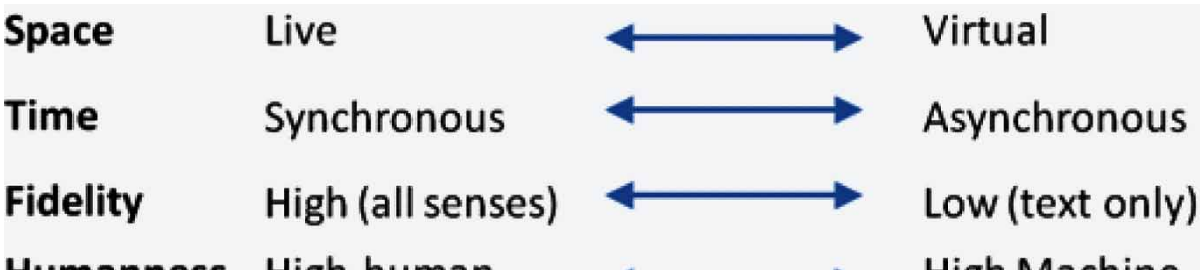
Probably the most succinct definition of blended learning is provided by Reynolds and Greiner, who describe blended learning simply as the "use of more than one instructional methodology" (p. 216). A combination of storytelling, song, recitation, reading aloud, flash cards, puppetry, and corporal punishment is what Cross (2006) adds to the discussion about a blended learning definition with a retrospect to traditional teaching methods. Included in this definition is the remark that most learning is blended in the sense that it always combines different methods, materials, and media. His perception is in agreement with Masie (2006), who goes on by saying that since 1998 the term is widely used for a combination of e-learning and classroom learning. Wagner (2006) describes blended learning as a combination of F2F instruction and computer-mediated instruction. Wagner adds that blended learning always involves content objects and assets, or as Lindquist (2006) stated a combination of classroom and online. This is equivalent to the definition of Wright, Dewstow, Topping & Tappenden (2006), who add traditional distance learning measures to the blend, a definition of blended learning as F2F blended with traditional distance learning (Jung & Suzuki, 2006). The combination of an online teaching environment and F2F lectures leads to a blended learning framework as an approach for open interaction, information dissemination, efficient management or knowledge creation or a combination of all.

A very open definition for blended learning is provided by Ziob & Mosher (2006), who add the aspect of business perspective to the learning scenario. They define blended learning as "any combination of self-paced, instructor-led, distance, and classroom delivery with various digital and print form factors to achieve a positive business outcome" (Ziob & Mosher, 2006, p. 97). Jones also provides a variable definition, but focuses on the degree of technology used in blended learning and distinguishes between basic use of Communication and Information Technology (ICT) and intensive use of ICT. This approach is adopted by other authors, who concentrate on the degree of ICT use and F2F instruction (Lee & Im, 2006; Limon, 2006; Kaur & Ahmed, 2006). ICT use is mainly determined by different forms of e-media (Lee & Chong, 2007) and mode of delivery is typically via a managed learning environment. This environment runs in combination with tutor-led support systems, such as synchronous and asynchronous discussion groups, supplemented by F2F meetings. These characteristics are typical features of blended learning systems (Jones, 2006). The combination of the latest technology and high-skilled human support are the essentials of blended learning (Salmon & Lawless, 2005), or in other words traditional F2F teaching combined with evolving technical possibilities (Henrich & Sieber, 2007). This eventually leads to an evolution model of blended learning. This model starts out with synchronous learning, moves on to the more effective simple blend, and progresses on to rich experience seamless blending to eventually reach performance personalization, the fusion of learning and work as an embedded system, linked with business applications (Singh, 2006). This evolution aims at a continuously improved learning quality: recognizing cost, time, effectiveness and the fusion of learning and work as main settings. Jones coins the term of the 'continuum of blended learning', that describes a continuous increase of ICT use in combination with F2F activities (Jones, 2007). A different terminology is used by Ross and Gage (2006), who describe blended learning either as Web-enhanced or technology-enhanced as opposed to hybrid or reduced and they see the blend on course or program level..

Dimensions of Blended Learning

To describe the variety of interaction Graham (2006) introduced the so-called four dimensions of interaction in F2F and distributed learning environments. The four dimensions are space, time, fidelity, and humanness. Space can range from live or physical and F2F over mixed reality to virtual reality. The time dimension develops from live synchronous, with a very short lag time, to asynchronous, which has a long lag time. Fidelity reaches from a high level that is rich in senses, which means it can incorporate sound, pictures,

Figure 1. Four dimensions of blended learning (Graham, 2006)



text and even fragrances, to a low level, using only one of the senses (e.g. text only). The humanness dimension addresses the ratio of human interaction and machine interaction.

Figure 1 shows the dimensions and also helps to visualize the variety of systems possible within the range described above. All the dimensions can vary between the extreme values, thus providing a huge variety of different interaction settings for the design of blended learning and accommodating the diversity of individual learner needs, learner styles as well as teaching styles.

Frameworks in Blended Learning

Poor design of blended learning material can lead to poor learning results in a blended environment compared to a single method of delivery. Several authors developed frameworks to react to this challenge. Wenger and Ferguson (2006) describe a framework to guide the design and deployment of company training and courses. The framework reflects the idea that most learning environments are blended anyway, considering that even a classroom-only course incorporates a variety of different learning modalities. Their approach consists of three steps. In a first step, the learning ecology matrix is developed. The x-axis illustrates the focus on the delivery of instruction that varies from "content delivery focus" to "experience and practice focus"; whereas the y-axis illustrates the navigation of the learning process that varies from "guided navigation" to "learner self-navigation." In a second step, four general learning modalities are included: studying, practicing, teaching, and coaching. These modalities do not refer to either classroom or e-learning, but are rather applicable to both. In a last step, the matrix is completed with distinct instructional, learning, and knowledge elements. Table 1 shows the framework by Wenger and Ferguson.

The learning ecology matrix aims to deliver a high quality learning experience and at providing control over the learning experience for both the learner and the instructor. It strives to combine formal and informal learning rather than positioning them as opponents. The social nature of learning has to be considered in all learning elements. The aspect of cost-effectiveness is recognized, but merely in the sense that any project aims at a combination of learning outcomes at a minimum total cost.

Another example is the generic framework that was developed by McSporran and King (2005) to enable a structured combination of educational delivery methods. Table 2 shows the generic framework for blended learning.

The framework is intended to provide guidance for the selection of delivery methods, considering the learning needs as well as available resources. Benefits, difficulties, constraints, but also complementary methods are listed to provide the information necessary to develop the right blend. The generic framework is then applied to specific learning needs.

Table 1. Learning ecology matrix (Wenger & Ferguson, 2006)

Studying	Learner Self-Navigation		Practicing
	Books, articles, guides References White Papers Asynchronous content Job aids Glossaries FAQs	Authentic tasks Role play Projects Case studies Peer discussion Discussion forums	
Content			Experience and
Delivery Focus			Practice Focus
	Classroom lectures Synchronous content Demonstrations Reviews/Discussions Video Videoconferencing	Exercises Diagnostic labs Practice labs Mentoring/Tutoring Experiments	
Teaching			Coaching

Table 2. Generic framework for blended learning (McSporran & King, 2005)

A	B	C	D	E	F	G
Category of learning needs	Examples	Possible methods	Benefits	Constraints / Difficulties	Likely effectiveness	Possible blend
This column is used to describe the skills or concepts that need to be learned	Examples place the learning needs in context	A selection from a given list or other methods	Allows author to clarify benefits of particular selected method. Used as a check	Indicates possible challenges to implementation	Provides Ranking for selected method. Used in conjunction with columns D and E	Suggestions of complementary methods

The Mobile Learning Curriculum Framework (Botha, Batchelor, Traxler, De Waard, & Herselman, 2012) is a first attempt to systematically describe how to include mobile learning practice in a blended environment (see Table 3). The framework identifies a basic structure, consisting of a theme as an outline of the domain. A theme contains a number of modules, each module a unit covering a single topic. The module differentiates module rationale, challenges, content and suggested adoption strategies.

Success Factors for Blended Learning

A variety of teaching methods, as well as a variety of different learners with different preferences and needs, determine the success of blended learning. Several success factors have been identified in the literature.

Design of the Blend: A well-designed blend of teaching methods can provide an appropriate learning experience for most learners. The characteristics of the audience must be considered. This

Table 3. Mobile learning curriculum framework themes and modules (Botha, et al., 2012)

Themes	1. The Impact of Mobiles on People, Communities and Societies	2. The Impact of Mobiles on the Economy	3. The Impact of Mobiles on Learning	4. The Nature of the Technology, Systems and Devices	5. Becoming Mobile
Modules	1.1 Mobile Life: Digital Identity, Online Communities	2.1 The Nature of Goods and Services	3.1 Mobile Learning	4.1 Nature of the Technology, Systems and Devices	5.1 Governance
	1.2 Mobile Learning: Knowing, Learning, Finding out	2.2 The Nature of Work and Jobs	3.2 Formal Learning		5.2 Planning
			3.3 Informal Learning		5.3 Practicalities
					5.4 Agency and Control

includes recognition of the amount of time they will have to access the content, which includes connectivity issues (Bersin, 2003; McSporran & King, 2005).

Time Flexibility: The flexibility in scheduling and a variety of document formats is critical to success. System availability enables students to study when they are ready to do so.

Mix of Media and Learning Styles: The flexibility in media formats provides optimum learning experiences based on personal preference. To select the right methods and formats, the learning styles and the education level of employees must be considered, as well as the motivation of the learners (Bersin, 2003; Serveau, 2004).

Student Support: Response from tutors, subject matter experts as well as technical or logistical support staff should be posted within 24 hours, which corresponds to a rule of thumb for effective e-communication in general. The positive effect of a timely response can be intensified by additional phone calls and F2F conversations and will provide a sense that there exists real people behind the online environment (Serveau, 2004).

Executive Support: Blended learning needs executive support for its introduction, just as any other major change in a business environment. The decision to change to a blended solution from the learning system previously in use needs support from senior management (Serveau, 2004).

Content: The kind and quality of learning content is critical for success. Apart from choosing the appropriate content, which is either intended to inform people, develop skills, or build competencies, it is necessary to ensure that content is up-to-date (Bersin, 2003).

Learning Styles: Another factor for success of any learning system is the consideration of learning styles. There are a variety of different models and theories for learning styles. In engineering education Felder and Silverman's model (1988) is mentioned most often. Research has developed from there, such as the impact on learning styles through Web-based course components (Smart, Kumar & Kumar, 2005) or the implications through research literature (McLoughlin, 1999). Different authors describe the application of the theory of learning styles in computer-based settings (Fenrich, 2006), the incorporation of learning styles in adaptive hypermedia systems (Stash, 2007; Moebs, Piombo, Batatia & Weibelzahl, 2007) and frameworks to adapt instruction to learning styles (Piombo, Batatia & Ayache, 2003). Recently, learning styles and the so-called

Table 4. EU thresholds for SMEs (European Commission, 2005)

Enterprise Category	Headcount: Annual Work Unit (AWU)	Annual Turnover	Annual Balance Sheet Total
Medium-Sized	< 250	≤ €50 million	≤ €43 million
Small	< 50	≤ €10 million	≤ €10 million
Micro	<10	≤ €2 million	≤ €2 million

neo-millenial learners, learners who grew up using interactive media, opened up the area of research on the impact of the use of social software on learning styles (Baird & Fisher, 2006). In a recent publication, Felder describes how learning styles, approaches to learning, and different intellectual development, forms a diversity in students that can only be fully addressed applying different models for each of these aspects (Felder & Brent, 2005).

These success factors of blended learning are valid for SME learners, but they do not consider specific settings of SMEs. The following section provides a closer look at the typical characteristics of and learning in SMEs.

LEARNING IN SMEs IN EUROPE

SMEs are described by business-related thresholds and typical advantages and disadvantages resulting from the company size. A Delphi study was used to explore the problematic issue of training in SMEs and a case study focused on the selection criteria in the Delphi study of the different stakeholder groups.

Characteristics of SMEs in Europe

Continuous learning is crucial for SMEs to foster the continual acquisition of knowledge and to improve their position in the market. SMEs must ensure their employees consistently expand their expertise. According to the European Commission (2007), the main reason for SMEs to engage in training activities is the growing pressure from the internationalization of markets, difficulties in recruiting or retaining staff, as well as, the inability of formal education to match the enterprise's needs. This is further aggravated by other factors such as continuous technological developments, shorter product life cycles, and increasingly demanding customers.

Due to the difficulties of defining SMEs in qualitative terms, we will use a quantitative classification for SME. Quantitative classifications usually apply the criteria "Number of employees," "Annual turnover" and "Annual balance sheet total" to distinguish between small- and medium-sized enterprises. The most recent definition of SMEs according to EU-regulations (European Commission, 2005) is listed in Table 4.

The company size and figures of turnover alone cannot describe typical SME characteristics fully. The Table 5 describes the characteristics, advantages and disadvantages of SMEs and helps to explain what makes their learning situation different from larger companies or small units within multinationals.

SME culture is often characterized by high identification with the business and by a stable environment. Due to the simple structures, any decision usually has very short reaction time. Once a decision is made, another advantage, the cross-functional communication and cooperation within the organisation helps overcome time restriction issues mentioned previously. At the same time, the dependency on a small number of staff puts a lot of pressure and time restraints on these employees. Time management is often neglected or impossible due to sudden demands of company owners.

Table 5. Advantages and disadvantages of SMEs (Baaken & Launen, 1993)

Characteristic	Advantages	Disadvantages
Dependence on a limited number of people (often owners and managers are the same person	Long-term thinking, perspectives Stability No pressure for short-term success High identification with the business, stable culture High commitment	Static thinking, limited to the experiences and the knowledge of the owner(s) Difficulties to adapt corporate culture to new situations and challenges Potential conflicts between corporate objectives and personal objectives of the owner
Close relationships to customers and business partners	Stable basis for further business Ability to cooperate successfully for mutual advantage Ability and willingness to enter partnerships	Risk to focus too much on existing basis of business
Simple structures	High flexibility and adaptability Short reaction times Cross-functional communication and cooperation within the organization	In many cases not suitable for the complex planning and implementing of international activities Low willingness to introduce more sophisticated structures
Small size	Basis for specialization, often successful with niche strategies Innovations and patents	Limited resources (in terms of financial means and manpower) Limited funds to finance investments and initial operating losses for new activities Spending for market research and market entry take a much higher proportion of total spending in SMEs than in larger businesses Limited number of staff to take on additional tasks Lack of internationally experienced employees
Decision maker is owner of the company	Quick decision making High motivation level of decision maker Wide experience	Limited willingness to delegate tasks If owner a person who doesn't take necessary steps, long-term strategy falls behind day-to-day business

Training courses are at times decided upon immediately when the need arises due to a new project, customers or pressure of the market, rather than as part of a sound training strategy. The lack of a general, long-term strategy includes the lack of strategy for development and training. On the other hand, SMEs are often highly specialised. In order to maintain this niche expertise, training is required and therefore provided. Overall it is typical that owners of SMEs rely too much on their own expertise and knowledge and they are prone to ignoring opportunities that staff development can provide (Baaken & Launen, 1993).

One of the well-known problems for learning in SMEs is that it is often not feasible for employees to attend training during working hours (Mungania, 2003). Training costs, including direct expenses as well as costs related to the absence of an employee from the workplace, seem to be too high for many of these companies. Moreover, the absence issue confronts small companies with huge problems, since there are only few colleagues to fill absences.

The need for flexibility and, therefore the option to use quiet periods for training make e-learning attractive for SMEs (Beer, Hamburg & Paul, 2006). This, however, requires a structured approach that enables learning-on-demand as well as corresponding delivery structures which need to be introduced.

E-learning, however, has a number of disadvantages from the perspective of employees in SMEs. Employees tend to interpret the substitution of F2F learning by e-learning as a cost reduction measure and perceive their company is not willing to spend the money for travel and accommodation. Employees also miss the social contact and interaction with other learners as well as the distance necessary to reflect on new topics when learning in their working environment (Beer, Hamburg & Paul, 2006).

Obstacles that make it difficult for SMEs to engage in competence development activities in general are typically:

- Important short-term business pressures (lack of time).
- Cost issues.
- Entrepreneurs' limited ability to effectively diagnose the competence needs or to contact sources of competence.
- Poor quality, extent, and theoretical orientation of the existing supply of formal training and external advice (EC, 2007).

Important obstacles to small business usage of e-learning are lack of appropriate learning materials, the attitude of individual managers, and lack of access to sufficient bandwidth to ensure high quality training (McCullough, 2005). Proliferation of e-learning is limited also by perceived ineffectuality, computer anxiety and a perceived lack of structure and guidance (Wood & Watson, 2002).

In a study on learning and development in Ireland 4 in 10 respondents said that on-the-job training is the most effective form of learning in their organization (CIPD, 2006). Work experience and formal training courses are the next most popular answers for organizations with less than 200 employees.

A Delphi Study on Blended Learning in SMEs

A Delphi study has three main characteristics: structured information flow, regular feedback and anonymity of the participants. The initial contributions from the Delphi participants were collected in the form of answers to questionnaires and their comments to these answers. While in regular group meetings, participants tend to stick to previously stated opinions and often conform too much to a group leader. Participants in a Delphi study are free to change their opinion between rounds, based for example on input from other participants. All participants maintain anonymity. Participants cannot dominate each other in the process by using their authority or personality. This frees them to some extent from their personal biases and helps to minimize the "bandwagon effect" or "halo effect." A Delphi study caters to the individual candidate to freely express their opinions, encourages open critique, and revise earlier judgments if need be.

The Delphi study included three rounds: Round one was used to collect initial input and Round 2 and 3 were used to rounds ask participants to rank the total list of aspects from all participants, select agreement level, and to comment on the definitions for the aspects relevant for learning in SMEs. The study was conducted with a panel of 40 experts, including learners from SMEs, training providers and learners from multinationals to compare the results among the learners. They were selected following a selection pattern. The pattern considers either practical skills as a trainer or knowledge in the area of the research. Learners were selected as experts depending on responsibility for a team of a certain size and experience with blended learning. The participants were asked initially what they consider up to ten relevant characteristics for successful blended learning for learners in SMEs. The study identified the aspects ranked most important over two rounds as well as agreed definitions for these aspects. The participant categories were defined from a blended learning stakeholder definition. A draft category list was then verified by 5 experts in the field as relevant participant categories.

Table 6 shows the preferences of the different stakeholder groups.

The aspects and the definitions which were identified most important by all participants and those selected by the SME stakeholders are provided below. The list contains the definitions as agreed upon by the participants.

Accessibility: 24-hour accessibility of online parts and the option to work from home or while travelling were mentioned. Materials, tutor, IT and classrooms have to be as convenient as possible for the learner to encourage maximum participation. The learner has to be able to decide where and when to learn.

Content Design: Find the most suitable representation. Engage learners with the content as much as possible. Think of interactivity not in

Table 6. Stakeholders' preferences for important aspects for blended learning in SMEs

Aspect	All Participants	IT SMEs	Tourism SMEs	Multinationals	Training Provider	Trainer
Accessibility		✓	✓			
Adaptability					✓	
Affordability					✓	
Blend design				✓		
Communication				✓		
Content design	✓	✓		✓		✓
Cost-efficiency		✓	✓			
Efficiency	✓	✓	✓			✓
Flexibility				✓		✓
Geographical independence			✓		✓	
Getting out of daily business				✓		
Hands-on experience						✓
Individuality			✓			
Learner-Centred	✓	✓			✓	✓
Mix of Learning Styles					✓	
Mix of Methods and Media					✓	
Motivation				✓		
Quality	✓	✓				✓
Relevance of Content	✓					✓
Results measurement		✓	✓	✓		
Self-Paced Learning	✓	✓	✓	✓	✓	
Student interaction	✓				✓	✓
Support mechanisms		✓			✓	
Time Flexibility	✓	✓	✓	✓	✓	
Usability	✓			✓		✓
Workplace-Related Learning	✓		✓			✓

terms of meaningless clicks, but in terms of meaningful interaction with the content. Examples: Sample questions, opportunities for reflection, benchmarking with industry or internal expert opinions, quizzes, simulations, group discussions, role play. All of these techniques engage the learner in meaningful ways with the content - while simultaneously providing interactivity.

Parts of the content are best presented online; others require practical exercise or a face-to-face discussion.

Cost-Efficiency: Blended learning as an option to keep the price of training as low as possible was mentioned. Participants also see a potential to find a good mix by emphasizing the lower-cost elements of the blend (e.g. off-the-shelf e-learning entities, on-line books, etc.). Some participants expressed belief that blended learning often means lower costs. The option to use online course materials for training courses at a regional level with participants in different, often remote locations, is expected to reduce travel costs. In general, participants expressed the opinion that online learning is more cost-efficient both from a short-term, as well as from a long-term perspective.

Efficiency: Learning has to be done in a short time-span so results can be used for productive work immediately. Preparation and wrap-up through online sessions and telephone conferences make face-to-face seminars more efficient.

Gap analysis shows what learning needs to take place. Learning should focus on this gap and not just on what the "general target group" might need.

Suitability of different methods depends on the topic and the training challenge. The efficiency of a method is determined by the person learning, the context of learning and the learning goals.

Blended Learning needs to have more focus on developing the actual needs of the individual and then applying the learning to this need. Too often the effort (money, time) is spent on course content and on delivering the course rather than on the first step. A thorough analysis of the specific learner, her previous learning experience and learning goals will guide towards the right selection of content and learning technology.

Geographical Independence: For the online part we are independent of location as participants can do the online phases without having to leave the workplace. Online components of the blend are generally available wherever the learner has access to the Internet. Some employees are only working part-time and would not be able to spend a full day in a seminar. That makes it difficult to find time for a seminar. Whereas online courses can be attended by employees who are absent as well. It is important that everybody gets the chance to attend, even if they are not present in the company building.

Individuality: Instruction should be designed to adapt to the individual learner and it should provide different kinds of learning experiences. The e-learning enables learners to set an individual focus. Trainers or facilitators need to be able to deal with different personalities and heterogeneous groups.

Learner-Centred: Authentic learning is most effective. We learn best through practicing, applying the principles we are studying, and then reflecting on the experience.

Obviously there is little point in providing a blended learning course that does not meet the needs of the targeted learners. Although this seems very obvious, it is remarkable how often this aspect is neglected. A very clear and precise user needs analysis could be supported by technology. This could be for example a pre-course self-evaluation methodology could evaluate the level of pre-course knowledge existing within the learner community.

Courseware needs to not only address the individual needs of the learner, but it also needs to be relevant to her circumstances and has to be meaningful in relation to her cultural and her linguistic surroundings. Some learning is abstract: therefore, contextualization is critical.

Quality: Subject matter presented must be accurate and authentic. Problem solving and inquiry designs that are presented have to be practiced and reinforced.

Online media can be structured following well-established methods and procedures. Having the online media tested by several testers guarantees a high standard.

The desire is to produce the blend that causes the most effective learning. Whilst the technologies have an impact on the course, the learning design must be solid. Thus the e-learning components must be effective, the stand up trainer must be excellent, the Webinar host stimulating and fluent, and so on. There must be a consistent standard of excellence across all media.

The individual contact, the tutors, the trainers, coaches, mentors, managers, all of these must be flawless in their professionalism. In fact, this is where the personal aspect can make up lightly for any flaws in the components that are purely technology driven, e.g. e-learning.

Both should be able to use new technologies. It does not make sense to offer such combinations to employees who hardly use computers and give these possibilities to trainers, which are not able to trace and analyse the progress of their learners in the electronic system.

The quality of information is relevant; being able to access up-to-date, quality information sources.

Relevance of Content: Courses can be too generic or too specific. Time is a critical factor with SMEs so the course must focus on closing the gap between time required for learning and time available. Having clearly identified learning outcomes and an agreement on the learning outcomes provides an implicit agreement on the relevant content.

We all learn best when we have a good reason to learn. People are not very motivated to learn things they do not need at the moment or to learn facts that are not up-to-date.

Look for methods of capitalizing on the "wisdom" of the workforce.

Any Content needs to be as apt to individual trainee's needs as possible. Learning must be relevant and useful to the learner, otherwise it is just an exercise soon to be forgotten.

Results Measurement: It is important that the assessment and results measurement is solid, reliable, and accurate. Frequently, this is not considered sufficiently as an element in the blend. Feedback to the tutor enables her to assess the knowledge level among participants. In contrast to pure e-learning, the tutor can react to difficulties of the learner on an individual basis during face-to-face sessions.

Quick error checks - learning success or mistakes can be highlighted easily. Online programs enable quick check of learning results.

Self-Paced Learning: One needs to learn self-paced learning. A lot of learning is simply presented to students rather than letting them explore it themselves. Provide learning and practice experiences that are available over a continuum of time, versus all within a short timeframe. Spaced learning and practice helps cement new knowledge into long term memory, and provides additional cues for retrieving the knowledge and skills under different circumstances. Self-paced courses enable participants to select the order of topics and modules. The pacing of the learning process is placed to a certain extent with the student and can suit their time needs and commitment. Self-paced learning is suitable for shift workers and those on time constraints who may not be able to attend a conventional timetable class or course. Blended learning's main benefit for students and employers is the flexibility to do the course at your own time and pace.

Student Interaction: The ability to interact at different levels and through different media should allow a more adaptive approach to learning. Participatory opportunities for students to have a voice e.g., using Voice over IP was mentioned several times, but also taking the student through a number of learning routes rather than a given sequencing of learning materials.

Support Mechanisms: Personal support for every participant by mail, phone or chat, or mentoring is considered important. Collaboration tools are seen as possibilities to greatly improve the team work that can be allocated and performed. The ability to work in teams or virtual teams is perceived as a supporting function. Providing ample opportunities for students to obtain help with specific problems was mentioned as well as the need to explore topics that might be a little off the curriculum. The online assessment is considered helpful for motivating the learner, because it gives immediate feedback. Nevertheless, social interaction in the classroom is also required.

Time Flexibility: Trainers and participants should have the time to get to know the system and the combination of online and face-to-face teaching and learning. Online learning should allow learning when it suits the learner and moreover enable completely independent learning. It should enable participants to decide on learning times suitable to other activities and to use times in between normal work. Online learning should support the learner in making best use of their own time.

Usability: The access and the registration for the trainee to a course should be easy. Nothing keeps more people away from online training than tedious registration processes.

Formal learning is guided by an instructor. If the guidance is not working then frustration replaces learning.

The platform should be easy to use. Only username and password should be required to log in.Perhaps it is the length of time required in projects that perspective sometimes gets lost, but clear navigation is critical.

Most online platforms to attend so called "Webinars" are too complicated to use. Logging in takes up to 15 minutes because you need to register, get an email, enter the registration code, and call the company in the states, and so on.

Workplace-Related Learning: The course needs to be relevant to the skills or the information gap of the organization. Learning content has to be up-to-date and important to the user.

Due to the nature of the Delphi study as an explorative study, the results must be read as qualitative rather than quantitative results. The study results give an overview of what was considered important by the different stakeholder groups. This does not mean that aspects not selected among the most important aspects are not relevant.

The ranking-type Delphi aims at finding an agreement between groups through a ranking of self-selected issues. Initially the panelists are asked to list five to ten important aspects of blended learning. Participants have to add a description and a rationale for putting the item on the list. The total input from round 1 is consolidated into a list size short enough to be accepted by the participants in the next round. The panelists rank their "Top 20 Issues," ties not allowed from the n-item list from round 1. The results of this second round are aggregated into a list of "Top 20" items for each sub panel. This 20-item panel specific list is presented in the third round as a list of the "Top 10" with ranks from ten to one. All other items on the list (11-20) are equally ranked "0." The panelists rank their "Top 10" issues from the 20-item list in the third round. The rank is calculated by combining percentage of mentions and relative rankings by the individual panelists.

The results did not change significantly throughout the three rounds. This shows that they are fairly solid. Mostly aspects were defined more clearly or expanded throughout the rounds.

Recommendations for Blended Learning in SMEs

The results from the Delphi show that SME learners put a balanced emphasis on the area design, skill-driven learning, the access to knowledge, quality assurance and cost effectiveness. A successful blend has to keep a focus on those areas. The preference for a blend varies depending on the industry and the size of the company. A comparison of the sub-panels IT and tourism SMEs shows that Tourism SME learners rate the importance of social interaction much higher. The large companies sub-panel chose clearly different areas, compared to the IT SME sub-panel. There was a strong emphasis on design and social interaction, whereas cost effectiveness was not considered as important.

These results give some indication to which preferences exist among SME learners, while these preferences might not be reflected in the results of any of the other groups involved in the study, e.g. trainers or learners in multinationals. Providers can apply these aspects for their product development. For example "student interaction" is among the top 10 from the provider sub-panel, whereas the SME sub-panels did not select the social interaction- related aspects at all. SME learners prefered feasibility and individuality. This gives some indication that providers should include feasibility and individuality as requirements for their development in addition to features that enable student interaction.

Trainers put a strong focus on design-related aspects, which are not in high demand with the SME sub-panels. Support mechanisms and self-paced learning are much more important to the learners according to our results. Emphasizing the support and enabling self-paced learning should not replace the design aspects. But if in doubt, the SME-selected aspects should be preferred. The results show that providers and trainers interested in blended learning for SMEs have a highly different view on the topic. There is an opportunity for SMEs to get into a dialogue with providers, and trainers where possible, to change their approach to blended learning. This might not be feasible for the individual SME; however most companies are members of professional organizations and can transport their view of the topic through these communication channels.

Another option would be openness towards new learning technologies. A lot of the implementations that enable, for example the individuality of social interaction or the time flexibility for access to knowledge are based on new technologies, often Web 2.0-based. Openness to using these learning technologies can easily bring together the diverging approaches of SME learners and trainers or providers.

LEARNING IN SMEs IN AFRICA

One goal of this chapter is to explore which of the results from the study can be transferred from the European to an African context. Clearly the situation is different on both continents, but there are still similarities in the context of SME learning that allow comparison and experiences that are worth sharing.

SMEs in Africa

A quantitative definition for SMEs from South Africa describes SMEs in similar parameters as the European definition (see Table 7).

EU and African definitions for SMEs are very similar. Headcounts are within the same range and although the South-African annual turnover and the South-African annual balance sheet total

Table 7. Thresholds for SMEs for EU (European Commission, 2005) and Africa (Government Gazette of the Republic of South Africa, 2003)

Enterprise Category		**Headcount: Annual Work Unit (AWU)**	**Annual Turnover**		**Annual Balance Sheet Total**	
Medium	Africa	50-200	≤ €4.2 million	≤ ZAR 51m	≤ €1.6 million	≤ZAR 19 m
	Europe	< 250	≤ €50 million		≤ €43 million	
Small	Africa	1-49	≤ €1.1 million	≤ ZAR 13 m	≤ €0.4 million	≤ ZAR 5 m
	Europe	< 50	≤ €10 million		≤ €10 million	

are much smaller once converted into Euro, the absolute numbers are almost the same, e.g. annual turnover for medium-sized companies ≤ €50 million and ≤ ZAR 51 million.

A comparison of the characteristics from Table 5 shows that most characteristics similarly define SMEs in Europe and South Africa. The most significant characteristics are the dependence on a limited number of people, close relationships to customers and business partners, and the decision maker being the owner of the company (Fatoki, 2011). SMEs in Europe suffer from a deficiency of formal education to match the enterprise's needs, while in South Africa a lack of education and training lead to reduced management capacity in SMEs (Olawale & Garwe, 2010).

A recent study found that SMEs in South Africa are negatively impacted by a number of obstacles, mainly related to economy, markets, infrastructure, and management (Olawale & Garwe, 2010). While the first three obstacles are external, management is an internal factor that cannot be influenced much by the individual SME. Main internal management factors are control of finance, managerial competency of the owner, selection of location, decision on investment in information technology, cost of production and networking. The lack of managerial experience and skills, as well as lack of education and training are the main reasons for SMEs to fail (Olawale & Garwe, 2010).

Learning Environments

While in Europe Technology-Enhanced Learning (TEL) is still mainly based on PCs and laptops, TEL in Africa often relies on the use of mobile phones. Mobile phones are more widespread than PCs and laptops in Africa and thus enable smore people to participate in education and training. Therefore blended learning in the African context is seen as a mix of events in a classroom and on the mobile phone. This blend is suited to the reality of many African SME learners and is also seen as a trend for future blended learning elsewhere, with mobile devices, particularly tablets, replacing PCs and laptops more and more worldwide. The following section looks at the learning environment, considering infrastructure, ways to improve access to learning, obstacles to learning, and new concepts to overcome of the challenges presented.

The main challenges for the introduction of mobile learning initiatives are infrastructure, learning theory and cost (Adesope, Olubunmi & McCracken, 2007). Infrastructure is being built across the African continent and continuously improves accessibility of the Internet and mobile resources. Internet access has improved a lot during the last 5 years, resulting in decreasing costs for operators and end users. This happened mainly due to a number of projects for an undersea backbone in the Indian Ocean, in particular EASSy, TEAMS, and SEACOM. EASSy (East African Submarine cable System) is a 10,000km submarine fibre-optic cable system that connects Mtunzini (South Africa) and Port Sudan (Sudan), with landing points in Mozambique, Madagascar, the Comoros, Tanzania, Kenya, Somalia and Djibouti on the eastern coast of Africa since 2011. TEAMS (The East Africa Marine System) is a submarine fibre optic cable project of the Kenyan government. SEACOM, is a privately owned and operated pan-African submarine cable operator, serving the East and West coasts of Africa.

Mobile devices, in particular smartphones, are becoming more affordable for larger parts of the African population and many experts predict there will be smart phones and tablets available below the $60 (Aker & Mbiti, 2010; Jidenma, 2011). The first examples of these available phones came on the market recently with the Huawei Android IDEOS, Nokia Lumia 710, or the African-designed VMKTech Android phone and tablet (VMKTech).

Learning theory is a challenging topic as well. Much of the mobile learning is based on collaborative learning. However, teachers and trainers are often not sufficiently prepared to accommodate this form of learning and teaching (Adesope et al., 2007). Trainers and teachers could gain these skills using new learning formats, for example Massive Open Online Courses (MOOC) or collaborative learning scenarios like the Reconstructed Living Lab (R-lab) in Cape Town, South Africa. Both learning formats will be introduced below.

Access is the Key – Open Educational Resources (OER) (Wright & Reju, 2012), open source software, open access publications and Web accessibility will enable access on many different levels relevant for blended learning. OER and open source allow access in several ways. Both, software and educational resources can be legally shared and adapted, depending on the users needs. Open access publications are not hidden behind costly subscriptions, but available for all interested readers. The consideration of Web accessibility (W3C-WAIa) not only includes users with different abilities, but makes online resources better usable across different devices (W3C-WAIb). The learner is free in her decision of the learning content and the device used to access learning.

Many of the learners cannot assign time during their workday, but they spend time travelling to work in public transport or have time resources at home after work (GSMA & MasterCard, 2011). Better available online material will address the need of this large learner population who has to juggle work and study and finds it difficult to attend many sessions in a classroom. Relevant educational material available through mobile phones will allow these learners to improve their skills. This can be informal, work-related learning like CV advice, language learning, or technical documentation. The material on the mobile can tie in with TV and provide a multi-screen educational material. While the TV was named as information source by 43% in a recent study (GSMA et al., 2011), mobile learning is associated with savings in time, because it is cutting out travel and rather allows using travel time for learning. It saves money, because by its nature it is often an alternative to private learning institutions. Nevertheless classroom time is helpful, but it is also precious, for aforementioned reasons.

The concept of the flipped classroom is moving collaborative activities into the classroom while delivery of materials is done outside classroom time (Butt, 2012). Classroom time can be used for collaborative work, rather than collecting new information. Collaborative Fearning Classroom learning can happen in new forms of collaboration like living labs or "Learn with Grandma." "Learn with Grandma" is a small, not-for-profit company based in Wales, UK. They promote intergenerational learning, often an exchange of knowledge how to use technology and more traditional skills. Living labs, for example R-Labs in Cape Town, South Africa initiate knowledge exchange with the goal to impact, empower and reconstruct communities through innovation. Both initiatives build on students who will continue learning by turning into teachers themselves. The living lab example of the Reconstructed Living Lab (R-lab) in Cape Town (Parker, Wills & Wills, 2012) combines an academy with community development and incubation. They provide courses for entrepreneurs and social innovators using a play and learn approach. The iHub in Nairobi is a community of technology entrepreneurs and an openspace workspace (iHub, 2013). Learning happens continuously between members of the community in informal and formal sessions, supported by their iHubResearch group. All these collaborative forms of working and learning tie in with the "on-the-go" mobile learning. Massive Open Online Cources (MOOC) (Koutropoulos & Hogue, 2012) is a form of self-directed learning and requires the learners to be very proactive. Learners are expected to actively feed into a learning community. Most MOOCs are heavily based on OERs and are therefore available for everybody with access to the Internet. MOOCs and mobile learning can be combined successfully (Traxler & Leach, 2006). In combination with one of the collaborative learning forms above they can be a suitable blend for SME learning, because the open format of a MOOC allows focusing on parts of the course that are of most interest. SMEs can use this learning format in collaboration with other companies with similar learning needs. Subjects that allow for a sufficiently broad learner base, e.g. accounting, project management, communication skills or even basic digital literacy are suitable.

Sustainable learning models have to consider the physical environment of the learner, which can be quite challenging for SMEs in Africa. Office buildings and study rooms might only provide limited learning infrastructure, such as furniture, books, electrical light and poor mains electricity. There might only be one computer with Internet access available, which limits opportunities to share and upload materials. The mobile phone can balance out some of these challenges, in particular ICT skills can be learned and taught using the ubiquitous mobile phone. Many learners with very little experience with a mobile device can figure out how to use a mobile phone in a short period of time (Traxler & Leach, 2006) and will quickly start learning using educational games on mobile phones (Greenop & Busa, 2008).

Obstacles for blended learning using mobile phones are the pricing strategies of the Internet providers. Feature phones provide a lot less features and therefore less comfortable learning than the much more expensive smart phone. It still requires a bit of learning moving from feature phone to smart-phone. A stronger commitment to m-learning in the mobile industry could solve many of the obstacles mentioned (GSNA & MasterCard, 2011; Mahai, 2012).

A VISION FOR THE FUTURE OF BLENDED LEARNING

In 2020 SME learners can rely on simple access to education, based on community learning groups or classroom sessions combined with a vast array of mobile and online learning material. The learning materials are mostly OER, covering skills and subjects like digital literacy, communication, bookkeeping, health and safety, as well as specific and technical material. The course materials are a mix of resources authored for the specific learning needs, adaptations of existing OER, new creations, often as user-generated content and they are distributed and sourced world-wide.

Smart phones are affordable for everybody. Due to competitively priced data packages everybody who owns a mobile device can learn. Blended learning combines mobile learning and (flipped) classroom sessions. The terms m-learning, e-learning and blended learning have disappeared. People are learning with whatever device or method is available and the learning systems are flexible enough to allow everybody to start at the appropriate level. This allows learners, including those in SMEs to use short learning sessions on their way to work or during breaks, waiting for customers, spare parts or other similar situations.

For those who cannot sit down somewhere with their phone, the audio Web provides a good way to access all the materials through their mobile phone only. Learning on mobiles uses audio clips, e-books, Web links, and study guides. On a smart phone, learners can get learning support, hints, tips, revision material, polls, and quizzes.

Learning material is available at any time for self-paced learning, but for more structured learning MOOCs are offered. They can be used for programs to gain certificates. People can learn in small steps as it fits into their life. Bi-weekly face-to-face training sessions cater for the need of exchange with other students and the facilitators. These sessions are filled with task-based collaboration, question and answer sessions, discussions and, sometimes, they can be used for exams as well. Certificates can be gained by sitting for an online exam. Modular degree courses allow counting these certificates towards the degree. Online exams can be taken anywhere, as long as some official verifies the identity of the person logging in for the exam. The flipped classroom sessions are preceded by individual learning, usually via the smart phone. People learn at home, on their way to work at work, whenever they need to know something. or when they have ten or fifteen minutes to dive into a short learning session.

The biggest change has happened in company culture. Management in small SME encourages employees to learn and has put incentives in place for those who educate themselves or use organized courses. Well trained staff, educated through formal or informal learning, is encouraged to continually update their knowledge.

CONCLUSION

This chapter has presented a variety of definitions and dimensions of blended learning. These are mainly concentrating on a variety of teaching methods and their delivery mode, in particular a mix of online learning and face-to-face teaching. The chapter has introduced blended learning frameworks and outlined the main success factors. These are primarily a designed mix of media and learning styles, time flexibility, and support mechanisms. A study analysing requirements for successful blended learning in SMEs showed that time flexibility, cost efficiency, support mechanisms, accessibility, efficiency, quality, self-paced learning, results measurement, content design, and learner-centeredness are most relevant.

The applicability of those concepts to small and medium-sized companies varies between Europe and Africa, due to the different geographical, economical, and cultural circumstances. However, company size results in a number of similar characteristics in European and African SMEs, which allows applying the results. One outstanding common characteristic is the lack of education and training. Taking into account recent changes of the technical infrastructure and the general prevalence of mobile devices in Africa the actual implementation of blended learning will focus more on a mix of m-learning, rather than PC-based learning and face-to-face learning. This will enable learners, wherever they are and will give access to education and training as required.

REFERENCES

Adesope, O. O., Olubunmi, S. O., & McCracken, J. (2007). Implementing mobile learning in developing countries: Prospects and challenges. In C. Montgomerie & J. Seale (Eds.), *Proceedings of World Conference on Educational Multimedia, Hypermedia and Telecommunications,* (pp. 1249-1254). Chesapeake, VA: AACE.

Aker, J. C., & Mbiti, I. M. (2010). Mobile phones and economic development in Africa. *Center for Global Development Working Paper No. 211*. Retrieved January 28, 2013, from http://ssrn.com/abstract=1693963 or http://dx.doi.org/10.2139/ssrn.1693963

Baaken, T., & Launen, M. (1993). *Software-marketing*. Munich, Germany: Vahlen.

Baird, D. E., & Fisher, M. (2006). Neomillenial user experience design strategies: Utilizing social networking media to support always on learning styles. *Educational Technology Systems*, *34*(1), 5–32. doi:10.2190/6WMW-47L0-M81Q-12G1

Beer, I., Hamburg, P., & Paul, H. (2006). E-learning in kleinen und mittleren Unternehmen. *IAT Report*. Retrieved January 28, 2013, from www.iatge.de/iat-report/2006/report2006-01.pdf

Bersin, J. (2003). *What works in blended learning*. Retrieved January 28, 2013, from http://www.learningcircuits.org/2003/jul2003/bersin.htm

Bonk, C. J., & Graham, C. R. (2006). *Handbook of blended learning*. San Francisco, CA: Pfeiffer.

Botha, A., Batchelor, J., Traxler, J., de Waard, I., & Herselman, M. (2012). Towards a mobile learning curriculum framework. In *IST-Africa 2012 Conference Proceedings*. Retrieved January 28, 2013, from http://www.IST-Africa.org/Conference2012

Bowden, J., & Marton, F. (1998). *The university of learning: Beyond quality and competence in university education*. London: Kogan Page.

Butt, A. (2012). *Student views on the use of lecture time and their experience with a flipped classroom approach.* Retrieved January 28, 2013, from http://papers.ssrn.com/sol3/papers.cfm?abstract_id=2195398

Carman, J. M. (2002). *Blended learning design: Five key ingredients*. Retrieved January 28, 2013, from http://www.agilantlearning.com/pdf/Blended%20Learning%20Design.pdf

CIPD. (2006). *Learning and development annual report 2006*. Retrieved May 2, 2006, from http://www.cipd.ie

Cross, J. (2006). Foreword. In C. J. Bonk & C. R. Graham (Eds.), *Handbook of blended learning* (p. xvii). San Francisco, CA: Pfeiffer.

Dennis, A., Bichelmeyer, B., Henry, D., Cakir, H., Korkmaz, A., Watson, C., & Bunnage, J. (2006). The Cisco networking academy: A model for the study of student success in a blended learning environment. In C. J. Bonk & C. R. Graham (Eds.), *Handbook of blended learning* (pp. 120–135). San Francisco, CA: Pfeiffer.

Dey, P. (2012). Rapid incubation model for the development of micro and small enterprises in Sub-Saharan Africa. *Global Journal of Management and Business Research*, *12*(10), 79–85.

European Commission. (2005). *The new SME definition—User guide and model declaration*. Retrieved January 28, 2013, from http://ec.europa.eu/enterprise/policies/sme/files/sme_definition/sme_user_guide_en.pdf

European Commission. (2007). *Observatory of European SMEs competence development in SMEs*. Retrieved January 28, 2013, from http://ec.europa.eu/enterprise/policies/sme/facts-figures-analysis/sme-observatory/index_en.htm

Fatoki, O. O. (2011). The impact of human, social and financial capital on the performance of small and medium-sized enterprises (SMEs) in South Africa. *Journal of the Social Sciences*, *29*(3), 193–204.

Felder, R. M., & Brent, R. (2005). Understanding student differences. *Journal of Engineering Education*, *94*(1), 57–72. doi:10.1002/j.2168-9830.2005.tb00829.x

Felder, R. M., & Silverman, L. K. (1988). Learning and teaching styles in engineering education. *Journal of Engineering Education*, *78*(7), 674–682.

Fenrich, P. (2006). Getting practical with learning styles in live and computer-based training setting. *Issues in Informing Science and Information Technology, 3*.

Garavan, T. N., & O'Donnell, D. (2003). *eLearning in Irish organizations?* Retrieved April 14, 2006, from http://www.cipd.ie

Government Gazette of the Republic of South Africa. (2003). *National small business amendment act.* Retrieved January 28, 2013, from http//www.info.gov.za/gazette/acts/2003/a26-03/pdf

Graham, C. R. (2006). Definition, current trends, and future directions. In C. J. Bonk & C. R. Graham (Eds.), *Handbook of blended learning* (p. 5). San Francisco, CA: Pfeiffer.

Greenop, K., & Busa, D. (2008). Developing educational games for mobile phones in South Africa. In J. Luca & E. Weippl (Eds.), *Proceedings of World Conference on Educational Multimedia, Hypermedia and Telecommunications,* (pp. 6171-6181). Chesapeake, VA: AACE. Retrieved January 28, 2013, from http://www.editlib.org/p/29237

GSMA & MasterCard. (2011). *Shaping the future—Realising the potential of informal learning through mobile*. Retrieved January 28, 2013, from http://www.gsma.com/mobilefordevelopment/shaping-the-future-realising-the-potential-of-informal-learning-through-mobile

Henrich, A., & Sieber, S. (2007). Concepts of blended learning for different content types. In J. Fong & F. L. Wang (Eds.), *Blended learning* (p. 151). Singapore: Prentice Hall.

iHub Nairobi. (n.d.). Retrieved January 28, 2013, from www.ihub.co.ke/

Jidenma, N. (2011). *Mobile trends 2020 Africa*. Retrieved January 28, 2013, from http://thenextWeb.com/africa/2011/05/08/the-future-of-mobile-in-africa-in-2020/

Jones, N. (2006). E-college Wales, a case study of blended learning. In C. J. Bonk & C. R. Graham (Eds.), *Handbook of blended learning* (p. 186). San Francisco, CA: Pfeiffer.

Jones, N. (2007). The disruptive effect of technology: A university case study. In J. Fong & F. L. Wang (Eds.), *Blended learning* (pp. 114–122). Singapore: Prentice Hall.

Jung, I., & Suzuki, K. (2006). Blended learning in Japan and its application in liberal arts education. In C. J. Bonk & C. R. Graham (Eds.), *Handbook of blended learning* (p. 270). San Francisco, CA: Pfeiffer.

Kaur, A., & Ahmed, A. (2006). Open distance pedagogy: Developing a learning mix for the open university Malaysia. In C. J. Bonk & C. R. Graham (Eds.), *Handbook of blended learning* (pp. 311–324). San Francisco, CA: Pfeiffer.

Koutropoulos, A., & Hogue, R. J. (2012). *How to Succeed in a MOOC—Massive online open course*. Retrieved January 28, 2013, from http://www.learningsolutionsmag.com/articles/1023/how-to-succeed-in-a-massive-online-open-course-mooc

Lee, K. K. C., & Chong, M. P. M. (2007). An observational study on blended learning for Japanese language studies in a local university in Hong Kong. In J. Fong & F. L. Wang (Eds.), *Blended learning* (p. 89). Singapore: Prentice Hall.

Lee, O., & Im, Y. (2006). The emergence of the cyber-university and blended learning in Korea. In C. J. Bonk & C. R. Graham (Eds.), *Handbook of blended learning* (p. 281). San Francisco, CA: Pfeiffer.

Limon, A. A. (2006). Tecnologico de Monterrey, Mexico: Where technology extends the classroom. In C. J. Bonk & C. R. Graham (Eds.), *Handbook of blended learning* (p. 355). San Francisco, CA: Pfeiffer.

Lindquist, B. (2006). Blended learning at the University of Phoenix. In C. J. Bonk & C. R. Graham (Eds.), *Handbook of blended learning* (p. 225). San Francisco, CA: Pfeiffer.

Mahai, L. (2012). ICT based support for rural students of the Open University of Tanzania: Perceptions, challenges and prospects. In T. Amiel & B. Wilson (Eds.), *Proceedings of the World Conference on Educational Multimedia, Hypermedia and Telecommunications* (pp. 694-702). Chesapeake, VA: AACE. Retrieved January 28, 2013, from http://www.editlib.org/p/40821

Masie, E. (2006). The blended learning imperative. In C. J. Bonk & C. R. Graham (Eds.), *Handbook of blended learning* (p. 22). San Francisco, CA: Pfeiffer.

McCullough, C. (2005). *Obstacles to small business usage of e-learning in Europe*. Retrieved January 28, 2013, from http://www.Webpronews.com/ebusiness/smallbusiness/wpn-2-20050802ObstaclesToSmallBusinessUsageOfeLearningInEurope.html

McLoughlin, C. (1999). The implications of the research literature on learning styles for the design of instructional material. *Australian Journal of Educational Technology*, *15*(3), 222–241.

McSporran, M., & King, C. (2005). *Blended is better: Choosing educational delivery methods*. Retrieved January 28, 2013 from http://www.heacademy.ac.uk/resources/detail/evidencenet/Blended_Is_Better-Choosing_Educational_Delivery

Moebs, S., Piombo, C., Batatia, H., & Weibelzahl, S. (2007). A tool set combining learning styles prediction, a blended learning methodology and facilitator guidebooks—Towards a best mix in blended learning. In *Proceedings of the Interactive Computer-Aided Learning Conference*. Retrieved January 28, 2013, from http://hal.inria.fr/docs/00/19/72/94/PDF/178_Final_Paper.pdf

Mungania, P. (2003). *The seven e-learning barriers facing employees*. Retrieved January 28, 2013, from http://aerckenya.org/docs/ElearningReport.pdf

Murphy, J. (2007). How a blended approach for job-embedded learning has led teachers to recognize and reflect upon the unique intersections of content, technology, and classroom practice in the advanced broadband enabled learning (ABEL) program. In C. Crawford et al. (Eds.), *Proceedings of the Society for Information Technology and Teacher Education International Conference* (pp. 2233-2237). Chesapeake, VA: AACE.

Norberg, A., Dziuban, C. D., & Moskal, P. D. (2011). A time-based blended learning model. *Horizon*, *19*(3), 207–216. doi:10.1108/10748121111163913

Olawale, F., & Garwe, D. (2010). Obstacles to the growth of new SMEs in South Africa: A principal component analysis approach. *African Journal of Business Management*, *4*(5), 729–738.

Oliver, M., & Trigwell, K. (2005). Can 'blended learning' be redeemed?. *E-Learning and Digital Media, 2*(1), 17-26. Retrieved January 28, 2013, from http://dx.doi.org/10.2304/elea.2005.2.1.17

Parker, M., Wills, J., & Wills, G. (2012). RLABS: A South African perspective on a community-driven approach to community informatics. *Journal of Community Informatics*. Retrieved January 28, 2013, from http://eprints.soton.ac.uk/273137/1/RLabsJOCI.pdf

Piombo, C., Batatia, H., & Ayache, A. (2003). A framework for adapting instruction to cognitive learning styles. In *Proceedings of the Third IEEE International Conference on Advanced Learning Technologies* (pp. 434-435). IEEE. Retrieved January 28, 2013, from http://ieeexplore.ieee.org/stamp/stamp.jsp?tp=&arnumber=1215160.

Reynolds, T., & Greiner, C. (2006). Integrated field experiences in online teacher education. In C. J. Bonk & C. R. Graham (Eds.), *Handbook of blended, earning* (p. 216). San Francisco, CA: Pfeiffer.

Ross, B., & Gage, K. (2006). Global perspectives on blended learning: Insight from WebCT and our customers in higher education. In J. Fong & F. L. Wang (Eds.), *Blended learning* (p. 156). Singapore: Prentice Hall.

Salmon, G., & Lawless, N. (2006). Management education for the twenty-first century. In J. Fong & F. L. Wang (Eds.), *Blended learning* (pp. 387–399). Singapore: Prentice Hall.

Serveau, K. (2004). Examining an online corporate study group. In G. Richards (Ed.), *Proceedings of the World Conference on E-Learning in Corporate, Government, Healthcare, and Higher Education,* (pp. 940-945). Chesapeake, VA: AACE.

Singh, H. (2006). Blended learning and work: Real-time work flow learning. In C. J. Bonk & C. R. Graham (Eds.), *Handbook of blended learning* (p. 477). San Francisco, CA: Pfeiffer.

Smart, K., Kumar, P., & Kumar, A. (2005). Blended learning: Impacting student learning and learning styles through integrating web-enhanced course components. In G. Richards (Ed.), *Proceedings of the World Conference on E-Learning in Corporate, Government, Healthcare, and Higher Education* (pp. 940-945). Chesapeake, VA: AACE.

Stash, N. (2007). *Incorporating cognitive/learning styles in a general-purpose adaptive hypermedia system*. (Unpublished PhD thesis). Technische Universiteit Eindhoven, Eindhoven, The Netherlands.

The eLearning Guild. (2006). *Trends in blended learning research report 2006*. Retrieved January 28, 2013, from http://www.elearningguild.com/

Traxler, J., & Leach, J. (2006). Innovative and sustainable mobile learning in Africa. In *Proceedings of the Fourth IEEE International Workshop on Wireless, Mobile and Ubiquitous Technology in Education*, (pp. 98-102). Washington, DC: IEEE Computer Society. Retrieved January 28, 2013, from http://www.open.ac.uk/deep/Public/Web/publications/pdfs/JTraxlerJLeach2006-WMUTE.pdf

Valiathan, P. (2002). *Blended learning models*. Retrieved January 28, 2013, from http://dimadele.org/platform10/blended_learning/Blended%20Learning%20Models.pdf

VMKTech. (n.d.). Retrieved January 28, 2013, from http://www.vmktech.com/en/

W3C Web Accessibility Initiative (W3CWAI). (n.d.a). *Mobile accessibility*. Retrieved January 28, 2013 from http://www.w3.org/WAI/mobile/

W3C Web Accessibility Initiative (W3CWAI). (n.d.b). *Shared web experiences: Barriers common to mobile device users and people with disabilities*. Retrieved January 28, 2013 from http://www.w3.org/WAI/mobile/experiences.html

Wagner, E. D. (2006). On designing interaction experiences for the next generation of blended learning. In C. J. Bonk & C. R. Graham (Eds.), *The handbook of blended learning: Global perspectives, local designs*. San Francisco, CA: Pfeiffer.

Wenger, M. S., & Ferguson, C. (2006). A learning ecology model for blended learning from Sun Microsystems. In C. J. Bonk & C. R. Graham (Eds.), *Handbook of blended learning*. San Francisco, CA: Pfeiffer.

Wood, D., & Watson, J. (2002). Factors limiting the proliferation of e-learning within small to medium sized enterprises. In G. Richards (Ed.), *Proceedings of the World Conference on E-Learning in Corporate, Government, Healthcare, and Higher Education,* (pp. 1049-1055). Chesapeake, VA: AACE.

Wright, C., & Reju, S. (2012). Developing and deploying OERs in sub-Saharan Africa: Building on the present. *The International Review of Research In Open And Distance Learning, 13*(2), 181-220. Retrieved January 28, 2013, from http://www.irrodl.org/index.php/irrodl/article/view/1185

Wright, N., Dewstow, R., Topping, M., & Tappenden, S. (2006). New Zealand examples of blended learning. In C. J. Bonk & C. R. Graham (Eds.), *Handbook of blended learning* (p. 171). San Francisco, CA: Pfeiffer.

Ziob, L., & Mosher, B. (2006). Putting customers first at Microsoft: Blending learning capabilities with customer needs. In C. J. Bonk & C. R. Graham (Eds.), *Handbook of blended learning* (p. 97). San Francisco, CA: Pfeiffer.

ADDITIONAL READING

Education Podcasts for Mobile Learning. (n.d.). Retrieved from http://edudemic.com/2013/01/education-podcasts/

Mobile Learning Initiatives, infoDEV. (n.d.). Retrieved from https://edutechdebate.org/archive/mobile-learning-initiatives/

OER Africa. (n.d.). Retrieved from www.oerafrica.org/

Open Access Journals Search Engine. (n.d.). Retrieved from http://www.oajse.com/subjects/education.html

The International Review of Research in Open and Distance Learning. (n.d.). Retrieved from http://www.irrodl.org/index.php/irrodl/index

KEY TERMS AND DEFINITIONS

Blended Learning: A mix of learning methodology, learning technology, and delivery methods. It is most often a mix of different learning technology suitable for face-to-face and classroom parts of a course.

Feature Phone: Simple mobile phone that allows sending short messages, making phone calls, saving short notes, and storing addresses in an address book.

Massive Open Online Courses (MOOC): MOOCs are online learning environments aiming at a large, often worldwide online audience interested in one particular topic area. They are often using OERs, but this is not mandatory. Some of the key benefits are depending on large numbers: high interactivity in forums, related blog posts, and online conference discussions. More information: http://mooc.ca/ or http://mobimooc.wikispaces.com.

M-Learning: Mobile learning, using mobile devices, typically mobile phones, feature phones, but more often smart phones and tablets. Mobile learning uses the typical user scenarios of mobile devices and integrates them for learning. This is in particular, messaging, listening to audio clips, reading texts, discussions, taking pictures,and feeding into social media (blogs, Twitter, Facebook).

Open Educational Resources (OER): Educational resources which can be used, adapted. and shared. They are usually protected with a Creative Commons Licence. More information: http://creativecommons.org/education.

Small and Medium-Sized Enterprises (SME): SMEs have characteristic advantages and challenges because of their size. They allow for quick decisions, are often highly specialized, but can also lack defined work processes and a strategic approach to market challenges.

Smartphone: Mobile phones with more advanced features than a feature phone, like reading emails, going online, using dedicated mobile applications for a number of online and offline activities. Overall its scope is closer to that of a laptop than a feature phone.

This work was previously published in Advancing Technology and Educational Development through Blended Learning in Emerging Economies edited by Nwachukwu Prince Ololube, pages 36-58, copyright year 2014 by Information Science Reference (an imprint of IGI Global).

Chapter 32
Active Learning in the Flipped English Language Arts Classroom

Clarice Moran
North Carolina State University, USA

Carl A. Young
North Carolina State University, USA

ABSTRACT

This mixed-methods research study examines the engagement of high school students in a flipped English Language Arts (ELA) classroom. The students were enrolled in two sections of an Advanced Placement English Language Arts and Composition (AP Lang) course and were in the 11th grade. Forty-nine participants answered questions on a validated survey, and 8 participants took part in 2 focus groups. In addition, a researcher observed the flipped classroom and took field notes. Quantitative survey data was analyzed through STATA statistics software, and qualitative data was transcribed and coded. The results of the data analysis indicate that students had mixed feelings about the flipped method and its implementation in an ELA classroom. Survey data indicates general support for the method's principles but revealed mixed attitudes toward it as a method of instruction, especially in terms of it as a strategy for addressing all instruction in the ELA classroom. Qualitative data indicates that some students felt more engaged by the flipped method, while others did not. The results of the research indicate that the flipped method might be effective, in part, in an ELA classroom, but not as a sole means of instruction.

INTRODUCTION

Much is being made about the flipped model of instruction as a major reform initiative with the potential to reshape teaching and learning. Journals, newspapers, conferences, websites, podcasts, and blogs all tout the benefits of this new pedagogy as a paradigm shift that is reshaping learning and will reshape the classroom environment, reaching even the most reluctant of learners.

Teachers in English language arts (ELA) classes have begun using the flipped instructional model as a way to deliver fact-based content in a focused and efficient manner. Although there

DOI: 10.4018/978-1-4666-8246-7.ch032

is scant research on the efficacy of the model in the ELA classroom, a handful of teachers across the country have begun using the method in an attempt to better engage their students and, ideally, effectively address the curriculum. Their reasons are similar to those used by teachers in other content areas: they want more one-on-one time with students (Fulton, 2012); they want a classroom centered on inquiry and problem-based learning (Bergmann & Sams, 2012a); and they want to eliminate the constant homework struggle (Strayer, 2007). This chapter will provide a review of relevant literature and research and also present the results of an independent research study on the flipped method conducted in a high school ELA classroom. In addition, it will discuss the advantages and disadvantages of using the flipped method in an ELA environment and will highlight strategies, activities, technologies, and tools that might be a part of an effective flipped ELA classroom.

Although many English teachers have attempted to incorporate new technologies into their classrooms using an integrated framework, such as TPACK (Koehler & Mishra, 2009), others have used Web 2.0 tools and the Internet in an attempt to "tick the box" on technology use and follow the guidelines for technology use in the new Common Core State Standards (CCSS). Although technology is one component of the flipped classroom, educators who want to integrate the method into an ELA classroom must ensure that the curriculum is driving the technology, not the other way around (Shelly, Gunter & Gunter, 2012). We believe that a flipped classroom is but one component of a well-stocked, ELA pedagogical toolbox. English teachers may choose to adopt or reject the strategy, as well as technological integration in general (Swenson, Young, McGrail, Rozema & Whitin, 2006). The research study presented in this chapter demonstrates that the combination of technology and a new pedagogical method can be engaging for students but should be implemented with intention, forethought, and care.

BACKGROUND

Making the Flip: The Origins of the Flipped Classroom Model

The "flipped classroom" moniker can trace its origins to the frustrations experienced by a university professor in a small, private college in Ohio (Baker, 2000). After noticing that his communication students were simply copying verbatim from PowerPoint slides without processing the information, Professor J. Wesley Baker at Cedarville University decided to post the PowerPoint slides onto the school's new computer network and have the students read the slides before coming to class. His idea, launched in 1995, was to use four key concepts to drive the model. The concepts were: "clarify, expand, apply, practice" (Baker, 2000, pp. 13-14) in order to shift his role from "sage on the stage to guide on the side" (Baker, 2000, p. 9). The students reviewed the material on the slides before class, and Baker (2000) then clarified and explained the concepts at the start of class, expanding on the basic information in the slides. The students broke into small groups to apply and practice the concepts. Baker (2000) surveyed his students at the end of the term and discovered that they felt they had learned a great deal from their peers through the collaborative activities. He dubbed the new process the "Classroom Flip" and presented a paper on the idea at a conference in 2000.

Simultaneously, another group of university instructors at Miami University in Ohio launched an "inverted classroom" (Lage & Platt, 2000) in an attempt differentiate their microeconomics lessons for different learning styles. The availability of technology was the spark that ignited the idea and allowed the researchers to turn the traditional classroom environment on its head by asking students to view PowerPoint slides and course content on a course website before coming to class. Once in class, the students worked in small groups to analyze the material. Lage, Platt and Treglia (2000) wrote that "inverting the classroom means that events that have traditionally taken place inside the classroom now take place outside the classroom and vice versa" (p. 32). A survey administered at the end of the course indicated that students enjoyed the collaborative nature of the class and valued learning economics in a new way. The researchers concluded, "students generally preferred the inverted classroom to a traditional lecture and would prefer to take future economics classes using the same format," (Lage, et al, 2000, p. 41).

A few years later, in 2007, two high school chemistry teachers in Colorado began a collaborative effort to teach their content with the aid of screen capture software that allowed them to record lectures and spend class time working one-on-one with students (Bergmann & Sams, 2012a). Their idea was born independently of Baker's (2000), but seemingly created from the same primordial goo of the 21st Century: technology access and frustration over students' lack of engagement. Anecdotal evidence suggested that the Bergmann & Sams (2012a) method was successful, so the pair began touting its benefits through conferences, blogs, and a website. They have since moved the basic flip idea into a "Flipped Mastery" concept (Bergmann & Sams, 2012a, pp. 51-93) in which asynchronous learning takes place as students work simultaneously, but at different paces, on multiple projects. Bergmann & Sams (2012a) believe the flipped classroom model has tremendous potential to reduce the frustrations of teaching, because (among other things) it personalizes education, increases student-teacher and student-student interaction, and makes the classroom content transparent to parents and others.

Higher Education and STEM as the Focus of Flipped Research

Since the inception of the idea, others have attempted this paradigm shift in their own classrooms in an effort to "reach every student in every class every day" (Bergmann & Sams, 2012a, book title). The flipped method has become the hot topic with regard to education in the media, garnering significant attention in newspapers (Barr, 2013) and journals (Bergmann & Sams, 2012b; Berrett, 2012; Fulton, 2012; Tucker, 2012). Yet, almost all of the published research to date has been conducted exclusively in Science, Technology, Engineering, and Math (STEM) classrooms – and most of these studies were conducted at higher education institutions. To complicate matters further, much of the data has been inconclusive, as students and teachers cannot quite decide if they like the new method or not, or decide if it is effective enough or not.

In one mixed-methods study, J.F. Strayer (2007) compared two introductory statistics classes that he taught. One class was taught using the traditional lecture format, while the other employed the flipped method. Strayer's framework leaned on Activity Theory and active-learning theories posited by Vygotsky (1978) and Dewey (1990), which speculated that students learn best through activity and physical engagement with the content. Strayer (2007) used a video series to deliver the lecture content to his flipped class and followed up with activities and collaborative learning during class time. Both his quantitative and qualitative data found that students in the flipped classroom were less satisfied with the instruction they received. Although students in the flipped class were found to prefer collaboration and innovative teaching strategies, they said they felt less connected to the professor and that class time felt redundant after learning the content from a video. Strayer (2007) concluded that the students did not really know "how to do class" (p. 155) and that frequently the collaboration felt like "the blind leading the blind" (p. 135).

However, in another study, the flipped model outscored the traditional classroom paradigm in terms of student satisfaction with the course, as well as academic achievement. The study, conducted by Marcey and Brint (2012) in two introductory biology classes at a private university in California, compared the Cinematic Lectures and Inverted Classes (CLIC) model to the traditional lecture model. Students in the CLIC class outscored the traditional class on all quizzes and tests in the first half of the semester. By the second half of the semester, however, the achievement gap had closed between the groups. The researchers posited that this was because students in the traditional lecture class had begun watching the videos too – an interesting finding that led them to conclude that the videos, not the collaborative activities, were the key to success in the class.

Other studies at higher education institutions have not shown such clear preferences for the flipped model. In a study conducted by Ferreri and O'Connor (2013) in university-level pharmacy classes, students demonstrated improved grades and learning outcomes in a class that emphasized collaborative learning over traditional lectures. However, the students in the non-traditional class turned in course evaluations that were more negative than those in the traditional class.

A study in two university-level computer science classes found that students in a flipped class demonstrated high levels of engagement, compared to the traditional class (Gehringer & Peddycord, 2013). The students in the computer science flipped class watched videos for homework, then collaborated during class time while the instructor circulated among the groups and answered questions. The students reported enjoying working with a partner to talk through material, but they did not score as well on the final exam as those in the traditional lecture class.

Secondary Schools Context

A study conducted in a high school also indicated mixed results from using the flipped method of instruction. Johnson and Renner (2012) used a mixed methods switching replications design to study two, 12-week high school computer classes. One class was flipped; the other was traditional. Students were randomly assigned to each class, and then they were switched at the half-way point. This way, students experienced both methods of instruction within the 12-week period. The researchers measured the success of the instruction through the cognitive levels of questions asked by students. They used Bloom's Taxonomy to assess the cognitive level. The researchers concluded that there was no evidence to support higher satisfaction with the flipped method and no significant difference in academic achievement. In fact, they found that there were more higher-level questions asked in the traditional class. However, Johnson and Renner (2012) remained cautiously optimistic about the flipped method at the end of their study, noting the following:

If a teacher is driven to implement the flipped approach and is willing to commit to the extra work required in order to ensure success, content area should not be a significant factor. Future research on determining the efficacy of the flipped method of instruction should only be conducted when teachers realize the need for drastic change in instructional practice and are willing to tackle the drawbacks associated with time, student work ethic, personal work ethic, technology access and history (p. 67).

Other data on the flipped method is anecdotal, but indicates promise for the strategy. In a high school calculus class, student proficiency with course material increased after their teachers adopted a flipped method (Fulton, 2012). In a middle school in North Carolina, teachers reported that student engagement and test scores increased after implementation of the flipped classroom in math and social studies (Barr, 2013). And nearly 99% of 453 teachers surveyed who implemented a flipped classroom said they planned to repeat the approach during the next school year (Flipped Learning Network, 2012).

FLIPPING THE ELA CLASSROOM

There is great interest among educators in the flipped classroom method at all grade levels and in all subject areas. However, there is a dearth of research published on flipping the classroom in the elementary grades, as well as at the middle- and high-school levels. Since the pedagogy is new, many educators are simply trying it without the aid of empirical evidence. To date, there appears to be no published research on the flipped ELA classroom yet – at any level – and, according to the National Center for Academic Transformation (NCAT), dozens of colleges and secondary schools are using the method anyway. This means that ELA teachers interested in implementing the method must rely on their own ideas for adapting the strategy or consult resources from conferences, workshops, websites, or word of mouth to construct their flipped lessons. As such, the paradigm shift of the flipped classroom may be in jeopardy of not having a viable or lasting impact. As Tucker (2012) explains, "Given education's long history of fascination with new instructional approaches that are later abandoned, there's a real danger that flipping, a seemingly simple idea that is profound in practice, may be reduced into the latest educational fad" (p. 83). Tucker's warning highlights the need for more research on the flipped model in all content areas at all levels, but especially for ELA.

Framework for a Research Study in a Secondary ELA Classroom

To address the lack of research in secondary schools and ELA classrooms, we conducted a mixed-methods independent research study in two 11th grade English classes. Our purpose for the study was to assess student engagement with the flipped classroom method in a secondary ELA classroom and to add to the body of research about the flipped method. We used a theoretical framework based upon Kearsley and Shneiderman's (1998) Engagement Theory for technology and learning, along with the principles of TPACK (Koehler & Mishra, 2009). In addition, we viewed a flipped ELA classroom as being reflective of Dewey's (1897) beliefs about the importance of creating new attitudes and new interests in pedagogical methods. In his seminal work *My Pedagogic Creed*, Dewey (1897) states, "The progress (of education) is not in the succession of studies, but in the development of new attitudes towards, and new interests in, experience." In effect, students are engaged with, motivated by, and learn from compelling interactive educational experiences.

Student engagement as defined by Fredericks, Blumenfeld and Paris (2004) is a three-pronged concept:

1. **Behavioral Engagement:** "Draws on the idea of participation," as well as active involvement in the activities of the classroom;
2. **Emotional Engagement:** Includes the student's "positive and negative reactions" to the academic subject; and
3. **Cognitive Engagement:** Reflects the student's willingness to put forth effort and consider higher-level concepts (p. 60).

We viewed student interest, or engagement, in the flipped classroom as being composed of all three concepts. We measured behavioral and emotional engagement through field observations in the classroom. In addition, we used a survey based on a modified version of the Computer Attitude Questionnaire (CAQ) originally developed and validated by Knezek and Christensen in 1996 to assess middle-school students' attitudes toward learning with computers. Beeland (2002) adapted the CAQ to measure student engagement in interactive whiteboards.

In addition, Kearsley and Shneiderman (1998) developed an Engagement Theory that posits students learn best when using technology in conjunction with collaborative, project-based learning. The theory states that technology is a vehicle that helps drive the learning and heighten student engagement, while collaboration and project-based curricula allow students to reach higher levels of cognitive understanding. Kearsley and Shneiderman (1998) write:

Engagement theory is presented as a model for learning in technology-based environments which synthesize many elements from past theories of learning. The major premise is that students must be engaged in their course work in order for effective learning to occur (p. 23).

We felt it was important to measure student engagement, as defined by Fredericks, et al (2004) and Kearsley and Shneiderman (1998) in our flipped classroom study because students who are engaged are more likely to succeed in school and less likely to drop out (Connell, Spencer & Aber, 1994). In addition, students who are more engaged in a flipped classroom than in a traditional classroom may be more likely to have positive academic outcomes, since there is a strong correlation between participation/behavioral engagement and academic achievement (Finn, 1989; Finn, 1993).

In our study, we used technology in our flipped method as an additional tool to help interest students. However, we did not want the technology to simply be an "add on" (Koehler & Mishra, 2009), but rather a different way to excite students and keep our pedagogy fresh. Our intent was to use the TPACK framework (Koehler & Mishra, 2009) as a means to inform the integration of technology so that students engaged more fully with the course material. Since TPACK describes an integration of technology, pedagogy, and content knowledge, we hoped the use of technology in our flipped classroom would help engage students. We aimed to blend content knowledge with our new pedagogical approach and technology.

Our research questions for the study were:

1. Are high school ELA students engaged by the flipped classroom method? If so, what aspects of the strategy appeals to them as students? If not, why not?
2. Do high school ELA students prefer the flipped classroom paradigm over the traditional classroom paradigm? If so, what aspects of the strategy inform their preference? If not, why not?

Sample

A purposeful convenience sampling method was used in the study. The participants (n=49) were students in two class sections of an Advanced Placement English Language and Composition (AP Lang) course at Pinewood High School, a suburban high school in the Southeastern United States. Pinewood has a student population of more than 2,000 students in grades 9-12. The school is located in a semi-rural area and is comprised of 46% African Americans, 37% European Americans, 14% Hispanic Americans, 2% Asian Americans, and 1% American Indians, according to a county report on gender and ethnicity. In addition, county school system records show that about 47% of the students at Pinewood High School are eligible for free or reduced lunch.

The 49 student participants in the sample were largely of European American decent with 39 European Americans, 8 African Americans, 1 Asian American, and 1 Hispanic American. The students were enrolled in the AP Lang course, which is an advanced course that focuses on rhetoric and composition in English. Students self-select the course and are not tracked in, or placed, in the course by counselors or former teachers. All students enrolled in the year-long course, however, must be aware of the increased rigor and workload related to the content. The course culminates in a standardized exam administered by the College Board in May.

We chose to conduct our study in the AP Lang classes because we felt that students enrolled in the course would be highly motivated and more likely to complete the flipped method's requirements. Since students choose to take the rigorous course, we hypothesized that they would be motivated to engage in the new method. In addition, Ms. Brown, the teacher for both sections of the course, offered her classroom as a testing ground for the flipped model. Ms. Brown distributed informed consent forms prepared by the researcher to all students (n=52). Forms signed by parents were returned by 49 students.

Method

In our study, Ms. Brown was instructed on how to implement the flipped method, which we interpreted to mean inverting the classroom so that direct instruction and lectures took place outside the classroom and activities related to the instruction took place inside the classroom (Baker, 2000). In other words, the homework that normally would have taken place outside the classroom was completed during class time, while the lecture and direct instruction that normally would have occurred during class time was completed at home.

Using Jing screen capture software to record lectures, Ms. Brown implemented the flipped method with her students twice. We hypothesized that students might be confused by the inversion during the first flip and would need a second flip to gain comfort and practice with the method. The students were instructed to view for homework the videos Ms. Brown created with Jing and uploaded to her class website. The students were directed to take notes on the videos and then come to class prepared to participate in activities related to the video content. The researcher was present for the creation of the first Jing video, as well as for field observations during both implementations of the flip. At the conclusion of the second flip, a survey was administered to students. In addition, the researcher met with two focus groups of 4 students each (n=8) to discuss their feelings about the flipped method. The researcher also met separately with Ms. Brown to discuss her observations on the flipped method.

Survey data was analyzed quantitatively through STATA statistics software. Focus group comments were audiotaped and then transcribed. The comments were open coded (Creswell, 2013) and analyzed for similarities, differences, and common themes. We felt that a mixed-methods approach was best for our study as it allowed the researcher to "strive to understand the meaning people have constructed about their world" (Merriam, 2002, p. 4). In addition to gathering the quantitative survey data, we were interested in field observations and conversations with students as a means of triangulation. Creswell (2013) described this type of qualitative research as being naturalistic in that researchers gather multiple forms of data in the field, not in a lab setting.

Survey Instrument

The survey instrument we used to measure student engagement in the flipped method was a modified version of the validated CAQ (Knezek & Christensen, 1996). Like Beeland (2002), we used the instrument to measure student engagement in a specific method of instruction. Beeland (2002) used a modified version of CAQ to investigate student engagement in interactive whiteboards. The survey we used consisted of the same 20 questions used by Beeland (2002) with the language modified to reflect the flipped method, rather than an interactive whiteboard. The dependent variable as measured by the survey was student engagement in the learning process. The independent variable was the flipped classroom method.

Students (n=49) responded to the survey questions on a Likert-type scale from 1-5. A response of 1 indicated that the student "strongly disagreed" with the statement; 2 indicated the student "disagreed"; 3 signified the student was "undecided"; 4 indicated the student "agreed" with the statement; and 5 indicated the student "strongly agreed" with the statement. Table 1 displays the questions on the survey, as well as the means and standard deviations for the responses.

Procedures

The First Flip

Ms. Brown is a veteran teacher with a Master's degree and more than 10 years teaching experience in ELA. She is enrolled in a Ph.D. program in education at a major research university. She was only vaguely familiar with the idea of the flipped classroom, but was open to learning more about it. The researcher met with Ms. Brown during a teacher workday and went over basic principles and ideas behind the flipped classroom, as defined by Bergmann and Sams (2012a) and Baker (2000). Ms. Brown decided to implement the first flip during a unit on writing research papers. She said that she had struggled in previous years to get students to adhere to the Modern Language Association's (MLA) guidelines on formatting papers, notecards, and Works Cited pages. She wanted to try the flipped method for instructing students on how to create notecards for a research source. She opted for the free Jing.com screen capture software after debating the benefits of filming herself on camera. She said she did not feel comfortable in front of a camera and preferred the voice-over capabilities of Jing. With the aid of the researcher, she downloaded the free Jing

Table 1. Questions from student survey with means and standard deviations

Question	M	SD
1. I enjoy learning with the flipped method of instruction	3.27	.81
2. I do not like receiving instruction through the flipped method	2.82	.97
3. I will be able to learn more material if my teacher uses the flipped method	2.80	.87
4. I concentrate better on the lesson when I watch an instructional video for homework	3.12	1.05
5. I enjoy watching videos very much	3.55	.94
6. I would work harder if I could learn through the flipped method more often	2.73	.88
7. I know I can learn many new things when my teacher uses the flipped method	3.02	.80
8. I enjoy watching an instructional video for homework	3.27	.97
9. I enjoy the chance to work on my own in class	3.65	.97
10. I believe that the more often teachers use the flipped method, the more I will enjoy school	2.80	1.0
11. I believe that it is very important for me to be able to learn through video lectures	3.02	.99
12. I feel comfortable with learning through the flipped method	3.53	.84
13. I get a sinking feeling when I think of learning through the flipped method	2.39	.86
14. I think that it takes a longer amount of time to learn when my teacher uses the flipped method	2.76	1.05
15. Learning through the flipped method makes me nervous	2.20	.96
16. Using the flipped method is very frustrating	2.41	1.02
17. I will do as little work as possible when my teacher uses the flipped method	2.41	1.02
18. Learning through the flipped method is difficult	2.20	.76
19. Independent learning does not scare me at all	3.83	.96
20. I can learn more from a live lecture in class than from a video at home	3.59	.98

Note: High school ELA students (n=49) responded to questions on a Likert-type scale from 1-5.
1=strongly disagree; 2=disagree; 3=undecided; 4=agree; 5=strongly agree.

software and recorded a lecture on formatting notecards for research papers. Through Jing, she was able to demonstrate precisely where citations and information should go on the cards. The Jing software limited her lecture to five minutes, which she found constraining. She had to re-record the lecture several times to accommodate the time limitation. Afterwards, however, she remarked that the time limit forced her to be more concise and specific, and she thought that was a positive quality.

Ms. Brown uploaded the completed research card video onto her classroom website. She instructed students the next day that they had one week to watch the video and take notes on it. She also gave all students an accompanying handout with specific guidelines on making notecards. The students were told that they would have class time in the school media center to find sources for their research papers and complete their notecards. Ms. Brown told them she did not plan to give further instruction on how to create notecards, but that they were to use the video, the handout, and each other as resources.

On the day the students were scheduled to complete the notecards in the media center, the start of school was delayed due to snow. One class was able to complete the cards as scheduled. The second class did not go to the media center until the following week because of the weather-related shift in the school schedule. The researcher was present as an observer in the media center during both classes and observed student interactions and comments. Ms. Brown reminded students that they should have watched the video for homework. She also told them that they could watch it on the media center computers during class time if they were unable to watch it at home. At the end of the class periods in both classes, Ms. Brown instructed each student to hand in a minimum of five notecards and one citation card. The results of the correct notecards were recorded.

The Second Flip

For the second flip, Ms. Brown felt comfortable with the Jing software and recorded a lecture by herself on how to annotate a primary source. Annotation of primary sources is a key skill for AP Lang students, who must quickly discern the meaning of certain words and phrases for the AP Lang exam. Teaching annotation is one of the skills recommended by the College Board for AP Lang teachers.

Ms. Brown's second Jing video provided a lecture on the importance of annotation, as well as a demonstration on how to annotate a primary source document. Ms. Brown uploaded the video to the class website and instructed students to watch it for homework. Students were told that they would be expected to demonstrate mastery of the annotation skill in class and that they should take notes on the video to aid in their retention of concepts.

In the classroom, Ms. Brown presented the students with a document and instructed them to annotate it and write an essay. The researcher was present as an observer in the classroom as the students worked. On this flip day, both class periods were able to meet on the same day. During the last 10 minutes of the class period, Ms. Brown directed students to listen to the researcher. The researcher then read a prepared statement to the students, instructing them to fill out a survey on the flipped classroom method. The flipped classroom method was defined in the statement, and students were told that their responses were anonymous. The students completed the survey in class and then deposited completed surveys in a bag that sat on a desk at the front of the room.

The Focus Groups

The researcher returned to Pinewood High School about a week after the second flip had been implemented. At this time, Ms. Brown selected four participants from each class for a focus group discussion with the researcher. Ms. Brown's stated aim in selecting participants was to choose students of differing genders and racial/ethnic backgrounds, as well as ability levels. The students from the first class period met with the researcher in a conference room next to Ms. Brown's classroom. The students in the second class period met with the researcher in another teacher's classroom.

FINDINGS

In our study, we wanted to determine if high school ELA students were engaged by the flipped classroom method. We conducted a mixed methods research study in two AP Lang classes to determine the extent to which students found the flipped method engaging. We administered a survey to the participants (n=49), spent time in field observations, and conducted two focus groups of students. In addition, we talked with the teacher to determine her thoughts and reflections on the flipped process. Our results were mixed. Survey data indicated that students were engaged with the flipped method and liked it as a form of instruction, but remained unsure about whether it was superior to a traditional lecture model. Field data and focus group data indicated that students were polarized in their support of the method, with some students strongly supporting it and others intensely disliking it.

Survey Data

Survey data indicated that students enjoyed the flipped method and found it engaging, although they were unsure about its effectiveness as an instructional method that might be used exclusively. The questions on the 20-question survey can be divided into three main classifications:

1. Independent learning;
2. Comfort with the flipped method; and
3. Belief in the efficacy of the flipped method.

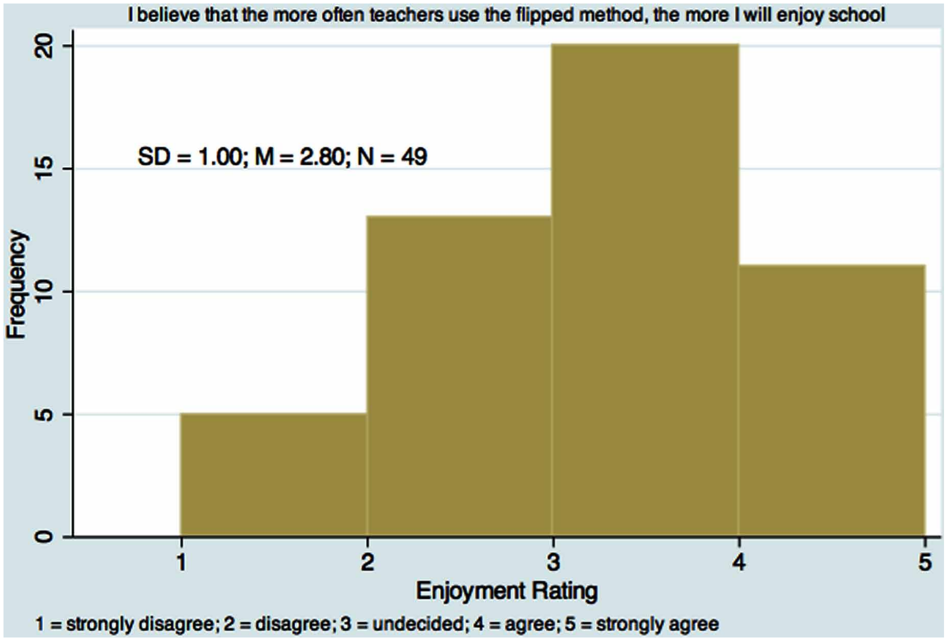
Student responses indicated that most students enjoyed the opportunity to learn independently and work on their own without direct instruction from their teacher. In addition, responses indicated that most students felt comfortable with the flipped method and enjoyed the chance to view lectures and direct instruction on a video. However, responses showed that students were unsure about the efficacy of the flipped method and were undecided as to whether it was superior to the traditional lecture model.

In regards to independent learning, student responses to question 9 ("I enjoy the chance to work on my own in class") indicated support for this statement (M=3.65; SD=.97). In addition, responses were highly supportive of question 19 ("Independent learning does not scare me at all") (M=3.83; SD=.96). These high ratings may be reflective of the type of students who sign up to take an Advanced Placement course. Most of these students are highly motivated and are probably more inclined to need less support or structure to learn.

In regards to comfort with the flipped method, student responses indicated that most students were unafraid of the method and open to learning through it. Survey responses indicated agreement with question 12 ("I feel comfortable learning through the flipped method") (M=3.53;SD=.84). In addition, a large number of responses indicated agreement with question 1 ("I enjoy learning with the flipped method of instruction") (M=3.27;SD=.81). Likewise, there was disagreement with question 15 ("Learning through the flipped method makes me nervous") (M=2.20;SD=.96). This comfort level may be indicative of the "digital native" (Prensky, 2001) status accorded to 21st Century teenagers, who have grown up with a wide array of digital tools at their fingertips and may have developed a mindset that makes them more open to new innovations.

In regards to belief in the efficacy of the flipped method, student responses indicated that many were unsure whether it was an effective

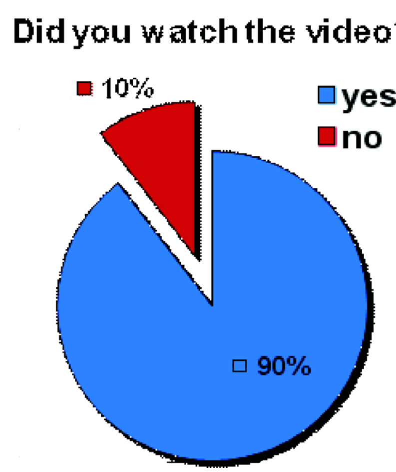
Figure 1. Histogram of responses to question 10



pedagogical strategy and some disagreed that it was an appropriate tool. Responses indicated disagreement with question 3 ("I will be able to learn more material if my teacher uses the flipped method") (M=2.80; SD=.87), as well as disagreement with question 10 ("I believe the more often teachers use the flipped method, the more I will enjoy school") (M=2.80;SD=1.00). And, perhaps, most telling of all, responses indicated agreement with question 20 ("I can learn more from a live lecture in class than from a video at home") (M=3.59; SD=.98). With the strategy being new to the students and with their not having many prior opportunities to weigh in on their perceptions of teaching strategies, it does make sense that they are undecided at this point. Figure 1 indicates the responses to question 10 with means, standard deviations, and frequency counts.

The vast majority of students indicated on the survey that they did watch the video for homework. Figure 2 shows the percentages of students who watched the video.

Figure 2. Percentage of students who watched the video for homework

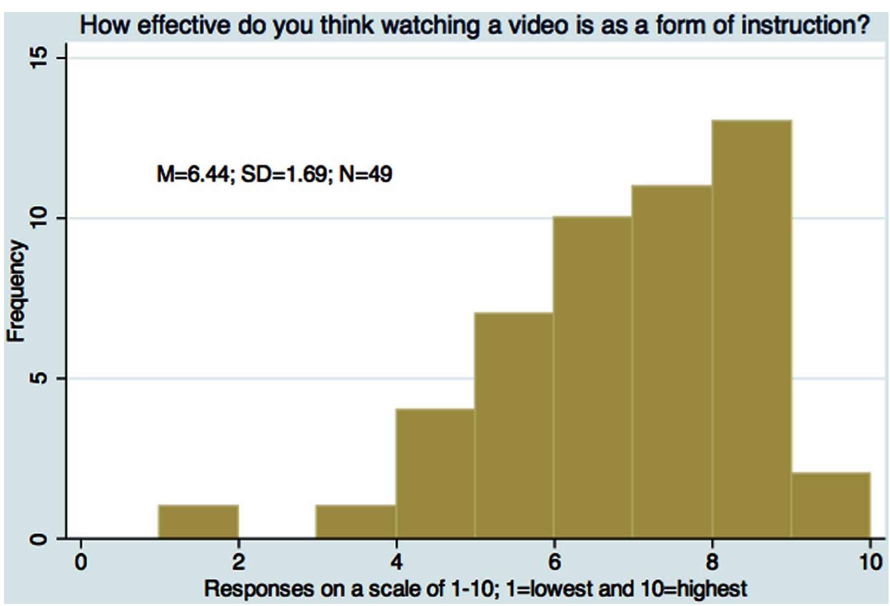


Lastly, we included one item on the survey that was not on the Beeland (2002) survey or on Knezek and Christensen's (1996) original CAQ survey. We also asked students the following: "On a scale of 1 to 10 – with 1 being the lowest and 10 being the highest – how effective do you think watching a video is as a form of instruction? Write your number." Student responses indicated a moderately high level of belief in the efficacy of the method, with a mean of 6.44, standard deviation of 1.69. This is a finding that is inconsistent with the other survey data. This question was asked before the other survey questions, so the early placement on the survey may have caused some respondents to change their minds by the time they got to the last question. It might also indicate a discrepancy in their perceptions of how they learn on their own or at home versus how they expect to learn in school or on school-related tasks. Figure 3 indicates the student responses.

Qualitative Data

Two focus groups were held with a sample of students (n=8) from both classes. The first focus group consisted of two males and two females. In the first group, one student was African American; the other three were European American. The second focus group consisted of three females and one male. In the second group, two students were African American, and two students were European American. All students were selected for participation in the focus groups by Ms. Brown, who chose them based on ethnicity, gender, and ability level in order to hear a variety of student voices. In addition, the researcher observed the students in the flipped classroom on four separate occasions and took field notes. The researcher also interviewed Ms. Brown in a private conference room. The findings from the qualitative data supported those of the quantitative data. Students had mixed feelings about the flipped classroom method and were nearly polarized in their responses to it. Some students seemed to enjoy it, while others actively disliked it. One student attributed this discrepancy in attitudes to learning styles. Nicole remarked that she was not a visual learner and did not like having to rely on the visual components of the Jing video to learn a new concept: "For the reading thing that we have -- I had some questions about it. If [Ms. Brown] would try to explain on the video, I would have some questions. My learning style is not visual."

Figure 3. Histogram of student responses to efficacy of videos as instructional tools



The responses from the focus groups and the observed field data were coded and analyzed for theoretical similarities and differences (Creswell, 2013). Five main themes emerged from the data analysis regarding students' perceptions of the flipped method:

1. **"I like the flipped method:"** Class time is more productive, and I can rewind the homework videos.
2. **"I prefer traditional classes:"** I don't like the flipped method, and I want lecture-based, traditional, teacher-led instruction.
3. **"The flip is impersonal:**" You have to rely on yourself, and collaboration with other students is difficult.
4. **"The flip is not good for English class:"** Discussions and deep, theoretical concepts are not appropriate for the flipped method.
5. **"I don't care:"** School is still school, no matter what method you use.

1. "I Like the Flipped Method"

Students who said they liked the flipped method said they enjoyed the ability to rewind the video that Ms. Brown made and listen to it repeatedly until they understood her message. Students also said they liked being able to work on their own or in small groups and not sit through long lectures that might run off-topic during class. Students said they enjoyed the "to the point" aspect of the flipped method and were able to come into class and get to work immediately on the activities. They also commented that lectures in a traditional class sometimes were derailed by student questions. In the flipped method, Ms. Brown was able to be concise and precise without interruption or unnecessary tangents.

Student responses to the survey question "I do not like receiving instruction through the flipped method," indicated that a majority disagreed with the statement (M=2.82; SD=.97).

From the teacher's perspective, Ms. Brown said she enjoyed the flipped method and likely would use it again. She said she thought the students were more on-task during class time and that more class time was devoted to doing the activity than to her explaining and re-explaining what was required. At the end of both periods in which the students made research notecards, the completion rate of correct cards was much higher than in previous years, according to Ms. Brown. She explained further:

Before, when I explained it in class, they would ask questions and not even look at the handout. Now, they tell their friends they didn't do their homework, but they don't want to admit to me they didn't do the homework. So, if anything, it's forcing them to be more self-reliant and ask fewer questions about how to do it.

Students who said they liked the method seemed very enthusiastic about it and were clear that they preferred the flipped instruction over a traditional class. As Jake said, "I think it's perfect, because you come into class with the knowledge of what's going to go on in class." Other students, like Sadie, said the ability to listen to something repeatedly and find answers to their own questions was their favorite aspect of the model: "I liked that we could go back. Like, instead of ask questions, you could go back and listen to it again if you didn't understand."

2. "I Prefer Traditional Classes"

Likewise, students who said they did not like the method were very vocal about their dissatisfaction. Those who did not like it said they missed the discussion-based format of a traditional English class. The flipped classroom involved more student-to-student interaction and less student-to-teacher interaction. This was a negative aspect for some participants, who felt that deep concepts would be missed without the teacher's direct instruction. In addition, they said they found watching a video tedious and tiresome and preferred the animated teaching style of Ms. Brown. On the survey, a majority of students disagreed with the statement, "I would work harder if I could learn through the flipped method" (M=2.73; SD=.88).

Keisha explained, "I feel like sometimes when you watch a video, you get tired of sitting there. It's hard to focus on the video for so long. And then, in the classroom, it's just hands-on and it can be more involved. And you already have to be there." Danny added, "It's funny, because I can sit there and play with my phone all day. But when I had to watch the video, I was like: 'Is it over yet? How many minutes?' It's like my concentration span for that is not good."

When asked how they would feel if their English class was taught via the flipped method all year, students who disliked the pedagogy said they would "quit" or "switch classes" and said they did not think they would learn as much. Juan explained, "I think I prefer traditional, because the way it is normally, I think that being taught in class and going home, homework is generally trying to see if you understood and can apply what you've learned in class at home. I think in the flip, you might not learn as much."

Juan's statement was corroborated by survey data, which indicated a majority of students were undecided when it came to the statement "I know I can learn many new things when my teacher uses the flipped method" (M=3.02; SD=.80).

3. "The Flip is Impersonal"

Students relied heavily on each other to complete correct notecards and annotations. This self-reliance caused some students to react negatively to the flipped method. Marcus said, "As far as doing anything at length, like an entire unit, I feel like it would become too impersonal in a way. The teacher is not there, hands-on teaching you, and they also take your questions as they come to you."

Survey data indicated that most students were undecided or agreed with the statement "I can learn more from a live lecture in class than from a video at home" (M=3.59; SD=.98).

During field observations Ms. Brown was observed to answer an average of 11 individual questions during a 10-minute period, or slightly more than one question per minute. Students appeared visibly frustrated with having to wait their turn for her attention, and a couple of students sighed loudly and dropped their raised hands with a loud slap onto their desks. In addition, Ms. Brown answered some of the same questions repeatedly as she went from student to student. During the 90-minute class period, she did not sit down once. Although Bergmann and Sams (2012b) have indicated that they enjoyed communicating individually with each student and felt a more personal connection in a flipped classroom, Ms. Brown reported some annoyance at having to run around her classroom repeatedly to answer individual questions.

The students also expressed some concerns. Danny commented, "When she made the videos, they're relatively easy to understand, but I watched them like three or four times so that I could take the notes on them. And I don't have that problem usually. So I don't know what it is. Maybe it is just better to have a person talk directly to you."

4. "The Flip Is Not Good for English Class" (Or Is It?)

Most students were new to the flipped method, but one male focus group participant said he had also experienced it in an Advanced Placement biology class. The method worked well in biology, Juan said, but he did not think it worked as well in English, because English required more discussion and reflection. Other students echoed this idea, remarking that English class was the one subject area in which yes-no answers did not always apply and that discussion was important. They said the unique nature of ELA made the flipped method unsuitable for every unit. Instead, simple lessons that required more quantitative thinking, such as research paper formatting or grammar instruction, would be the only aspects that would be effective in a flip because of "the questions and the confusion."

Juan explained further:

I don't think English in a video form is very interesting. I know it wouldn't be the same thing with math, because that's always interactive when you're going through a question. Or in science, where you're watching a video that [teachers] would go over in class. I know that those two things would normally be in a video, and the teacher might say, "Go watch this. Prepare for the next day." But English... it's kind of in its own realm. It takes, like I said, a little more personal connection on the information you're going over at that time. Because questions arise at that time that aren't really explained the way a math problem or a science video would explain something.

Ultimately, students provided insights into the types of content material that might be better suited for the flip strategy rather than seeing the strategy as a method to be used exclusively in the ELA classroom.

5. "I Don't Care"

Lastly, a small number of students said they actually did not care which pedagogical method their teacher used. In the end, it was all just school to them anyway. This group said that the excitement and newness of instruction on a video was not the same as "watching a video with kittens" or some other short, high-interest, entertaining video they might find on YouTube. The short, five-minute time frame of Ms. Brown's Jing videos felt "too long" for these students, who said they struggled to watch the entire lesson.

Most of these students said they would "just deal" with whatever instructional method their teacher chose. They remarked that they felt "neutral" toward the flipped method and did not prefer it over the traditional classroom method, but that they didn't "hate it" either. "It's not horrible," Keisha said. Another student, Rachel, said she did not watch the video, although the method might work if she cared more. She said, "It sounds like it would be a really good idea, but in reality I didn't do it. I'm just really apathetic."

On the survey, a majority of students disagreed with the statement "I believe that the more often teachers use the flipped method, the more I will enjoy school" ($M=2.80$; $SD=1.0$), possibly indicating that no instructional method would provide school enjoyment. Although this is a source of frustration for teachers, it is important to note that even the best instructional methods may not promote school enjoyment for older teenagers.

DISCUSSION

Overall, the students seemed to have mixed feelings about the flipped method of instruction and did not embrace it whole-heartedly as a pedagogical strategy for the ELA curriculum. In regard to research question 1 -- "Are high school ELA students engaged by the flipped classroom method?" – the data indicated that students are engaged by the method. Many reported that they liked the opportunity to work at their own pace. Survey data revealed that students felt the flipped method was not difficult and that they liked watching an instructional video for homework.

In regard to research question 2 – "Do high school ELA students prefer the flipped classroom paradigm over the traditional classroom paradigm?" – the data indicated that students were mixed in their preferences of classroom paradigms. Many students said they preferred the lecture/discussion model that is already employed in ELA classes and that they would learn more from a live lecture in class than from a video at home. Students also voiced the idea that discussions are the best method of instruction for English classes, but that the flipped method may be more engaging for science and math classes.

Issues, Controversies, Problems

As discussed previously, the flipped classroom method is a current educational innovation that many see as a means for transforming teaching and learning in the 21st century and beyond. Describing the "right way" to flip a classroom is a tall order, however, as advocates for the method have devolved into individual camps whose methods for implementing the flip are not always consistent with each other. Some proponents believe that the method is one tool among many from which a teacher can choose. Others posit that the flip must be implemented in every class, every period, all year long in order to have the lasting impact intended.

One major issue teachers must consider before implementing the flip in ELA classrooms is the types of lessons and content information that they want to cover. In our study, students said repeatedly that they did not believe discussion-based formats should be abandoned in an ELA course. In particular, high-level courses, such as the AP Lang course in our study, benefit heavily from discussions. Students indicated that they enjoyed the opportunity to hear other students' ideas and thoughts. They also said they valued teacher-led, whole-class discussions, since student-led group discussions occasionally lose focus or reinforce faulty information. As Keisha said: "I feel like in small groups, you get off topic, and you don't focus on what you're supposed to. You need the teacher." In addition, working in isolation may run contrary to the overarching intent of studying the humanities, which involves understanding what it means to be human, as well as connecting with others. Without the collaborative aspect of discussions, students' responses implied that they might miss the intangible benefits of higher-order thinking, as defined by Bloom's Taxonomy.

Another issue to consider is the encouragement of active collaboration. This gets to the heart of Engagement Theory (Kearsley & Shneiderman, 1998), which advocates for a pedagogical model based on students actively being able to "Relate-Create-Donate" (p. 20). In this model, students "relate" to one another through collaboration and discussion; "create" through project-based learning; and "donate" their efforts to the community at large or to an "outside customer" (p.21). Simply working on individual activities, even in the asynchronous learning environment promoted by Bergmann and Sams (2012a), may not be enough to fully engage students in the ELA classroom.

Lodge McCammon, a specialist in Curriculum and Contemporary Media at the Friday Institute for Educational Innovation, conducts workshops for teachers interested in using the flipped classroom method. McCammon advocates for a paradigm shift in which as many lessons as possible are taught in a flipped environment. He instructs interested teachers in ways to alter their teaching, typically in lessons that last about one to two months. Many teachers elect to continue with the flipped method over the course of the school year. McCammon believes using the method on occasion is not sufficient enough to gauge student interest and increase engagement. In his workshops, he encourages teachers to flip their classroom as often as possible. He also advocates for an environment of asynchronous learning in which each student is engaged in his or her own project and goes at his or her own speed.

We have observed some ELA teachers successfully implementing the flipped principles in the majority of their lessons who continue to preserve some aspect of whole-class and small-group discussions. Troy Cockrum, a middle-school ELA teacher in the Midwest, has produced blogs and podcasts, as well as presented at conferences on his version of the flipped classroom. Cockrum has successfully implemented the flip for two years and is a strong proponent of asynchronous learning. However, he says that he prefers to leave some class days for book discussions, and his students enjoy this, as well. The benefits of teacher-led discussion in an ELA classroom cannot be underestimated, he says. In addition, Cockrum believes students need to be guided gently into the flipped method: "Kids need to know what's expected. Kids might be confused in the beginning." Although many students might be nervous about the flipped strategy initially, Cockrum has found that they adjust quickly.

Other issues to consider before flipping are access problems, as well as technological failure. Although we did not encounter any students who claimed to have a problem with computer or Internet access during our study, some participants said they "knew of" students for whom access could be a problem. Any flipped lesson that relies too heavily on Internet access could be doomed for failure. In fact, in Cockrum's ELA class, the school's Internet system went down for approximately 20 minutes during a 40-minute class period due to heavy snowfall. The students, who previously had been engaged in asynchronous learning projects, were unsure of what to do and began to walk around the room and consult with one another. One student said, "Since the Internet's down, I really can't do much. What are you guys going to do since the Internet's down?" The students discussed a birthday party and made "cootie catchers" instead. When the Internet came back up about 20 minutes later, a student shouted, "It's back! It's a miracle!" As with any well-planned lesson, a teacher is going to want to have contingencies, but this seems to be especially true when planning with technology.

SOLUTIONS AND RECOMMENDATIONS

There are several recommendations for teachers interested in implementing the flipped method in an ELA environment. First, teachers should work to introduce the method to students before relying on it as a primary means of instruction. In our study, and in our other observations, we found that students were apprehensive about the method initially. However, as they became more comfortable and more familiar with it, they were able to process the instructions better. After our first flip, some students remarked that they thought the method was "stupid" and did not watch the homework video. After the second flip, however, more students said they liked it and seemed less confused by the implementation in the classroom.

Second, teachers should keep videos to a maximum of 5 minutes. Some flipped proponents have advocated for videos between 5 and 10 minutes, but in our study and observations, we found that students begin to lose interest after about 2-3 minutes of viewing of time. Teachers who want to make certain students are viewing their instruction should write out a script for their lesson, and then condense it to less than 5 minutes for the video. Jing.com, as used in our study, is one tool for making a screen-capture video. In addition, PowerPoint offers an online commentary feature for teachers who would rather record comments over an existing PowerPoint. The most successful videos, however, may be those that feature the teacher's face. Research is ongoing in this area.

Third, students should be expected to demonstrate in some way that they have understood the concepts or instructions presented in the video or flipped instruction. One teacher we know of who uses the flipped method has all students turn in "something" by the end of every flipped class. Students must be held accountable and not see the flipped method as a way of getting by without working. Bergmann and Sams (2012a) recommend that every student come to class with a question about the video, the message to students being that they are going to be held accountable for viewing the video. Teachers can ask students to take notes while watching the videos and turn in these notes or have students post the notes on a class blog, wiki, or Google doc. This is another way of making students responsible for doing the homework associated with the flipped method, and if the teacher has them post to a shared space, it also helps to engage students in a shared community as well.

Young and Bush (2004) suggest a three-step process for introducing technology into the English classroom. This model involves:

1. Developing a pedagogical framework;
2. Asking the important questions; and
3. Establishing working guidelines.

With this in mind, we suggest a process for introducing the flipped paradigm into the English classroom:

- Develop a unit of study
- Determine the end goals
- Design the instruction

Develop a unit of study: The unit of study chosen for the flipped paradigm should involve project-based learning and student-led instruction. This model works well in an English class, as many of the instructional units already rely heavily on project-based learning. We suggest a short, one- or two-week unit as a way to introduce the concept to a classroom. Suggestions include: a unit on poetry; drama; genre studies; a single novel or non-fiction text; or essay writing. This unit may be a unit that is currently being taught through traditional methods, such as teacher-led instruction.

Determine the end goals: Most good, preservice teaching programs suggest that teachers must start with the end in mind. This is good practice for a flipped unit, as well. Determining the summative assessment, as well as general objectives, is an important aspect in implementing a flipped classroom. Teachers should ask themselves: If all students are working on something different at the same time, how will I know when they have met my objectives?

If, for example, the chosen unit to flip is one on poetry, how will the teacher know when students have met his/her goals? Are the goals clearly stated at the beginning of the unit? Should all students know specific literary terms or types of poems? Are the goals tied to local standards or the Common Core State Standards? Are all students required to create a poem? Should students be able to identify specific poetic language? Once the end goals are established, the individual aspects of instruction can be determined.

Design the instruction: In a flipped English classroom, students will have additional time to write (Bergmann & Sams, 2012a), as well as work on individual or collaborative projects. We advocate for a mix of both collaborative and individual assignments, as this allows for maximum differentiation. Teachers may choose to record instructional videos for the unit, and then assign them to students as homework. Troy Cockrum, the teacher in the Midwest, posts videos to his class website and allows students several days to view them. In our study, Ms. Brown also posted instructional videos to her class website and gave students several days to view them. When students have viewed a video, they should provide some evidence that they have watched it. This could take the form of notes they hand in or a verbal question/comment they tell the teacher. Our research indicates that students should be made accountable for watching videos.

Inside the classroom, students can work on activities designed by the teacher to further enhance their understanding of the topic and to meet the goals and objectives of the unit. Here is a sample outline for a two-week unit on poetry in a 7th grade classroom, suitable for 45-minute periods.

Before the unit: Teacher creates three videos about poetry. The first video is a 5-minute lecture of the teacher talking to the camera in his/her classroom and writing on his/her white board as if students were in the class. The lecture is on different types of poetic forms and their characteristics. The second video is a 5-minute voice-over lecture on figurative language and includes a screen capture shot of defined terms. The teacher talks over the screen capture through the Jing.com software. The third video is a 5-minute lecture on writing with the five senses, created by a PowerPoint voiceover.

Day one:

1. Explain the flipped classroom.
2. Introduce the poetry unit.
3. Assign three videos for homework for the week. (All videos must be watched by the end of the week. Students should bring in an index card with one interesting fact they learned – or a question they had - from each video by the end of the week.)
4. Watch a ready-made video together as a class. This video is one that has been created by another teacher, such as Troy Cockrum (see resources); the teacher models taking notes on the video by rewinding and pausing as he/she writes down important facts. (For example, see a short video on writing a limerick poem here: http://www.youtube.com/watch?v=UKMGd_uNlbE.)
5. Put students into groups and distribute a poem to each group for reading and analysis. Each group creates a poster that visually illustrates the feelings and main concepts behind the poem, based on the video information.

Day two:

1. Distribute handouts with individual projects for students to complete. The individual work includes: listening to an audio recording of a poem and writing a reflection on it; reading a poem by a famous author and completing a graphic organizer to analyze it (poems can be differentiated for ability); creating a poem of student's choice (e.g.,, cinquain, limerick, haiku, free verse, etc).
2. Distribute handouts for a group project. The group project is to film or act out a version of a ballad poem (such as "Richard Cory" by Edwin Arlington Robinson), complete with script.
3. Assign students to groups.
4. Take questions.
5. Have students begin working. (It may be beneficial to structure it so that some of the individual tasks occur before group work in order to provide scaffolding for the group project.) All projects must be completed by the end of the unit.

Days three-eight: Facilitate learning by walking around room. Start each class period with five minutes of questions/issues. Assess student progress and provide occasional formative assessments. Check in on each student and each group to monitor progress. Collect notecards with questions/interesting facts gleaned from the three videos by the end of the first week. Use the notecards as formative assessments to gauge student understanding of the concepts.

Day nine: Remind students that all work for the unit is due on the following day. Offer a student-led review of key poetry terms and types. This could be a Jeopardy-style game.

Day 10: Short summative assessment (such as a quiz) and presentation of student films/skits. All poetry unit work due.

FUTURE RESEARCH DIRECTIONS

More research is needed in assessing the effectiveness of the flipped method in an ELA classroom, as well as all subject areas. Flipped classrooms across all grade levels would benefit from empirical evidence assessing their effectiveness. While a growing body of research is gathering on the method in STEM classes at the higher education level, dozens of teachers at the secondary level are implementing the method without clear knowledge of its usefulness. In order to keep this from being yet another educational fad, we advocate for research in all disciplines at all grade levels.

A number of researchers are finding that the way the flipped method is implemented varies from teacher to teacher. This is another avenue for research. There seem to be subsets and variations of the flipped method. Some teachers advocate for collaborative work and project-based learning as the key components of the flip, while others use the method along with the same worksheets and activities that they would use in a traditional classroom. In both cases, it would be beneficial to know which *way* of flipping is the best.

CONCLUSION

The flipped method of instruction shows great promise. It has the potential to change the entire paradigm of teaching and cast the teacher, as Baker (2000) envisioned it, as the "guide on the side," rather than the "sage on the stage." However, with any new pedagogical idea, careful research and analysis is needed. We do not believe in abandoning other methods just to implement one. In other words, there is much that is right about current methods of instruction, including teacher-led discussions and hands-on workshop models, particularly in the best practices associated with an ELA curriculum. Perhaps the flipped classroom has a place in project-based learning and inquiry activities, while cohabitating with other, more traditional methods, or perhaps, as the students in our study seemed to imply, the flipped method should only be targeted for specific, perhaps more lower level content knowledge in ELA. Additional research, we believe, is the key to finding the proper balance of the flipped method with other best practices in the ELA classroom.

REFERENCES

Baker, J. W. (2000). *The 'classroom flip': Using web course management tools to become the guide by the side*. Paper presented at the 11th International Conference on College Teaching and Learning. Jacksonville, FL.

Barr, S. (2013, March 13). Teachers find success flipping classes. *Midtown Raleigh News*, pp. 1M, 5M.

Beeland, W. D. (2002). *Student engagement, visual learning and technology: Can interactive whiteboards help?* Paper presented at the Annual Conference of the Association of Information Technology for Teaching Education. Dublin, Ireland.

Bergmann, J., & Sams, A. (2012a). *Flip your classroom: Reach every student in every class every day*. Eugene, OR: International Society for Technology in Education.

Bergmann, J., & Sams, A. (2012b). Before you flip, consider this. *Phi Delta Kappan*, *94*(2), 25.

Berrett, D. (2012, February 19). How 'flipping' the classroom can improve the traditional lecture. *The Chronicle of Higher Education.* Retrieved from http://www.chronicle.com/article/How-Flipping-the-Classroom/130857/

Connell, J. P., Spencer, M. B., & Aber, J. L. (1994). Educational risk and resilience in African-American youth: Context, self, action, and outcomes in school. *Child Development*, *65*, 493–506. doi:10.2307/1131398 PMID:8013236

Creswell, J. (2013). *Qualitative inquiry & research design: Choosing among five approaches* (3rd ed.). Thousand Oaks, CA: SAGE Publications.

Dewey, J. (1897). My pedagogic creed. *School Journal*, *54*, 77–80.

Dewey, J. (1990). *The school and society and the child and the curriculum*. Chicago, MA: The University of Chicago Press.

Ferreri, S. P., & O'Connor, S. K. (2013). Redesign of a large lecture course into a small-group learning course. *American Journal of Pharmaceutical Education*, *77*(1). doi:10.5688/ajpe77113 PMID:23459199

Finn, J. D. (1989). Withdrawing from school. *Review of Educational Research*, *59*, 117–142. doi:10.3102/00346543059002117

Finn, J. D. (1993). *School engagement and students at risk*. Washington, DC: National Center for Education Statistics.

Flipped Learning Network. (2012). Improve student learning and teacher satisfaction in one flip of the classroom. *Teacherview Survey on Flipped Classrooms.* Retrieved from http://flippedlearning1.files.wordpress.com/2012/07/classroomwindowinfographic7-12.pdf

Fredericks, J. A., Blumenfeld, P. C., & Paris, A. H. (2004). School engagement: Potential of the concept, state of the evidence. *Review of Educational Research*, *74*(1), 59–109. doi:10.3102/00346543074001059

Fulton, K.P. (2012). 10 reasons to flip. *Phi Delta Kappa, 94*(2).

Gehringer, E. F., & Peddycord, B. W. (2013). The inverted-lecture model: A case study in computer architecture. In *Proceedings of SIGSE '13*. SIGSE. DOI: doi:10.1145/2445196.2445343

Johnson, L., & Renner, J. (2012). *Effect of the flipped classroom model on a secondary computer applications course: Student and teacher perceptions, questions and student achievement.* (Doctoral dissertation). University of Louisville, Louisville, KY.

Kearsley, G., & Shneiderman, B. (1998). Engagement theory: A framework for technology-based teaching and learning. *Educational Technology*, *38*(5), 20–23.

Knezek, G., & Christensen, R. (1996). *Validating the computer attitude questionnaire (CAQ).* Paper presented at the Annual Meeting of the Southwest Educational Research Association. New Orleans, LA.

Koehler, M. J., & Mishra, P. (2009). What is technological pedagogical content knowledge? *Contemporary Issues in Technology & Teacher Education*, *9*(1), 60–70.

Lage, M. J., & Platt, G. (2000). The internet and the inverted classroom. *The Journal of Economic Education*, *31*(1), 11.

Lage, M. J., Platt, G., & Treglia, M. (2000). Inverting the classroom: A gateway to creating an inclusive learning environment. *The Journal of Economic Education*, *31*(1), 30–43.

Marcey, D. J., & Brint, M. E. (2012). *Transforming an undergraduate introductory biology course through cinematic lectures and inverted classes: A preliminary assessment of the CLIC model of the flipped classroom.* Retrieved from http://www.nabt.org/websites/institution/index.php?p=720

Merriam, S. (2002). *Qualitative research in practice: Examples for discussion and analysis*. San Francisco, CA: Jossey-Bass.

National Center for Academic Transformation. (2011, October). Retrieved from http://www.thencat.org/Newsletters/Oct11.html#7d

Prensky, M. (2001). Digital natives, digital immigrants part 1. *Horizon*, *9*(5), 1–6. doi:10.1108/10748120110424816

Shelly, G., Gunter, G., & Gunter, R. (2012). *Teachers discovering computers: Integrating technology in a connected world (Shelly Cashman)*. Boston, MA: Course Technology.

Strayer, J. F. (2007). *The effects of the classroom flip on the learning environment: A comparison of learning activity in a traditional classroom and a flip classroom that used an intelligent tutoring system.* (Doctoral dissertation). The Ohio State University, Columbus, OH. Retrieved from http://etd.ohiolink.edu/view.cgi/Strayer%20Jeremy.pdf?osu1189523914

Swenson, J., Young, C. A., McGrail, E., Rozema, R., & Whitin, P. (2006). Extending the conversation: New technologies, new literacies, and English education. *English Education*, *38*(4), 351–369.

Tucker, B. (2012, Winter). The flipped classroom: Online instruction at home frees class time for learning. *Education Next*, 82–83.

Vygotsky, L. S. (1978). *Mind and society: The development of higher psychological processes*. Cambridge, MA: Harvard University Press.

Young, C. A., & Bush, J. (2004). Teaching the English language arts with technology: A critical approach and pedagogical framework. *Contemporary Issues in Technology & Teacher Education*, *4*(1).

KEY TERMS AND DEFINITIONS

Advanced Placement English Language and Composition: This course is certified and audited by the College Board. Teachers must submit an audited course plan and receive certification by the College Board in order to teach the AP Lang class. The class is generally taught in the 11th grade and consists of instruction in rhetoric, composition, argumentation, and the analysis of primary sources and non-fiction texts. The course culminates in an annual standardized exam given by the College Board in May.

Flashdrive: This is a small device that stores data and has a Universal Serial Bus (USB) interface. It plugs into the USB port on any standard computer and can upload or download digital content.

Flipped Classroom Method: The process of flipping the traditional instruction paradigm, whereby the lecture or direct instruction is given via video or other digital means and viewed as homework, and the activities normally reserved for homework are completed in class.

Inverted Classroom: Another term for a flipped classroom.

Jing: A computer software program that allows users to record their voices and their actions on a document on their computer screen. Jing is a free download from the Internet and can be accessed from http://www.techsmith.com/jing.html.

Modern Language Association (MLA) Guidelines: These guidelines are formatting rules recommended by the Modern Language Association, a body of members founded in 1883 that oversees the study of language and literature. Most English language arts papers are formatted in adherence to MLA guidelines.

Screen Capture Software: This is the term used for computer software that records the online actions of its users. Users can, for example, highlight, annotate or type text into documents, and screen capture software will record their actions and replay them for other viewers. Screen capture files are saved like document files and can be emailed or pasted into other online venues.

This work was previously published in Promoting Active Learning through the Flipped Classroom Model edited by Jared Keengwe, Grace Onchwari, and James N. Oigara, pages 163-184, copyright year 2014 by Information Science Reference (an imprint of IGI Global).

Chapter 33
A Flipped Classroom Design for Preservice Teacher Training in Assessment

Isabelle Nizet
Université de Sherbrooke, Canada

Florian Meyer
Université de Sherbrooke, Canada

ABSTRACT

This chapter presents a strategy for designing a flipped classroom model (Khan, 2011) for the training of future teachers in a university context. This model was designed by a group of university professors with complementary expertise in didactics, learning assessment, and Information and Communication Technologies (ICT) for education. This chapter describes their collective procedure, as well as the chosen design. The approach is based on an instructional systems design method called Méthode d'Ingénierie des Systèmes d'Apprentissage (MISA) (Paquette, 2004). The authors use this framework to describe the different stages of the design process while paying particular attention to the challenges posed by a hybrid model of training in higher education.

INTRODUCTION

For several years now, thanks to the Khan Academy (Khan, 2011), the flipped classroom is a teaching model used in many primary and secondary schools. Teachers see an opportunity to take advantage of technologies (video in particular) that allow students to access concepts and knowledge that are presented by their teacher in the setting of their choice in a personal and timely manner that is adapted to their needs and no longer restricted to school hours. This ensures that students become responsible for listening and watching these presentations in conditions that are likely more conducive to learning (as they are chosen by the students themselves) and that allow them to listen as many times as they feel the need. More important still, this approach ensures that class time usually required for theoretical presentations by the teacher, during which students are often mostly passive and unresponsive, can now be used to place students in active learning situations and

DOI: 10.4018/978-1-4666-8246-7.ch033

to free up the teacher so that he or she can play the valuable roles of pedagogical mediator and coach (Jonnaert & Vanderborght, 2009).

In Quebec, this pedagogical model is being tested in some schools (innovationseducation.org, 2013) but is still very marginal in universities, in particular at the University of Sherbrooke where the experiment we present here takes place. During a course in learning assessment and evaluation, which is mandatory for a Bachelor in Secondary Education where we teach, we realized that the flipped classroom model would be highly suitable to support complex learning concepts and skills related to rubric-referenced assessment.

In this chapter, we begin by presenting the context and background of the project. This includes a description of the practical dimension of professional development for preservice teachers in Quebec, the course in learning assessment and evaluation and the bachelor's program of which this course is a part. Secondly, we describe the theoretical framework supporting our thought process and the development of the project. This includes two important models: the Scholarship of Teaching and Learning model (SoTL) (Kreber, 2002) and the Technological Pedagogical and Content Knowledge model (TPaCK) (Mishra & Koehler, 2006). Thirdly, we describe the collaborative design and implementation process of our flipped classroom project as it relates to the method called *Méthode d'Ingénierie des Systèmes d'Apprentissage* (MISA) (Paquette, 2004). This method identifies four complementary design axes that led us to implement our project and to prepare it for testing with students. Fourthly, taking into account these four different axes, we describe the flipped classroom training environment created for preservice teachers, as well as the different kinds of resources established. Finally, we conclude with an analysis of the collective design process to determine the strengths and weaknesses of the chosen strategy, as well as its relevance in the context of collaborative design. We also include a quick overview of the next steps of the project.

BACKGROUND

The project discussed in this chapter has been initiated at the University of Sherbrooke, a francophone university located in the province of Quebec (eastern Canada). The target students for the flipped classroom are future teachers enrolled in a Bachelor in Secondary Education program, and more particularly those students enrolled in the course in learning assessment.

Bachelor in Secondary Education

The Bachelor in Secondary Education at the University of Sherbrooke[1] is a professional program accredited by the Quebec Ministry of Education, Recreation and Sports (MERS). Upon completion of the program, students receive a teaching certificate that authorizes them to teach in any secondary school in Quebec.

Like all teacher education programs in Quebec, this is a four-year curriculum that consists of a total of 120 credits. In this particular program, these credits are distributed as follows: 24 credits in education, 63 credits in specific disciplines and didactics (some of these courses are taken in partner faculties in conjunction with students pursuing bachelor degrees in these particular disciplines), 21 internship credits including a cyberfolio, and 12 credits for the reflective process, which includes an essay. Five distinct pathways are offered: Mathematics, Science and Technology, French, Social Studies (History, Geography and Citizenship Education), and English as a Second Language (ESL).

The Practical Dimension of Professional Training for Preservice Teachers

The training of future secondary school teachers involves an initial two-credit course in learning evaluation. When offered in a university context, this training has both theoretical and practical dimensions. In a professional program of this nature, the practical dimension is essentially achieved through a long-term process of internships (700 hours of internship over a four-year curriculum); this reinforces the idea that pedagogical courses in the classroom are, comparatively, mostly "theoretical." Although the above mentioned course delivers crucial procedural knowledge to 75 future teachers (year 3) before their third internship, up until this point it is essentially devoted to theory and a few key practical exercises (to improve abilities to design and use rubrics). To avoid the side effects of such a traditional pedagogical model, a complementary laboratory is offered to students in order to promote the implementation of these rubrics within the four core fields covered by this two-credit course-Mathematics, Science and Technology, Social Studies and French. In parallel, students take courses about the didactics of these core fields, which allows them to contextualize rubrics to the content of those fields. After eight weeks, students should begin to design a learning and assessment situation and create a rubric-referenced tool in order to demonstrate their skills for assessing pupils in the classroom. Since research in professional knowledge development shows that future teachers require a space in which they can experience the development of complex know-how, we think that reversing this habit becomes crucial to improve the development of assessment competencies.

Assessment Training: A Pedagogical Challenge

Designing rubrics is an iterative problem-solving approach that requires the development of logical reasoning and the ability to make hypotheses (Scallon, 2004; Mueller, 2009). Also, it is not limited to the application of rules and principles because experimentation and induction (trial and error) play a large role, such that truly structured guidance and contextualized feedback must be provided to students. The creation of pedagogical conditions supporting this type of learning for dozens of teams of students is a true challenge in a two-credit course. The main problem is to increase the supervision of practical rubrics design by the professor and class laboratory tutors. Therefore, we propose to reverse the pedagogical dynamic to free up class time for this purpose, while ensuring that conceptual input is sufficient. The objective is to create, for this portion of the course, conditions that lead to active learning, where future teachers learn by doing while receiving support that is enriched and contextualized to suit various didactic profiles.

FRAMEWORK

Our framework provides the epistemological and theoretical basis underlying our exploratory process: as trainers, we need to ground our pedagogical choices on research results and as researchers; we need to define pedagogical problems. For an epistemological point of view, we refer to the SoTL model (*Scholarship of Teaching and Learning*) (Kreber, 2002). For a theoretical perspective, we refer to the TPACK (*Technological, Pedagogical And Content Knowledge*) model (Mishra & Koehler, 2006).

The SoTL Model: A Systemic and Quality-Oriented Frame for Teaching and Learning

As we monitored training for future teachers, who themselves must develop as reflexive practitioners (Schön, 1983), we decided to adopt the SoTL model as a guide for our own approach to solving pedagogical problems in the classroom. This model suggests that the trainer or teacher is also a researcher who is attempting to fix problems by implementing a research process and reinvesting research results as solutions to problems in a systemic way (see Figure 1). Implementing the SoTL approach means adopting an epistemological posture that places the teacher and students in a professional co-development context that enhances pedagogical knowledge building in a collaborative way. This approach involves four highly intricate questions: What must the students learn? Who are the students and how do they learn? How can their learning process be efficiently supported? How can we know that teaching and learning are effective? This investigation relies on the ability of the teacher to observe and interpret signs of dissatisfaction in both teaching and learning. As a researcher, the teacher's own questions represent the beginning of a research process that helps him or her define local problems, identify specific conceptual choices and design methods to improve the teaching-learning process. Creating knowledge to foster innovation in pedagogy becomes crucial for maintaining teaching and learning quality. Every question can initiate a research process because it can be viewed as the source of the definition of a problem.

In our case, the problem is based on the third question that can be contextualized as follows: How can we support learning of procedural complex knowledge about assessment in a traditional classroom? Following the SoTL model, our questioning must rely on complementary considerations: What will the students learn and what are their learning characteristics? These first two questions of the model require a deeper investigation into learning content and learners' pedagogical needs. Answering the third question requires reflection about alternative pedagogical support and the development of tools that can potentially solve the problem. In this chapter, we answer only the

Figure 1. Scholarship of teaching and learning (SoTL) (Adapted from Bélisle [2012])

first three questions, as our intent is simply to describe the results of the design approach and not the results of the testing of solutions itself. Referring to the SoTL process, we explore the following three questions: What must students learn about assessment techniques? What are their pedagogical needs in a context of procedural learning? How can we support their learning of assessment techniques in a 5-6 hour classroom session?

During our exploration of the third question, we hypothesized that the insertion of a sequence of flipped classrooms in the period devoted to the creation of rubrics could be a relevant pedagogical facilitator to address the above-mentioned issues. In addition, the development of self-study materials helps to free up time for classroom practice related to learning, the underlying assumption being that project materials also promote differentiated pedagogy since access to information about rubrics design is not limited to class time. This open and renewable access is likely to promote co-construction of knowledge because the video sequences will support individual or team learning in accordance with the learning pace of each. These are pedagogical choices that meet the pedagogical needs of students.

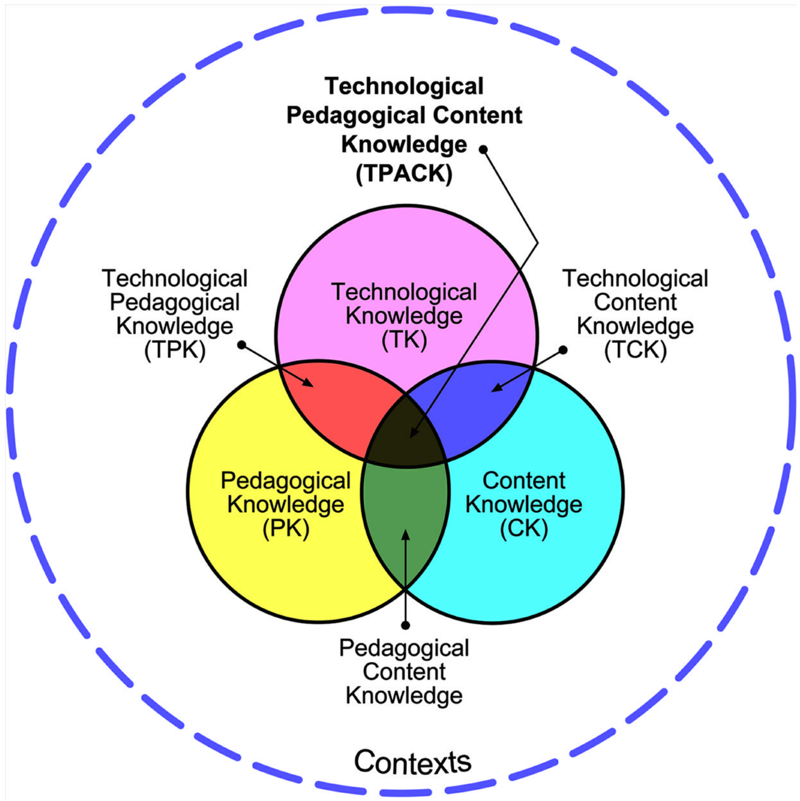
The use of on-line, self-learning videos (combining video, voice and Prezi animations) about the design principles of rubrics would enhance students' practical support in the classroom. The people responsible for supervising the laboratory classes could then act as tutors for the class's professor (team teaching). By doing so, the training model for this course would become a sort of hybrid (Basque, 2005; Charlier, De Schryver & Peraya, 2006), since it would be based on synchronous and asynchronous pedagogical activities. These videos could also be used during training sessions for in-service teachers or as resources that support reflexive thinking during internships for preservice teachers.

The TPACK Model: An Integrative Way of Thinking Shared Expertise

In addition, O'Brien (2008) emphasizes the importance of instructional design and pedagogical signature to explore the SoTL model's third question (Bélisle, 2012). Because we hypothesize that the flipped classroom could meet the needs of our students in terms of learning to create rubrics, we need to define more precisely how we want to implement it. However, before plunging into instructional design using a specific design method (we describe this method in the next section) – since the realization of such a project requires the use of multiple professional knowledge – we must take a step back in this regard in order to understand how to combine our respective knowledge and expertise. Indeed, we are two professors with different knowledge and expertise whose complementarity should be clarified in order to allow us to establish the foundation of an effective collaborative work. Professor Nizet specializes in learning evaluation in high school, while Professor Meyer is a specialist in the integration of ICT in secondary education and distance learning. The TPACK model (Figure 2) appears very helpful to us because it allows us to define our roles in this professional collaboration (Mishra & Koehler, 2006). The reference site Tpack.org defines the model as follows:

At the heart of the TPACK framework, is the complex interplay of three primary forms of knowledge: Content (CK), Pedagogy (PK), and Technology (TK). (…) The TPACK approach goes beyond seeing these three knowledge bases in isolation. TPACK also emphasizes the new kinds of knowledge that lie at the intersections between them, representing four more knowledge bases applicable to teaching with technology: Pedagogical Content Knowledge (PCK), Technological Content Knowledge (TCK), Technological Pedagogical Knowledge (TPK), and the intersection of all three circles, Technological Pedagogical

Figure 2. Technological pedagogical and content knowledge (TPACK) model (Reproduced by permission of the publisher, © 2012 by tpack.org)

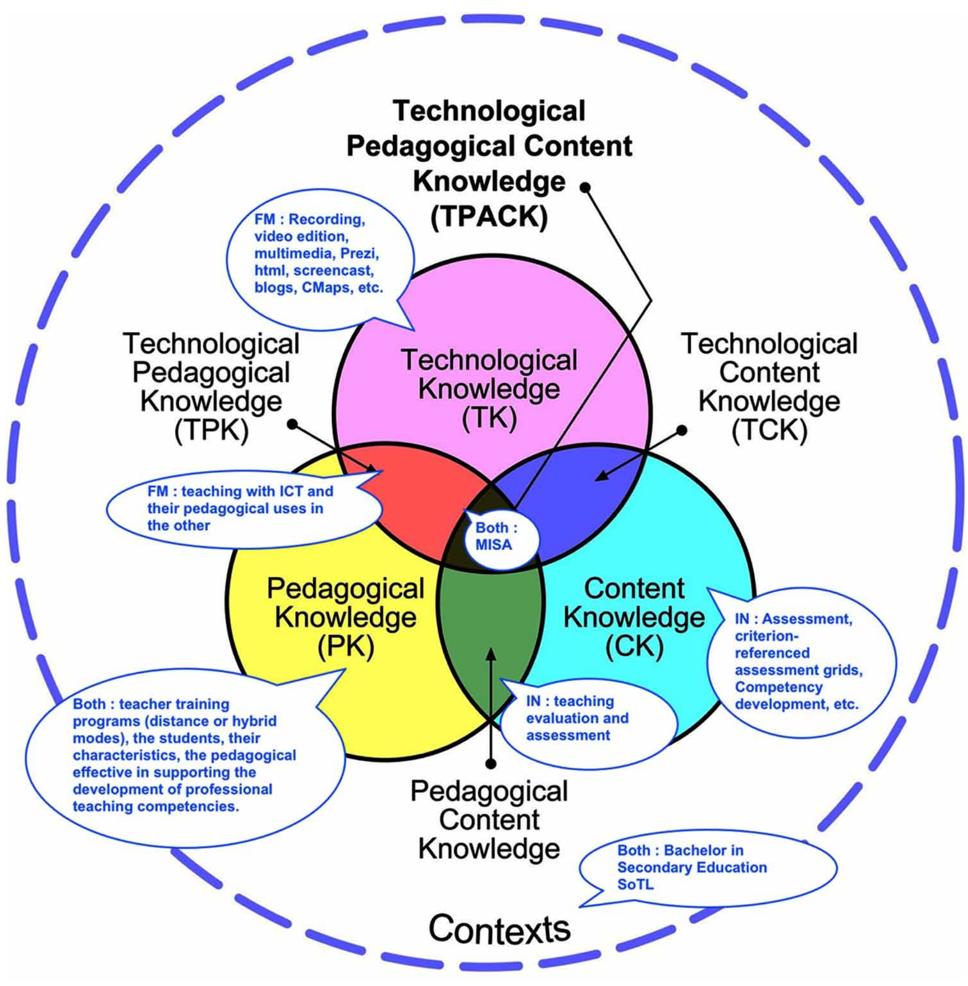


Content Knowledge (TPACK). Effective technology integration for pedagogy around specific subject matter requires developing sensitivity to the dynamic, transactional relationship between these components of knowledge situated in unique contexts. Individual teachers, grade-level, school-specific factors, demographics, culture, and other factors ensure that every situation is unique, and no single combination of content, technology, and pedagogy will apply for every teacher, every course, or every view of teaching (http://tpack.org).

In light of these three forms of knowledge and their interrelations as identified in the TPACK model, the complementarity and compatibility of our expertise and knowledge are easier to identify and characterize, and our collaboration is thus facilitated (Figure 3). Therefore, according to this model, if we wish to realize this flipped classroom project around concepts related to the development of rubrics for evaluating the learning of high school students, it is necessary to use content knowledge (CK) that, in this case, is knowledge about the evaluation of learning. This knowledge is, of course, more the specialty of Professor Nizet and much less that of Professor Meyer. On the other hand, Professor Meyer is rather an expert when it comes to the technological knowledge (TK) necessary to complete the project. In this case, it is a matter of technology-related knowledge that can be exploited in a flipped classroom: recording and video editing, multimedia production tools, concept mapping, webcasting, on-line communication, etc. Finally, we have both developed a solid foundation in the area of pedagogical knowledge (PK), that is to say knowledge about the training of secondary school teachers. In fact, we have both been teaching in preservice teachers training programs (distance or hybrid modes) for many years and have a good knowledge of the students, their characteristics and the pedagogical approaches that we believe effective at supporting the development of professional teaching competencies. We have discovered, however, that our respective pedagogical knowledge is akin to the pedagogical content knowledge (PCK) implemented for teaching evaluation in one case and to the technological pedagogical knowledge implemented for teaching with ICT and their pedagogical uses in the other (TPK).

Needless to say, some explanation and knowledge sharing were necessary for us to understand each other and to define how we could influence and help each other. We quickly observed the complementarity of our knowledge (TPACK) and determined that an instructional systems design method would prove essential for structuring effective sharing and achieving the implementation of our project. We have chosen the instructional systems design method called MISA. It is at the center of what brings us together.

Figure 3. Contextualized technological pedagogical and content knowledge model



METHOD

From a methodological point of view, what we present here is primarily an instructional systems design method because, as we mentioned previously, the purpose of this chapter is to describe the process of designing a flipped classroom session for subsequent insertion in a university course. This project can be considered a case study in a research and development context; the research method itself will be developed during a later phase of this project and will become the subject of another publication.

The MISA Model

Nowadays, various instructional design methods are used and have proven their effectiveness (Ko & Rossen, 2010) at supporting teachers and educators to develop their on-line or in-class courses or educational activities integrating ICT. Inspired by the ADDIE model (Analyze, Design, Develop, Implement and Evaluate), these instructional design methods are structured around a cycle of analysis, design, development and evaluation (Morrison, 2012). Evaluation establishes avenues for the next analysis phase of the cycle. The method we have chosen is called *Méthode d'Ingénierie des Systèmes d'Apprentissage* (MISA) (Paquette, 2004) and it fits perfectly into this cyclical dynamic and offers six phases that are defined as follows:

1. Definition of the project;
2. Preliminary analysis;
3. Definition of the course architecture;
4. Design of the various elements;
5. Implementation and validation; and
6. Diffusion (field implementation) and evaluation.

There are several reasons behind our decision to use this model. First, having been developed in Quebec (Paquette, 2004), this method offers many resources in French that are easier for us to use, as well as numerous illustrations and examples of usage in an educational context that is culturally similar to ours. However, our main motivation for using the MISA model lies in a unique feature that distinguishes it sharply from other methods. Indeed, this method offers the instructional designers that we are an opportunity to reflect, through each of the six stages, upon the four complementary dimensions or axes of design. These four axes are:

1. **DC:** Design of Content (Knowledge and Skill Representation);
2. **DP:** Design of Pedagogical Specifications (Application of Teaching Methods and Approaches);
3. **DM:** Design of Materials (Specification of Learning Materials); and
4. **DD:** Design of Delivery (Delivery Planning).

A model representing the design can be developed for each of these axes. The researchers responsible for this method suggest that designers use typed objects modeling tools (*Modélisation par Objets Typés*: MOT) (Paquette, 2004), but we chose to model our reflections about each of these axes with tables and text.

With regard to the first axis, Design of Content, our content knowledge (CK) (Mishra & Koehler, 2006) has largely been implemented. For us, this was an opportunity to determine the educational goals that this flipped classroom is aiming to reach. In other words, we took advantage of this axis to determine precisely the knowledge that students must construct during this activity, as well as the skills for implementing and exploiting this constructed knowledge. Given our diverse expertise, this first phase of work generated a lot of discussion to clarify our respective understandings.

With regard to the second axis, Design of Pedagogical Specifications, we called upon our respective pedagogical knowledge (PK) complete with its complementary differences, but we also had to construct new knowledge and understanding of the foundations and instructional strategies associated with the flipped classroom model. Our reflections associated with this axis were rich, mostly due to the fact that the flipped classroom model led us to determine how many capsules we should produce and to consider the relevant scripting for each capsule. It also led us to ponder teaching strategies related to the capsules that could be implemented and presented to students while they watch them independently, as well as teaching strategies for use in the classroom that has now been freed from the constraints of the presentation of that learning content. Educational options were therefore increased thanks to the various innovation opportunities offered to us. Finally, this model is strongly influenced by the first axis, but also by the third axis, namely Design of Materials.

With regard to this third axis, it was evident that technological knowledge (TK) was at work. Which technologies could offer possible interesting solutions for the pedagogical strategies chosen? As well, the opportunities afforded by current Web 2.0 technologies led us to imagine that the content capsules could greatly benefit from being multimedia and not just videos. As a result, the teaching screenwriting surrounding the construction of the capsules was strongly influenced. Moreover, in this design axis, we had to take into account the constraints and characteristics of the technological infrastructure of our institution, especially regarding activities during which we ask students to interact, produce or express themselves. In fact, many technological tools were already installed, such as the digital learning environment Moodle, and we were strongly encouraged to use them. As well, open collaborative environments are strongly discouraged for security and data ownership reasons. These aspects are also the main reason that we have spent little energy on the fourth axis, Design of Delivery, as it was more or less imposed on us by default. We have however determined the modalities of publication of the capsules and the timeframes during which all activities would be carried out.

It is also important to mention that an assistant joined our team after the first two phases were completed. She is an experienced secondary school teacher enrolled in one of our university's on-line graduate programs in secondary education. We recruited her precisely because of her technological pedagogical and content knowledge (TPACK) and its relevance to the project. Indeed, our assistant had taken courses related to learning evaluation and ICT integration in secondary education and was familiar with the flipped classroom model. She helped us a great deal during stage four of the MISA model - Design of the various elements - by developing prototypes and refining the models, questioning our different models and refining the various dimensions of the models and their integration.

It is therefore as a team of three educators (two university professors and a secondary school teacher) with complementary knowledge and skills and using a specific instructional design method that we have come to produce a first draft of a flipped classroom about rubric-referenced tools for assessment. To complete our design process, we also consulted the instructional designers specializing in ICT integration from the teachers training support service of our university, as well as our department's didacticians. The following section presents the models produced within each of the four axes.

RESULTS

Given that our design of the flipped classroom session was structured on the four MISA axes, we shall describe the results for all four as each is highly dependent on the others: the design was organized on a systemic pattern in which the output of one phase becomes the input of the next.

In this section, and in accordance with the SoTL approach, we first define the targeted content of learning; this step also corresponds to the Design of Content axis in the MISA model. Learning units were structured based on the content knowledge (CK) expertise of the professor responsible for the course in learning assessment. We then describe the second axis, Design of Pedagogical Specifications, which is based on principles that were collaboratively defined with the team of didactics professors in order to differentiate the approaches with respect to the specificities of each core field (Mathematics, Science and Technology, History, French and Social Studies). Next, we present the results of the third axis, Design of Materials, and describe the choices we made to guide the scripting and technical solutions for content delivery. We then present the principles underlying the Design of Delivery. Finally, we present the Learning Events Net matrix, which is the overall output representing the final planning.

Design of Contents: Knowledge and Skills Representation

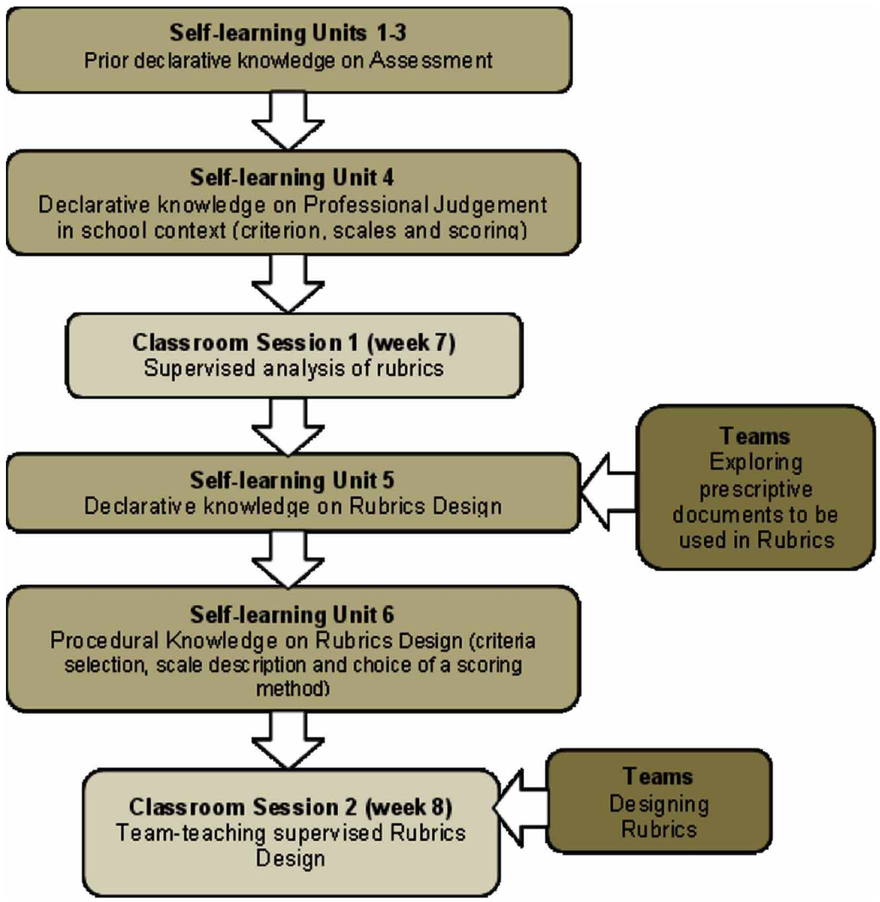
Since the first axis of the MISA model refers to the initial question posed by the SoTL approach: "What do the students (have to) learn?" in order to structure pedagogical events that will be described further, we analyzed the learning content as a whole from a cognitive perspective (Anderson, 1993; Tardif, 1992) that identifies declarative, conditional and procedural knowledge. Learning content about assessment is conceptually and technically complex. The students must become familiar with external prescriptions that constrain their practices and with methodological apprenticeship that falls far from their intuitive comprehension of what constitutes assessment in a classroom. To structure content, we identified several clusters of knowledge structured around core concepts or procedures that we refer to here as "sequences." Then, in order to reduce cognitive overload, we divided these sequences into learning units that included both declarative and procedural knowledge in an integrative and progressive way. This content structure will serve as input to the pedagogical and materials design axes.

The self-learning units to be delivered in this flipped classroom project are designed to confer prerequisite knowledge as well as prior declarative knowledge required to begin the first self-learning sequence. This sequence is divided into three short units (units 1 to 3 as shown in Figure 4). It embeds knowledge about assessment of complex tasks (unit 1), a criterion-referenced approach to competencies assessment (unit 2) and professional prescriptions about school report cards (unit 3) previously seen in class during weeks 1 to 6 of the semester. In the province of Quebec, teachers may choose the tools they use to assess students, but they must follow a common framework of pre-determined set of criteria upon which to base their professional judgment. In school report cards, results are now expressed as a score out of 100 and by group average.

The next three learning sequences have different design structures. Self-learning sequence #2 is dedicated to the principles underlying professional judgment (unit 4) and the essential components of *rubrics*: criteria and scoring scales. Students must learn to discriminate between different kinds of appreciation scales (analytical or holistic); they must also become familiar with the advantages and limitations of these instruments and learn to identify their misuse in school contexts. These general principles constitute core complex declarative knowledge for students who have only intuitive knowledge of such tools. In a traditional classroom context, such principles are probably only explained by the teacher orally with the help of some visual aids. In a flipped classroom format, after having been exposed to such information in a self-learning sequence, students will experience a first in-class session dedicated to the analysis of different kinds of rubrics based on scales and criteria such as the ones presented and explained in the self-learning sessions.

After this first in-class session, students will have access to a short, transitive flipped classroom session (self-learning sequence #3) in which

Figure 4. The self-learning units of the flipped classroom on assessment



they will have the opportunity to validate their synthesis of core key concepts. This will prepare them to learn about the core procedural knowledge regarding the design of rubrics. In parallel, they will also begin to work on a complex task that will be completed as homework in a team.

Next, students must take part in the final self-learning session (sequence #4). This sequence involves procedural knowledge about rubrics design that must be supported by frequent opportunities for experimentation and testing in a real context. For students, this represents a challenge that is generally very demanding intellectually given that rubrics design is a process based on logic, reasoning and progressively valid assumptions; this process is more difficult to cope with if conceptual knowledge is not yet built. For this reason, we suggest that two brief and progressive declarative self-learning sessions be alternated with two procedural classroom sessions. While creating rubrics, students must solve problems of coherence, level of generality and choice of vocabulary in order to describe different levels of descriptive scales. Designing rubrics related to a complex task requires mastering the standards and criteria professionally prescribed, choosing criteria and indicators relevant to the task, and monitoring coherent choices during the entire process. This work takes a few weeks to be completed, and students need constant support to validate their choices and process.

Design of Pedagogical Specifications: Application of Teaching Methods and Approaches

The Knowledge and Skills Representation model allows us to identify different levels of knowledge that must be conveyed to students within a significant pedagogical context and supported by relevant instructions and guidance. The second axis of the MISA model, Design of Pedagogical Specifications, refers to the second set of questions posed by the SoTL approach: Who are the students and how do they learn? This axis also targets the third question that is asked in the SoTL approach: How can the student's learning process be efficiently supported?

Considering that in a flipped classroom format, students can choose to learn in an individual context or with peers, we assumed that we could not merely reproduce or simulate a "declarative teacher speech" with technological tools, but that we would also have to create a stimulating environment that would enable them to understand, memorize and test their comprehension and, finally, to prepare them to transfer the knowledge they have built individually or collectively in complex problem-solving situations. To enhance the development of such abilities, we made pedagogical choices based on the constructivist principle of prior knowledge activation and the socio-constructivist principles of co-construction of different kinds of knowledge (Jonnaert & Vanderborght, 2009), as well as the pedagogical differentiation principles (Galichet, 2007).

Preservice teachers are highly influenced by assessment practices observed in their previous internship or even by their own past experience of assessment (Tierney, 2006; Stiggins, 2007). We believe therefore that it is very important to give them opportunities to speak about their prior knowledge regarding assessment. When the first three self-learning units take place, it is already week 7 of the session, and the students are already working in teams to achieve their main homework, which is long and complex. This is why interactions with peers during the first self-learning sequence will be encouraged. There will be instructions to support the co-validation of peers' representations about assessment of complex tasks, criterion-referenced approach for competencies assessment and professional prescriptions about school report cards. Those three subjects are actually discussed intensively in professional contexts, and the influence of mentoring in-service teachers during previous internships creates potential cognitive conflicts that must be clearly exposed and collectively solved. For this reason, the first classroom session will allow them to validate their understanding of principles with some individual support as they work in teams to improve their ability to analyze and categorize different types of scales under a constructivist supervision (Adcock & Bolick, 2011). In light of these considerations, we decided that the professor must conceptually support the students during a 3-hours session in order to be prepared to learn the next set of procedural knowledge. Since we prefer to create a socio-constructivist and situated learning context, real rubrics will be used for this activity.

Preservice teachers have to learn how to do, and not only what to do, to assess pupils in a personal and self-determined way (Durand & Chouinard, 2012). As previously mentioned, although all teachers in Quebec are legally required to follow a structured set of criteria for assessing prescribed learning contents, they may choose the assessment tools that suit them. Given the diversity of student profiles, one of the most important pedagogical challenges in such a course is to differentiate rubrics examples in a significant way, which means creating a set of commented rubrics for each of the four core fields. The flipped classroom format not only gives us the opportunity to provide examples of rubrics in core content fields that are adapted to the students needs, but also to prepare them to solve problems in their future professional contexts. To create those examples, the didacticians (professors specializing in didactics related to the four content fields) were asked to fill in a questionnaire about their own conceptions of what a *complex assessment task* is in their field and about the characteristics of rubrics in their specific area. They were also consulted to establish guidelines for interpreting the set of prescribed criteria to which students must refer while building rubrics. Our analysis of those questionnaires allowed us to better define specific methodological training needs related to rubrics for each core content field. We intend to integrate this information to differentiate procedures and principles that must be considered specific learning incomes for each profile. Following the principles of pedagogical differentiation helped us design the last two flipped classroom sequences. So, on the one hand, sequence #3 (unit 5) and sequence #4 (unit 6) are structured by common principles to be used by all students in a convergent way and, on the other hand, by specific principles related to the core fields to be used in a divergent way. In a traditional classroom context, such pedagogical differentiation is incredibly time consuming and frankly quite impossible to manage without creating frustration or a feeling of unfulfilled achievement in students' minds.

In a context of traditional teaching (frontal pedagogy), we observed that some students could not cope by themselves with the procedural dimensions of learning without explicit support. They needed and requested many individual meetings outside of classroom time to obtain explanations and opportunities to validate their own understanding. Even with explicit exposure to concepts, principles and procedures in the classroom, they could not simply be asked to apply principles or procedures in order to achieve tasks. We believe therefore that it is crucial to allow students to build declarative and conditional knowledge at their own pace of learning before beginning the process of procedural knowledge learning. Students also need to share personal understanding with peers before testing principles and procedures in contextualized and real problem-solving situations. Learning in a flipped classroom context does not mean learning alone; therefore, during the final flipped classroom sequence, students are also asked to understand principles and co-construct their understanding with peers in order to transfer learning into their team homework. In the next classroom session, they will have the opportunity to build rubrics with the support of the core field tutors (Classroom session 2).

Our reflections about students' characteristics and their pedagogical needs are a direct outcome of observations made over the last two years: because our own practices are deeply influenced by external constraints, such as lack of time, specific didactic needs, the need to coach students along their path of procedural training, we hope that integrating our proposed approach into flipped classroom sequences and supporting it with explicit guidance instructions will help students learn more effectively. Furthermore, because this new approach could make students more insecure and potentially cause some unexpected consequences with regard to learning efficiency, we must promote and support their autonomy with specific guidelines. Our aim is to limit negative side effects, such as lack of motivation and commitment towards the required learning task. On another level, we aim to help students develop greater autonomy and self-monitoring abilities.

Design of Materials: Specification of Learning Materials

The third axis of the MISA model, Design of Materials, also refers to the third question posed by the SoTL approach: How can the student's learning process be efficiently supported? Since pedagogical assumptions were already made to answer this question in the last section, the concept of specification and design of learning materials refers to technological assumptions about relevant mediation using audio and visual communication tools.

In order to make pedagogically structuring choices, we distinguished four levels of knowledge building as described below (Design of Content model) and associated specific mediation tools with each level in order to create a mediation design that constantly supports the appropriation of learning content.

We identified four distinct typical learning events to be mediated with technological support:

- Recall of previously learned knowledge;
- New simple declarative knowledge (concepts and categories);
- New complex declarative knowledge (principles and samples); and
- New procedural knowledge (declarative description of rules and procedures).

New procedural knowledge transfer (methodological and technical training in preparation for real problem solving) will be done in the classroom.

In order to mediate the recall of competency concepts and describe and explain the assessment process and the role of rubrics in the evaluation of complex tasks, which represent the first three self-learning units, we opted for a conceptual maps tool called CmapTools[2] (Novak & Cañas, 2008). Constraints related to school reports such as scoring and computing points with rubrics will also be explained with CmapTools. Hyperlinks to school report cards, criteria and indicators described in the official documents will be made to contextualize conceptual notions within professional realities. As visual demonstration is required to understand the relationships between the different elements to be integrated in a rubric - criteria, scale and scoring - video editing tools will be used to create Screencasts completed with voice-over to explain the CMaps (see Table 1).

In order to mediate simple declarative knowledge, we will create a more traditional Microsoft PowerPoint[3] presentation. It will show core concepts such as criteria and indicators, and will present different types of scales in simple lists labeled with visual prompts. Although PowerPoint is a very controversial mediation tool in learning contexts (Harris, 2011), it seems more convenient for linear and short sequences of learning and appears to be appropriate for small contents.

For the mediation of new complex declarative knowledge, we chose Prezi[4] (Knudson, 2011). This tools allows us to present comparisons between analytic and holistic rubrics. This point is really critical in professional contexts and requires cognitive commitment to be understood due to its complex terminology that is usually completely unfamiliar to students. Prezi allows learners to go back to the most specific and difficult items for them without losing the big picture. Indeed, it is designed like a set of mutually embedded maps. The zoom in and zoom out functions facilitate browsing from one concept to another in a way that engages the audience (Harris, 2011; Knudson, 2011). We chose the Prezi mediation tool especially because it seemed relevant for learning new information.

Table 1. Technological mediation choices

Typical Learning Events	Technological Mediation Products
Declarative Knowledge Recall	Cmaps, Hyperlinks, Multimedia presentations with voiceover and visual prompts, Screencast
New Simple Declarative Knowledge: Notions and concepts, categorization	PowerPoint, Multimedia presentations with voiceover and visual prompts, Hyperlinks
New Complex Declarative Knowledge: Principles and examples	Prezi, Multimedia presentations with voiceover and visual prompts
New Procedural Knowledge: Declarative description of rules and procedures, commented examples	Prezi, Pencast, Video, Screencast

The use of these two types of scales (analytical rubrics and holistic rubrics) is specific to the assessment needs, learning context and assessment objectives. Preservice teachers must learn specific principles that underlie the use of each of the scales, which basically means knowing *why* and *why not* to use them. As such, we believe that a dynamic visual support could help expose the students to demonstrations of situations in which each type could be used. Students must effectively decode real samples of rubrics used by inservice teachers. This is not done merely to reproduce common practices they have observed or will observe during internships. Rather, it is done so they can be prepared to analyze rubrics and ground arguments for choosing such tools in their future professional life. To give students the opportunity to clarify that, which is confusing even in professional contexts, discussions about *pros* and *cons* arguments should be encouraged while student teams view self-learning sessions.

In order to mediate new procedural knowledge, we chose some of the same mediation tools used previously, but also decided to add some SmartPen technology[5], and to create a pencast in order to simulate rubrics design directly for the student. As this design must be guided internally through the activation of principles, rules and specific procedures, we plan to add an audio explanation of the different internal processes to be played while a visual manual demonstration is done. To complete the demonstration, we will create a Prezi mixing frame containing the pencasts, videos of dynamic demonstrations by the course professor (to be edited with Microsoft MovieMaker[6]), and some visual prompts added to the audio discourse. Before going into the classroom for a supervised session of procedural transfer in real situations, the entire process of creating a rubric will be explained to students using examples and counter-examples. Videos of inservice teachers explaining the use of rubrics will be added to contextualize learning and motivate students.

Design of Delivery: Delivery Planning

As we mentioned at the beginning of this chapter, the terms of delivery have been more or less imposed on us because the technology distribution tools available at our university are subject to strict safety rules that are difficult to bypass. Therefore, the Moodle platform, which is the institutional digital learning environment to which all students have automatic access, is the platform through which content will be presented to students. Thus, all activities and multimedia resources like Prezi presentations, Youtubes videos, screencasts and other multimedia animations will be accessible via this channel only.

Despite this limitation, the choice of this channel is an advantage from our point of view because Moodle is actually known to students and is usually relatively well mastered. We believe that by making this choice, we will limit potential problems and cognitive and motivational barriers that might deviate students from the main pedagogical target. Moreover, for our initial experiment, we want only registered students to have access to these yet invalidated resources. By using Moodle and its managed access system, we can ensure such limited access.

As we mentioned earlier, we have chosen to distribute these flipped classroom activities over a period of two weeks of the session, i.e. weeks 7 and 8, because they are dedicated to these concepts in the syllabus approved by the program committee. It is generally expected that students invest about twice the time spent in class doing individual homework. In other words, in this course, students receive three hours of classroom instruction per week, to which they should add about six hours of homework. Given the magnitude and complexity of the knowledge to build and the skills to construct, it was not possible to distribute all of these resources and activities over a shorter period. On the other hand, if we had chosen to spread everything over a longer period, we believe that the students' focus and motivation would have been compromised, thereby undermining the effectiveness of our proposal. In addition, it would have required a redefinition and reorganization of the entire syllabus, which is not desirable at this stage of our experiment.

The delivery model of our flipped classroom is characterized as follows. During week 6, the professor will make a presentation about what a flipped classroom is and provide various instructions. Next, in preparation for the in-class session in week 7, students will view three capsules of about five to 10 minutes each (units 1-3). We believe that these capsules will require about 60 minutes of individual appropriation work for students. Together, this will represent a total of about 90 minutes of autonomous work.

Following this first sequence, and still in preparation for the in-class session in week 7, students will address sequence 2. This sequence will require students to view approximately 30 minutes of multimedia animations. We believe that these animations will require about 90 minutes of individual appropriation work. This will represent about a total of 120 minutes of autonomous work. During the in-class session in week 7, supervised exercises will be offered to students over the three-hour period.

Week 8 will follow the same pattern as week 7, which represents a total of 180 minutes of individual viewing of multimedia capsules, followed by a three-hour classroom session. After these two weeks of the flipped classroom, learning activities will resume in accordance with the more traditional yet still socio-constructivist model proposed until then.

Learning Events Net Matrix: A Guideline for Development

Applying teaching methods and technical specifications to specific learning content allowed us to design a matrix that describes the learning events net (LEN), structured on a chronological basis, in a way that catches in a glimpse the whole flipped classroom session. In order to develop a detailed scenario incorporating all flipped classroom sessions, we have described the different learning events specifically planned for each of them within the following structure: title, contents, resources, pedagogical strategies, duration and assessment, in a way to guarantee pedagogical alignment (Biggs, 1996). As previously stated, such a device is largely influenced by the introduction of innovation in a formal classroom context, wherein synchronous and asynchronous activities are planned (see Table 2). Such a context brings new challenges.

First, there is the integration of learning with respect to its theoretical, practical, individual and social aspects (Gibbons & Gray, 2002). We believe the flipped classroom must foster thorough learning and not merely expose students to “information” and then leave them alone with new knowledge. Integration of learning also means keeping in mind organizational and temporal dimensions (Schneider, 2005), so we intentionally planned *when* and *why* to introduce new different kinds of knowledge with asynchronous sequences. We bore in mind that creating such a training device in a traditional context would transform all pedagogical dimensions of classroom learning and the teaching process. It must definitely lead to a mutual enrichment of synchronous and asynchronous activities (Charlier et *al*., 2006).

Second, there is the mediation of knowledge using specific symbolic or technical artifacts in order to foster scaffolding learning from simple to complex knowledge. We chose specific tools to visually represent conceptual and procedural learning objects, schematize processes or demonstrate procedures. Although a clear understanding of the effects of such tools has not yet been largely established, but only explored in empirical field research and as an object of controversial discourses, our aim is to document those effects on students.

Third, there is the consideration of the students’ cognitive processes: incorporating the mediation of learning content into significant learning events

Table 2. Learning events net matrix

Title	Targeted Learning Contents	Resources	Pedagogical Strategies	Duration	Evaluation	Delivery Platform
Sequence 1 Prior Declarative Knowledge about assessment	**Unit 1** Assessment of complex tasks	Cmaps, Hyperlinks, Multimedia presentations with voiceover and visual prompts, Screencast	Self –Learning with Flipped Classroom session Activation of prior Knowledge Co-validation of understanding with peers	Week 7/10 30 min.	Self regulation with peers	Moodle
	Unit 2 Criteria approach to competencies assessment	Cmaps, Hyperlinks, Multimedia presentations with voiceover and visual prompts, Screencast	Self –Learning with Flipped Classroom session Activation of prior Knowledge Co-validation of understanding with peers	Week 7/10 30 min.	Self regulation with peers	
	Unit 3 Professional prescriptions about school report cards	Cmaps, Hyperlinks, Multimedia presentations with voiceover and visual prompts, Screencast	Self –Learning with Flipped Classroom session Activation of prior Knowledge Co-validation of understanding with peers	Week 7/10 30 min.	Self regulation with peers	
Sequence 2 Declarative Knowledge about professional judgment in school context	**Unit 4** Rubric's components: criterion, scales, scoring	PowerPoint, Multimedia presentations with voiceover and visual prompts, Hyperlinks	Self –Learning with Flipped Classroom session Visual Support Examples Discussion Conceptual co building Pedagogical differentiation	Week 7/10 2 h.	Self regulation with peers	
Classroom session 1 Supervised analysis of Rubrics	**Unit 4** Rubric's components: criterion, scales, scoring	Teacher	Coached analysis of Rubrics Transfer of declarative Knowledge	Week 7/10 3 h.	Formative	
Sequence 3 Declarative Knowledge about Rubrics design	**Unit 5** Validation of a core concepts synthesis	Multimedia presentations with voiceover and visual prompts, Screencast	Self –learning with Flipped Classroom session Activation of prior Knowledge Co-validation of understanding with peers	Week 8/10 30 min.	Self regulation with peers	
Teams	Exploring prescriptive documents to be used in Rubrics	All previous Flipped Classroom contents + prescriptive documents to be found on Internet (specific web site)		Week 8/10 2 h.	Self regulation with peers	
Sequence 4 Procedural Knowledge on Rubrics design	**Unit 6** Criteria selection Scale description Choice of a scoring mode	Prezi, Pencast, Video, Screencast	Self –learning with Flipped Classroom session Problem solving Assumptions making Monitoring coherent choices during all the process	Week 8/10 2 h.	Self regulation with peers	
Classroom session 2		Teacher and didactics laboratory assistants All Flipped Classroom session contents and prescriptive documents to be found on Internet (specific website)	Team-teaching with laboratory assistants Supervised Rubrics design Experimentation and testing choices in real context Transfer Problem solving Assumptions making Monitoring coherent choices during all the process	Week 8/10 3 h.	Formative	
Teams	Designing Rubrics			Week 9-10	Self regulation with peers	

not only means developing a clear understanding of the influence of the symbolic or technical artifacts chosen to facilitate knowledge comprehension, (Charlier et *al*., 2006; Jonassen, 1998) but also choosing cognitive tools as learning strategies to scaffold cognitive processes during asynchronous activities (Derry, 1990).

FUTURE RESEARCH DIRECTIONS AND CONCLUSION

To conclude the description of how to complete the planning of a flipped classroom session to be integrated into a university course in order to create an innovative hybrid context, we must remember the fourth issue of the SoTL cycle:

How do we know that the teaching and student's learning have been effective?

We will only be able to answer this question once the testing sequences of the flipped classroom have taken place. With that in mind, the production of capsules will be based on the planning of the different design models presented here, as well as a detailed script of the various capsules. These will be tested with two groups of students, but we can already anticipate that our systematic approach based on proven pedagogical and technological design principles will make this project a significant pedagogical innovation in a context of teacher training looking for sustainable and motivating training modalities.

As a team involved in a professional approach that combines research, pedagogy and development, testing this flipped classroom model will be an opportunity to collect data on the degree of satisfaction of students, their interest in the innovation and the effects on their learning. From the point of view of our own practice, experimenting with this type of pedagogy will allow us to capture the effect on our own coaching and instructional planning processes. These results will certainly be very useful and meaningful for trainers involved in training programs like ours who are challenged by pragmatic and praxeological issues related to teacher training courses that are rather theoretical in nature but who must generate significant practices in the professional field.

REFERENCES

Adcock, L., & Bolick, C. (2011). Web 2.0 tools and the evolving pedagogy of teacher education. *Contemporary Issues in Technology & Teacher Education*, *11*(2), 223–236.

Anderson, J. R. (1993). *Cognitive psychology and its implications* (4th ed.). San Francisco, CA: W.H Freeman.

Basque, J. (2005). Une réflexion sur les fonctions attribuées aux TIC en enseignement universitaire. *Revue Internationale des Technologies en Pédagogie Universitaire*, *2*(1), 30–41.

Bélisle, M. (2012). *Scholarship of teaching and learning (SoTL)*. Paper presented at Groupe de réflexion PeD-TICE. Sherbrooke, Canada.

Biggs, J. (1996). Enhancing teaching through constructive alignment. *Higher Education*, *32*, 347–364. doi:10.1007/BF00138871

Charlier, B., De Schryver, N., & Peraya, D. (2006). Apprendre en présence et à distance. *Distances et Savoirs*, *4*(4), 469–496. doi:10.3166/ds.4.469-496

Derry, S. (1990). *Flexible cognitive tools for problems solving instruction*. Paper presented at the Annual Meeting of the American Educational Research Association. Boston, MA.

Durand, M.-J., & Chouinard, R. (2012). *L'évaluation des apprentissages: De la planification à la communication des résultats*. Montréal, Canada: Marcel Didier.

Galichet, F. (2007). Concepts de base pour l'enseignement en ligne: Vers une approche constructiviste de la formation à distance. In J.-C. Mandersheid & C. Jeunesse (Eds.), *L'enseignement en ligne, à l'université et dans les formations professionnelles* (pp. 21–53). Bruxelles: De Boeck.

Gibbons, J., & Gray, M. (2002). An integrated and experience-based approach to social work education: The Newcastle model. *Social Work Education*, *21*(5), 529–549. doi:10.1080/0261547022000015221

Harris, D. (2011). Presentation software: Pedagogical constraints and potential. *Journal of Hospitality, Leisure, Sport and Tourism Education*, *10*(1), 72–84. doi:10.3794/johlste.101.339

Innovationseducation.org. (2013). *La pédagogie inversée*. Retrieved from http://innovationseducation.ca/la-pedagogie-inversee/

Jonassen, D. H. (1998). Computers as mindtools for engaging learners in critical thinking. *TechTrends*, *43*(2), 24–32. doi:10.1007/BF02818172

Jonnaert, P., & Vanderborght, J. (2009). *Créer des conditions d'apprentissage: Un cadre de référence socioconstructiviste pour une formation didactique des enseignants*. Bruxelles: De Boeck.

Khan, S. (2011). *Let's use video to reinvent education*. [Video file]. Retrieved from http://www.ted.com/talks/salman_khan_let_s_use_video_to_reinvent_education.html

Knudson, H. (2011). *See what I mean: Using Prezi for non-linear presentations*. Retrieved from http://cft.vanderbilt.edu/2011/03/see-what-i-mean-using-prezi-for-non-linear-presentations/

Ko, S. S., & Rossen, S. (2010). *Teaching online: A practical guide*. New York, NY: Routledge.

Kreber, C. (2002). Teaching excellence, teaching expertise, and the scholarship of teaching. *Innovative Higher Education*, *27*(1), 5–23. doi:10.1023/A:1020464222360

Mishra, P., & Koehler, M. J. (2006). Technological pedagogical content knowledge: A framework for teacher knowledge. *Teachers College Record*, *108*(6), 1017–1054. doi:10.1111/j.1467-9620.2006.00684.x

Morrison, G. R. (2012). *Designing effective instruction*. New York: John Wiley.

Mueller, J. (2009). *Assessing critical skills*. Columbus, OH: Linworth Publishing.

Novak, J. D., & Cañas, A. J. (2008). *The theory underlying concept maps and how to construct and use them*. Retrieved from http://cmap.ihmc.us/publications/researchpapers/theorycmaps/theoryunderlyingconceptmaps.htm

O'Brien, M. (2008). Navigating the SoTL landscape: A compass, map and some tools for getting started. *International Journal for the Scholarship of Teaching and Learning*, *2*(2).

Paquette, G. (2004). *Instructional engineering in networked environments*. San Francisco, CA: Pfeiffer.

Scallon, G. (2004). *Évaluation des apprentissages dans une approche par compétences*. Bruxelles: de Boeck Université.

Schneider, D. (2005). *Integrated learning@TECFA*. Retrieved from http://tecfa.unige.ch/tecfa/talks/coinf05/integrated-learning-coinf05.pdf

Schön, D. A. (1983). *The reflective practitioner: How professionals think in action*. New York, NY: Basic Books.

Stiggins, R. (2007). Assessment through the student's eyes. *Educational Leadership*, *64*(8), 22–26.

Tardif, J. (1992). *Pour un enseignement stratégique: L'apport de la psychologie cognitive*. Montréal, Canada: Les éditions logiques.

Tierney, R. D. (2006). Changing practices: Influences on classroom assessment. *Assessment in Education*, *13*(3), 239–264. doi:10.1080/09695940601035387

KEY TERMS AND DEFINITIONS

Analytic Rubric: An analytic rubric articulates levels of performance for each criterion so the teacher can assess student performance on each criterion (taken from http://jfmueller.faculty.noctrl.edu/toolbox/glossary.htm).

CMap Tools (cmap.com): A free application that allows the construction of concept maps.

Holistic Rubric: In contrast to an analytic rubric, a holistic rubric assigns a level of performance by assessing performance across multiple criteria as a whole (taken from http://jfmueller.faculty.noctrl.edu/toolbox/glossary.htm).

Méthode d'Ingénierie des Systèmes d'Apprentissage (MISA): An instructional design method developed in the province of Quebec.

Moodle (moodle.org): A free digital learning environment used in many higher education schools.

Pencasts: A multimedia animation that enables users to hear, see and retrieve notes exactly as they were recorded on paper. This is achieved with the aid of a smartpen.

Prezi (prezi.com): A website in which users can create dynamic and multimedia presentations.

Rubric: A tool used specifically to support the authentic assessment of competency. A rubric is composed of a scoring scale used to evaluate student work and of at least two criteria by which student work is to be judged and at least two levels of performance for each criterion (adapted from http://jfmueller.faculty.noctrl.edu/toolbox/glossary.htm).

Screencasts: A video capture of what is taking place on a computer screen that is usually accompanied by an audio narration.

SmartPen: An electronic ballpoint pen that digitizes, stores and transfers writings and drawings to a computer.

ENDNOTES

1. http://www.usherbrooke.ca/programmes/fac/education/1er-cycle/bac/secondaire/
2. http://cmap.ihmc.us/
3. http://office.microsoft.com
4. http://prezi.com
5. http://www.livescribe.com
6. http://windows.microsoft.com/en-ca/windows-live/movie-maker-get-started

This work was previously published in Promoting Active Learning through the Flipped Classroom Model edited by Jared Keengwe, Grace Onchwari, and James N. Oigara, pages 71-90, copyright year 2014 by Information Science Reference (an imprint of IGI Global).

Chapter 34
Designing Quality Blended Courses

Amy M. Grincewicz
College of Mount St. Joseph, USA

ABSTRACT

Over the last few years, a growing number of courses have been incorporating online elements into traditional face-to-face instruction. This movement has led to the emergence of a blended teaching and learning approach, which, in turn, has increased the need to discuss the educational benefits and underlying challenges of this type of instructional delivery. When developing a blended course, a number of important principles should be kept in mind to ensure the effectiveness of the course. Effective blended design takes into consideration the differences between face-to-face and online learning and incorporates different learning and teaching strategies. The purpose of this chapter is to discuss designing a quality blended course. This chapter discusses designing activities to encourage interaction, motivation, and engagement within a blended course that can be used in the online components. In addition, how to structure a blended course and benefits of working with a development team are discussed.

INTRODUCTION

Over the last few years, a growing number of courses have been incorporating online elements into traditional face-to-face instruction. This movement has led to the emergence of a blended teaching and learning approach, which, in turn, has increased the need to discuss the educational benefits and underlying challenges of this type of instructional delivery. Blended learning mixes the best of face-to-face instruction with the best of online instruction. When developing a blended course, developers and designers should keep a number of important principles in mind to ensure the effectiveness of the course.

Teaching a course in a blended style does not mean simply trying to replicate a syllabus for a face-to-face class. Effective blended design takes into consideration the differences between face-to-face and online learning, and incorporates different learning and teaching strategies. The class "meets" over a period of time, and this must be taken into consideration in the timing and pacing of activities. Communication occurs through

DOI: 10.4018/978-1-4666-8246-7.ch034

written text in the online environment, and the faculty role shifts to more facilitating than presenting. Activities must be intentionally designed to encourage learner interaction, and learner work is often more "public," since it is appears in tools like threaded discussions.

In converting a face-to-face course to incorporate blended elements, developers and designers need to consider the reasons for moving elements into the online components of the course including which elements remain the face-to-face portions of the course and those that move to the online portion. Working with an instructional design team can help instructors plan the activities and incorporate learning management system (LMS) tools into the course.

The biggest challenge in designing a blended course is developing the entire course ahead of time. This can be challenging for many instructors since in developing a face-to-face course many instructors have course outcomes, weekly topics, and a list of assignments. However, in developing quality blended courses, developers and designers need to clearly identify and align course components before the course begins. Osguthorpe and Graham (2003) stated that instructional objectives, many different personal learning styles and learning experiences, the condition of online resources and the experience of trainers play an important role designing an effective blended learning environment. Course developers and instructional designers need to ensure alignment of these components for effective learning.

COURSE ALIGNMENT IN BLENDED LEARNING DESIGN

Educational technology focuses on aligning the critical course component such as learning objectives, assessments, instructional materials, learner engagement, and technology (Quality Matters, 2011). Each of these components enables learners to achieve the desired outcomes yielding effective learning. Effective learning requires constructive alignment of the curriculum, which ensures that the program, learning outcomes, instructional approaches, assessments, and course evaluation complement each other. However, many instructors and course developers lack training in educational technology (Bober, Sullivan, Lowther, & Harrison, 1998). A lack of training in educational technology may influence learners' mastery of the course outcomes. The Center for the Study of Higher Education (2011) discusses the importance of alignment of assessments and objectives for effective learning. The relationship shows a direct correlation between the course components that is crucial for learner mastery.

An achievable goal for developing and designing blended courses is to have the courses become Quality Matters certified (Quality Matters Program, 2011). Seven of the essential standards that all quality courses must possess focus on alignment. Course developers need training on alignment and backwards design, so that these courses are certified. Backwards design is an instructional design methodology created by Wiggins and McTighe and is part of the *Understanding by Design* framework (Wiggins & McTighe, 2004). Backwards design begins with the end in mind by focusing on the course outcomes and then working backwards to develop the module or weekly objectives, assessments, and learning activities.

Outcomes and objectives should include an action verb that is measurable and a noun (Krathwohl, 2002). Each outcome/objective should include the learning behavior, appropriate assessment methods, and specific learner performance criteria. Course developers should write these outcomes as precise statements describing what the learner will achieve by the end of the course. Course developers write outcomes/objectives with non-measurable verbs such as understand and learn. Second, these course developers struggle with visualizing the entire course. Many course developers focus on one week at a time rather than focusing on the entire scope of the course. When focusing on a single topic, many course developers design engaging activities and assessments for that topic that learners enjoy. However, when instructional designers align the critical course components the topical objectives and assessments fail to align with the course outcomes. Both of these challenges faced by many course developers in developing quality online courses derive from a lack of effective training on backwards design and alignment and an inability of the course developers to look collectively at the course rather than just a single module or week.

Understanding by design (UbD) is a program and course-planning framework that focuses on effective learning (Wiggins & McTighe, 2011). Backwards design begins with the end in mind by focusing on the course outcomes and then working backwards to develop the module or weekly objectives, assessments, and learning activities. The model has three stages 1) identifying learning outcomes 2) determining ways to assess the outcomes and 3) deciding on instructional materials. These stages of development coincide with ADDIE (analysis, design, development, implementation, and evaluation) model for the systematic design of instruction (Dick, Carey, & Carey, 2005). Researchers utilizing this model to redesign a face-to-face course into a blended format have had improved learner performance as a result of the redesign (Shibley, Amaral, Shank, & Shibley, 2011).

It is important to note that successful teaching begins with clarity of desired learning outcomes and ends with supporting evidence that shows how learning occurred. Understanding by design supports this view by following three-stage backwards design process connecting curriculum units with instructional materials, assessments, outcomes, and objectives. Effective learning requires constructive alignment of the curriculum, which ensures that the program, learning outcomes, instructional approaches, assessments, and course evaluation complement each other (Wittstrom, Cone, Salazar, Bond, & Dominguez, 2010). Curriculum alignment that focuses on backwards design begins with the end in mind by focusing on the course outcomes and then working backwards to develop the module or weekly objectives, assessments, and learning activities (Vitale, 2010; Wiggins & McTighe, 2004).

In aligned systems, all components work simultaneously to guide instruction and facilitate learning. Program and course developers should conduct an alignment analysis. The analysis can provide valuable information regarding content validity on the assessments, weak areas that need improving, accountability, balance between assessments, objectives and outcomes (Vitale, 2010; Wittstrom et al., 2010). Programs that have curriculum committees monitor both course and program alignment for continuous quality improvement (Wittstrom et al., 2010); however, not all programs have curriculum committees. In addition, having a curriculum committee does not guarantee alignment of course components. The University of New Mexico's College of Pharmacy has many program and course components aligned with the exception of written examinations (Wittstrom et al., 2010). Borrego and Cutler (2010) analyzed alignment based on 1) identifying desired results and outcomes 2) determining what constitutes acceptable evidence to support the outcomes and 3) planning instructional strategies and learning experiences to generate learner competencies for program alignment. Similarly, Jacobs and Murray (2010) utilized the framework for analyzing alignment in a specific course. Alignment occurs when the course instructor communicates the desired learning outcomes to the learners and course components align with the outcomes.

During the three-stage process, revised Bloom's taxonomy (RBT) of cognitive knowledge can assess the structure and cognitive abilities associated with the outcome and objectives (Jideani & Jideani, 2012). Another layer to alignment could be in assessing the quantity and quality of outcomes and objectives relating to cognitive skills.

Many courses and programs strive for learners to achieve high cognitive skills, but many outcomes and objectives are low-level (Borrego & Cutler, 2010; Jideani & Jideani, 2012). In addition, Outcome-Based Learning (OBL) alignment has the potential to coordinate with UbD as long as the OBL alignment follows the backwards design process. Course development utilizing OBL focuses on outcomes that are desirable for learners. The OBL framework maps program outcomes, course outcomes, and intended learning outcomes to create an effective aligned program for learners (Kaliannan & Chandran, 2012; Wittstrom et al., 2010).

Following the principles of understanding by design before developing a program and/or courses should happen. Course developers and instructional designers who follow backwards design are more likely to ensure alignment of critical course components rather than trying to adjust either specific courses or programs after development. Misalignment can occur if curriculum and program mapping does not occur leading to learners not achieving the desired outcomes (Borrego & Cutler, 2010; Jideani & Jideani, 2012). Alignment through the UbD framework allows learners to deepen their understanding and transfer of knowledge (Wiggins & McTighe, 2011). Curriculum and program planning through backwards design prevent textbook teaching and assessment that lead to unclear goals and purposes (Wiggins & McTighe, 2011).

ORGANIZATION OF INSTRUCTIONAL COMPONENTS IN BLENDED LEARNING

In completing the alignment of critical course components, placement of the instructional components needs to be discussed to decide which components are best suited for the face-to-face environment and those that are best suited for the online components. Rossett, Douglis, and Frazee (2003) discuss that for successful blending, instructional tools and design strategies are important components, and designers and developers need to integrate all the components within the instructional method. In designing blended learning environments, the goal is to design an environment that is both effective and adaptive (Abdelaziz, 2012) that utilizes many models for organizing materials, activities, and assessments into the face-to-face and online portions of the course. The right blend depends on instructional conditions and instructors' own judgment and decisions in applying their instructional strategies for their instructional needs (Rossett et al., 2003). The National Research Council (NRC) (2001) discusses that effective learning environments need to include four basic components. Effective learning environments need to be knowledge-centered, learner-centered, community-centered, and assessment-centered. Developers and instructional designers need to consider these four components when designing courses.

Bonk and Graham (2005) propose that blended learning environments find a balance between enabling blends, enhancing blends, and transforming blends. Enabling blends allow learners flexibility through access to information in different modalities. Enhancing blends allow for slight changes in the pedagogy, but do not drastically change the teaching and learning processes. Enhancing blends allow supplemental material to be included in the online portion of the course to enhance the face-to-face materials. Finally, transforming blends occur in the online components where the learner actively construct knowledge through interaction with other and the material. These blends focus on merging educational theories with technology.

Oh and Park (2009) surveyed blended faculty members and found that 64.4% utilized the online components of a blended course to supplement the face-to-face instruction. In addition, 19.7% faculty blended instruction with less than 50% of the instruction occurring online and 12.1% utilized online instruction more than 50% of the time (Oh

& Park, 2009). These faculty members also had positive attitudes about blending instruction and that the blending improved the quality of instruction and the course (Oh & Park, 2009). One reason for improved instruction is that blended courses allow for easier establishment of social identification, roles, and relationships due to the face-to-face components. Learners may find it easier to feel invested and connected to the course with the placement of face-to-face meetings. MacDonald (2006) identified three common blended models. The most common method is learners meeting on campus and participating in asynchronous activities throughout the course. Second, focuses on blended synchronous and asynchronous components with strategically places face-to-face sessions. A third blended model is a mixture of traditional learners and distance learners who interact, but are separated.

Many blended courses have their first session in a face-to-face format to establish social presence, establish roles, idea sharing, and discussion of the course components. For Quality Matters certification of blended courses, faculty need to clearly state the purpose of the online and face-to-face components as well as how the two components work together (Quality Matters, 2011). During an initial face-to-face meeting, the course instructor can explain the course structure by describing how the two formats work together. In addition, introductions to the course and classmates can occur during this meeting. In addition to an initial meeting, face-to-face meetings can be interjected throughout the course to discuss topic changes. Colucci and Koppel (2010) designed a blended course focused on business technologies that met at the beginning of the course and three times throughout the course for the instructor to provide a face-to-face lecture on specific content areas. Face-to-face lectures can be supplemented with pretests, posttests, and discussions in the online components to enhance learners understanding of the material (Du, 2011; Lim & Morris, 2009). However, other blended courses preferred to conduct the discussions face-to-face and use the online portions for learners to review the lecture portion of the course (Crouch, 2009). In both blended designs activities were developed to increase engagement and motivation in both the online and face-to-face components (Colucci & Koppel, 2010; Crouch, 2009; Du, 2011).

The author has taught and developed blended courses that fit into two different models. The first model had learners meeting face-to-face during the first and last week of the course. During the initial meeting, the author described the course components and structure of the course. During the last meeting, the author summarized the course and learners presented their group presentations. During the online components of the course, the author provided lectures using Articulate software with checks of understanding embedded into the content, weekly discussions, knowledge checks, quizzes, and other instructional materials. Midway through the course the author realized that learners needed more assistance with the content, so synchronous discussions were included into the online environment to enhance the material.

In addition, the author developed a 16-blended course designed into four modules that met four times throughout the semester. Face-to-face meetings occurred at the start of the course to explain the structure and organization of the course and at the beginning of each module. The author designed each module around a specific content area and included a major assignment to show mastery of the content area. The purpose of the face-to-face meetings was to introduce each new module, explain the assignment, and provide training in the technology tools needed to complete the assignment within each module. The online portion of the course consisted of lectures, instructional materials, quizzes, discussion, and blogs.

In designing both models, the author aligned the course outcomes with weekly/modular objectives and assessments to show mastery. Once the alignment was completed, the author integrated the face-to-face meetings where they would support the outcomes and objectives of the courses. Learners liked both models mainly because they had time to process the information before discussing the information and completing the activities.

USING ONLINE DISCUSSIONS IN BLENDED COURSES

Contemporary discussions of education in blended-learning environments increasingly emphasize the social nature of learning which emphasizes interactions among learners, or among learners and instructors. Discussion based instruction is based on Merrill's First Principles of instructor by creating a sense of community, honoring voices, instilling critical thinking and problem-solving skills, offer shared participation, and demographic participation (Gibson, 2009). Merrill's instructional theory focuses on learner engagement through authentic problems, activation of knowledge construction, demonstrations for training, learning application, and integration of knowledge (2002). This instruction activates conceptual thinking through recalling prior experiences, providing relevant examples, and stimulating mental models (Merrill, 2002). According to Merrill (2002), learning promotion occurs when learners are involved in solving complex tasks, cognitive structures are activated through coaching, learners observe demonstrations, learners apply new knowledge to prior knowledge, and learners integrate knowledge into other task.

Discussion based instruction incorporates learner experiences into the learning process rather than just focusing on content driven instruction. Effective discussions derive from properly constructed discussion prompts and adequate participation. Discussion based instruction can lead into problem-based instruction since many discussion prompts may focus on solving a problem. Applebee, Langer, Nystrand, and Gamoran (2003) investigated the usage of discussion-based instruction in acquiring literacy skills. The use of discussion-based instruction enabled students to acquire the complex literacy skills they needed for successful academic achievement (Applebee et. al, 2003). Discussion instruction encourages development of understanding of concepts, internalization of knowledge, and engagement (Applebee et al., 2003).

Discussion instruction can be used in all types of classroom settings. Asynchronous discussions are a common assessment tool utilized in distance education. Discussions are primarily learner driven; however, instructor participation may vary in courses and programs. The author recommends including both an initial prompt and response prompt to encourage learners to engage and interact with one another. The author has found that writing open-ended, high-level discussion prompts encourages a richer discussion of the material that focuses on learners improving their critical-thinking skills. In addition, the addition of response prompts enables learners to focus their response on creating a substantive response.

Learners' participation is an important element for active and engaged learning. Many times in a short face-to-face meeting, learners do not have enough time engage in class discussions. One benefit of the asynchronous online components is that online discussions allow learners more time to process information to assemble their knowledge into a thorough and substantive discussion post. In addition, learners are allowed time to reflect before responding to their peers and instructor. Many researchers view online discussion as a major advancement in teaching and learning because it facilitates the exchange of information and provides opportunities for all learners. Research shows that learners are generally satisfied participating in online discussions because the online discussion improved their understanding of course content (Blankson & Kyei-Blankson, 2008). This outcome may be from the learners having more time to reflect and internalize the information. In addition, online discussions help meet the learner-learner interaction component for Quality Matters certification (Quality Matters, 2011).

In a blended-learning environment, discussions among students and instructors may occur synchronously or asynchronously over the internet or is using a discussion board tool in the LMS. The majority of asynchronous discussions are text-based (Girasoli & Hannafin, 2008). Text-based discussions can help assess proper grammar and formatting principles needed in academic writing by providing formative writing assessments that learners can use to enhance their writing. Some learners may struggle with explaining complex concepts with text, while other learners maybe misrepresented by the lack of verbal cues (Hew & Hara, 2007). In addition, learners may find it difficult to read lengthy discussion posts .The author recommends including a word count for the initial post and responses posts. Word counts encourage learners to be concise to their posting.

An alternative to text-based discussion is utilizing voice-based asynchronous discussions using Voice Thread or Wimba Voice Board software (Hew & Cheung, 2012). Hew and Cheung (2012) conducted an investigation of asynchronous voice-based online discussions within a blended learning environment and found no statistical difference between text and voice-based discussions. However, learners reported that the voice-based discussions enabled them further enhance their understanding of another learner's post, increased originality of ideas, and helped create a sense of community in the online components.

Developing quality, blended courses involves more than just making sure outcomes, objectives, and learning materials are aligned and properly organized and including learner-learner interaction in the form of discussions. Osguthorpe and Graham (2003) discuss the importance of designing activities to meet a variety of learning styles.

USING LEARNING STYLES TO GUIDE THE DESIGN OF BLENDED COURSES

When designing the online components of a blended course, developers and designers need to incorporate adequate support strategies to meet the needs of a variety of learner needs and styles (Maddux, Ewing-Taylor, Johnson, 2002; Thiele, 2003). Incorporating attention to a variety of learner needs has received significant attention over the last several years with the push for Universal Design for Learning (UDL) (Rose & Meyer, 2002). Under UDL educators, provide instruction and materials that meet the needs of diverse populations of learners to utilize the best method to help all learners successfully master a course's outcomes and goals. Learning styles are a grouping of intellectual, affective, and physiological factors that combine to create a unique and individualized environment to satisfy learners' needs (Collinson, 2000). Lim and Morris (2009) discovered that individual learning differences are an important area to consider in designing blended courses.

Rose and Meyer discuss developing instruction to meet the needs of visual, verbal, and kinesthetic learners (2002). Visual learners prefer visual displays like written information, notes, diagrams and pictures to effective learn information. Visual learners prefer taking notes and writing down key points to facilitate their learning. They follow reading written instructions better than oral ones. These learners may also tend to prefer reading text to having text presented with multimedia components. Auditory learners prefer information in verbal formats such as listening to a lecture, participating in a discussion to learn effectively. These learners prefer to have information read to them rather than having written information and instruction. Auditory learners prefer to participate in verbal discussions, listen to lectures without notes, and have audio texts rather than reading materials. Kinesthetic learners prefer movement and learn best in action tasks that require a hands-on approach. UDL encourages all instruction and materials to combine a variety of strategies to meet these needs (Rose & Meyer, 2002).

Consideration of learning styles can enhance an educator's perception of their teaching ability through the use of incorporating a variety of instructional strategies and materials to meet the individualized needs of learners while maintaining academic rigor (Noble, 2004). Noble (2004) found that learners receiving instruction and materials to match their learning styles had positive attitudes and behaviors toward learning. However, more research is needed on focusing instruction to include a variety of learning styles (Evans & Waring, 2006).

Evans and Waring (2006) found that educators benefit from considering different learning styles when they design their instruction. In addition, Evans and Waring found that educators typically use instructional approaches on transmitting information rather than focusing on learner needs (2006). Research supports the notion that educators' understanding of their learners' preferred learning styles can influence their understanding of the information. In following the UDL framework, instructional designers develop instruction for all learner styles. However, instructional designers need to design instruction based on learner characteristics. Instructional designers who do not design courses with the aim of meeting all learning styles may waste time and resources on developing materials that are unnecessary. In assessing learning styles, instructional designers need real data on the learners' learning styles rather than on perceived characteristics. Therefore gathering data from learners is important in the design process.

Akkoyunlu and Soylu (2008) utilized Kolb's Learning Style Inventory (LSI) to measure learners' learning styles to analyze learner perceptions based on learning style within a blended learning environment. Results revealed that learners' views on blended learning process, such as ease of use of the web environment, evaluation, face-to-face environment differ according to their learning styles; learners' perceptions were high in situations where the blended aspects aligned with learner learning styles. . The data showed that designing blended courses to meet a variety of learner needs may result in enhanced motivation, engagement, and increase retention. In addition, designing courses to meet a variety of learning needs by being ADA compliant is an essential standard for Quality Matters (Quality Matters, 2011).

Table 1. Roles of Team Members

Team Member	Role
Instructional Designer	■ Acts as pedagogical and design consultant ■ Helps course developer with designing engaging content and activities and transitioning classroom content for online delivery ■ Ensures the course adheres to program guidelines including Quality Matters standards ■ Assists team with selecting instructional materials Ensures ADA compliance
Course Developer	■ Acts as subject matter expert ■ Identifies and designs course content, activities, and assessments in collaboration with the instructional designer ■ Completes the templates for online development in accordance with the Quality Matters guidelines
Instructional Technicians	■ Provides technical support in building the course with a learning management system (LMS) ■ Reviews course for design flaws (testing links, proofreading) ■ Loads course content into LMS ■ Manages general navigational and course settings
Librarian	■ Ensures copyright compliance ■ Locates readings, open source and other instructional materials ■ Participates as guest consultant in the courses
Multimedia Specialist	■ Assists instructional designer with developing activities ■ Assists course developer with audio and video ■ Ensures ADA compliance
Review Panel	■ Reviews course to ensure standards are met

RECOMMENDATIONS FOR INSTRUCTORS AND NSTRUCTIONAL DESIGN TEAMS

This chapter provides an overview on how to design a blended course that utilizes a combination of effective face-to-face meetings with online components to meet a variety of learning needs. Osguthorpe and Graham (2003) found that blended instruction methods improved pedagogy, increased access to knowledge, fostered social interaction, increased the amount of teacher presence during learning, improved cost effectiveness, and enhanced ease of revision.

Quality Matters, Backwards Design, and the ADDIE model are great models to follow when designing blended courses. Compiling an instructional design team can help disperse the workload since developing quality blended courses is time-consuming. In addition, team members can assist faculty content developers with many of the elements in designing a blended course. Instructional designers can provide expertise on alignment of critical course components and helping the content developer decide how to best utilize the two different instructional methodologies utilized in blended courses. Since many models exist for integrating online components into face-to-face courses, looking at the courses goals and outcomes is essential for utilizing the formats to allow learners mastery of the material. In designing activities, assessments, and instructional materials, the team needs to be cognizant of learner needs and design components, so that all learners can benefit from the course.

It is clear that designing and developing blended courses requires greater amounts of time than designing classroom instruction. In particular, blended courses should be more elaborately designed than online or classroom instruction only by balancing the portion of each delivery method (Oh & Park, 2009). Blended course design should be a collaborative effort amongst an instructional design team to disperse the workload to specialized individuals. Grincewicz (2012) and Puzziferro and Shelton (2008) discuss the team approach to course design. Each team member has a specific role (see Table 1) (Grincewicz, 2012; Puzziferro & Shelton, 2008). These roles are crucial for effective course development. During the course development, each team member is held accountability for a variety of tasks. It is crucial that all team members stay on task since each piece relates to another piece.

REFERENCES

Abdelaziz, H. A. (2012). D^4 S^4: A four dimensions instructional strategy for web-based and blended learning. *Turkish Online Journal of Distance Education*, *13*(4), 220–235.

Akkoyunlu, B., & Soylu, M. Y. (2008). A study of student's perceptions in a blended learning environment based on different learning styles. *Journal of Educational Technology & Society*, *11*(1), 183–193.

Applebee, A. N., Langer, J. A., Nystrand, M., & Gamoran, A. (2003). Discussion-based approaches to developing understanding: Classroom instruction and student performance in middle and high school English. *American Educational Research Journal*, *40*(3), 685–730. doi:10.3102/00028312040003685

Blankson, J., & Kyei-Blankson, L. (2008). Nontraditional students' perception of a blended course: Integrating synchronous online discussion and face-to-face instruction. *Journal of Interactive Learning Research*, *19*(3), 421–438.

Bober, M. J., Sullivan, H. J., Lowther, D. L., & Harrison, P. (1998). Instructional practices of teachers enrolled in educational technology and general educational programs. *Educational Technology Research and Development*, *46*(3), 81–97. doi:10.1007/BF02299763

Bonk, C., & Graham, C. (2005). *Handbook of blended learning: Global perspectives, local designs*. San Francisco, CA: Pfeiffer Publishing.

Borrego, M., & Cutler, S. (2010). Constructive alignment of interdisciplinary graduate curriculum in engineering and science: An analysis of successful IGERT proposals. *Journal of Engineering Education*, *99*(4), 355–369. doi:10.1002/j.2168-9830.2010.tb01068.x

Centre for the Study of Higher Education. (2011). *Online assessment*. Retrieved from http://www.cshe.unimelb.edu.au/assessinglearning/docs/Online.pdf

Collinson, E. (2000). A survey of elementary students' learning style preferences and academic success. *Contemporary Education*, *71*(4), 42–48.

Colucci, W., & Koppel, N. (2010). Impact of the placement and quality of face-to-face meetings in a hybrid distance learning course. *American Journal of Business Education*, *3*(2), 119–130.

Crouch, M. A. (2009). An advanced cardiovascular pharmacotherapy course blending online and face-to-face instruction. *American Journal of Pharmaceutical Education*, *73*(3), 1–51. doi:10.5688/aj730351

Dick, W., Carey, L., & Carey, J. O. (2005). *The systematic design of instruction* (6th ed.). Boston, MA: Pearson, Allyn and Bacon.

Du, C. (2011). A comparison of traditional and blended learning in introductory principles of accounting course. *American Journal of Business Education*, *4*(9), 1–10.

Evans, C., & Waring, M. (2006). Towards inclusive teacher education: Sensitizing individuals to how they learn. *Educational Psychology*, *26*(4), 499–518. doi:10.1080/01443410500342484

Gibson, J. T. (2009). Discussion approach to instruction. In C. M. Reigeluth & A. A. Carr-Chellman (Eds.), *Instructional-design theories and models: Building a common knowledge base* (pp. 99–116). New York, NY: Routledge.

Girasoli, A. J., & Hannafin, R. D. (2008). Using asynchronous AV communication tools to increase academic self-efficacy. *Computers & Education*, *51*(4), 1676–1682. doi:10.1016/j.compedu.2008.04.005

Grincewicz, A. M. (2012). A model for developing quality graduate programs using blended courses in nursing education. In *Proceedings of E-Learn 2012*. Montreal, Canada: AACE.

Hew, K. F., & Cheung, W. S. (2012). Students' use of asynchronous voice discussion in a blended-learning environment: A study of two undergraduate classes. *Electronic Journal of E-Learning*, *10*(4), 360–367.

Hew, K. F., & Hara, N. (2007). Empirical study of motivators and barriers of teacher online knowledge sharing. *Educational Technology Research and Development*, *55*(6), 573–595. doi:10.1007/s11423-007-9049-2

Jacobs, G., & Murray, M. (2010). Developing critical understanding by teaching action research to undergraduate psychology students. *Educational Action Research*, *18*(3), 319–335. doi:10.1080/09650792.2010.499789

Jideani, V. A., & Jideani, I. A. (2012). Alignment of assessment objectives with instructional objectives using revised Bloom's Taxonomy-The case for food science and technology education. *Journal of Food Science Education*, *11*(3), 34–42. doi:10.1111/j.1541-4329.2012.00141.x

Kaliannan, M., & Chandran, S. (2012). Empowering students through outcome-based education (OBE). *Research in Education*, *87*(1), 50–63. doi:10.7227/RIE.87.1.4

Krathwohl, D. R. (2002). A revision of Bloom's taxonomy: An overview. *Theory into Practice*, *41*(4), 212–218. doi:10.1207/s15430421tip4104_2

Lim, D. H., & Morris, M. L. (2009). Learner and instructional factors influencing learning outcomes within a blended learning environment. *Journal of Educational Technology & Society*, *12*(4), 282–293.

MacDonald, J. (2006). *Blended learning and online tutoring: A good practice guide*. Aldershot, UK: Gower Publishing Co.

Maddux, C. D., Ewing-Taylor, J. F., & Johnson, D. L. (2002). *Distance education: Issue and concerns*. New York: Howarth Press.

Merrill, M. D. (2002). First principles of instruction. *Educational Technology Research and Development*, *50*(3), 43–59. doi:10.1007/BF02505024

National Research Council. (2001). *How people learn: Brain, mind, experience*. Washington, DC: National Academy Press.

Noble, T. (2004). Integrating the revised Bloom's taxonomy with multiple intelligences: A planning tool for curriculum differentiation. *Teachers College Record*, *106*(1), 193–211. doi:10.1111/j.1467-9620.2004.00328.x

Oh, E., & Park, S. (2009). How are universities involved in blended instruction? *Journal of Educational Technology & Society*, *12*(3), 327–342.

Osguthorpe, R. T., & Graham, C. R. (2003). Blended learning environments: Definitions and directions. *Quarterly Review of Distance Education*, *4*(3), 227–233.

Puzziferro, M., & Shelton, K. (n.d.). A model for developing high-quality online course: Integrating a systems approach with learning theory. *Journal of Asynchronous Learning Networks, 12*(3-4), 119-136.

Quality Matters Program. (2011). *Quality matters rubric workbook for higher education.* Retrieved from http://www.uwgb.edu/catl/files/workshops/Business/2011-2013RubricUnabridged.pdf

Rose, D. H., & Meyer, A. (2002). *Teaching every student in the digital age: Universal design for learning*. Alexandria, VA: Association for Supervision and Curriculum Development.

Rossett, A., Douglis, F., & Frazee, R. V. (2003). Strategies for building blended learning. *Learning Circuits.* Retrieved from http://www.essential-learning.net/news/Strategies%20for%20Building%20Blended%20Learning.pdf

Shibley, I., Amaral, K. E., Shank, J. D., & Shibley, L. R. (2011). Designing a blended course: Using ADDIE to guide instructional design. *Journal of College Science Teaching*, *40*(6), 80–85.

Thiele, J. E. (2003). Learning patterns of online students. *The Journal of Nursing Education*, *42*(8), 364–367.

Vitale, C. (2010). Foundations of university learning and teaching: A reflection on the curriculum alignment. *E-Journal of Business Education & Scholarship of Teaching*, *4*(2), 52–64.

Wiggins, G., & McTighe, J. (2004). *Understanding by design professional development workbook*. Alexandria, VA: Association for Supervision and Curriculum Development.

Wiggins, G., & McTighe, J. (2011). *The understanding by design guide to creating high-quality units*. Alexandria, VA: Association for Supervision and Curriculum Development.

Wittstrom, K., Cone, C., Salazar, K., Bond, R., & Dominguez, K. (2010). Alignment of pharmacotherapy course assessments with course objectives. *American Journal of Pharmaceutical Education*, *74*(5), 1–8. doi:10.5688/aj740576

ADDITIONAL READING

Al-busaidi, K. A., & Al-shihi, H. (2012). Key factors to instructors' satisfaction of learning management systems in blended learning. *Journal of Computing in Higher Education*, *24*(1), 18–39. doi:10.1007/s12528-011-9051-x

Bello-Haas, V. D., Proctor, P., & Scudds, R. (2013). Comparison of knowledge and knowledge application confidence in physical therapist students completing a traditional versus blended learning professional issues course. *Journal of Physical Therapy Education*, *27*(1), 10–19.

Caufield, J., & Aycock, A. (2011). *How to design and teach a hybrid course: Achieving student-learning through blended classroom, online, and experiential activities*. Sterling, VA: Stylus Publishing.

Conrad, R. M., & Donaldson, J. A. (2011). *Engaging the online learner: Activities and resources for creative instruction*. San Francisco, CA: Jossey Bass.

Edginton, A., & Holbrook, J. (2010). A blended learning approach to teaching basic pharmacokinetics and the significance of face-to-face interaction. *American Journal of Pharmaceutical Education*, *74*(5), 1–11. doi:10.5688/aj740588

Finn, A., & Bucceri, M. (2004). *A case study approach to blended learning*. Retrieved from http://www.centra.com/download/whitepapers/CaseStudy_BlendedLearning.pdf.

Hyo-Jeong So, & Bonk, C. J. (2010). Examining the roles of blended learning approaches in computer-supported collaborative learning (CSCL) environments: A delphi study. *Journal of Educational Technology & Society*, *13*(3), 189–200.

Kemp, J. E., Morrison, G. R., & Ross, S. M. (1998). *Designing effective instruction* (2nd ed.). Upper Saddle River, NJ: Prentice Hall.

Kliger, D., & Pfeiffer, E. (2011). Engaging students in blended courses through increased technology. *Journal of Physical Therapy Education*, *25*(1), 11–14.

Nowell, G. (2011). Student course evaluations in traditional and blended courses: A case study. *American Journal of Business Education*, *4*(1), 13–18.

Olthouse, J. (2010). Blended books: An emerging genre blends online and traditional formats. *ALAN Review*, *37*(3), 31–37.

Ömer, D. (2012). Student engagement in blended learning environments with lecture-based and problem-based instructional approaches. *Journal of Educational Technology & Society*, *15*(3), 310–322.

Stewart, A., & Nel, D. (2009). Blended and online learning: Student perceptions and performance. *Interactive Technology and Smart Education*, *6*(3), 140–155. doi:10.1108/17415650911005366

Thang, S. M., Wong, F. F., Noor, N. M., Mustaffa, R., Mahmud, N., & Ismail, K. (2012). Using a blended approach to teach English for academic purposes: Malaysian students' perceptions of redesigned course materials. *International Journal of Pedagogies & Learning*, *7*(2), 142–153. doi:10.5172/ijpl.2012.7.2.142

Thorne, K. (2003). *Blended learning: How to integrate online and traditional learning*. London: Kogan Page.

Tselios, N., Daskalakis, S., & Papadopoulou, M. (2011). Assessing the acceptance of a blended learning university course. *Journal of Educational Technology & Society*, *14*(2), 224–235.

Uur, B., Akkoyunlu, B., & Kurbanolu, S. (2011). Students' opinions on blended learning and its implementation in terms of their learning styles. *Education and Information Technologies*, *16*(1), 5–23. doi:10.1007/s10639-009-9109-9

Wainwright, S. (2011). Blended learning in higher education: Framework, principles, and guidelines. *Journal of Physical Therapy Education*, *25*(1), 73.

Wilson, M. L. (2012). Learning styles, instructional strategies, and the question of matching: A literature review. *International Journal of Education*, *4*(3), 67–87. doi:10.5296/ije.v4i3.1785

KEY TERMS AND DEFINITIONS

Blended Learning or Hybrid Learning Environments: Learning environments in which traditional face-to-face instruction is combined with learning opportunities delivered online.

Face-to-Face Learning: This type of learning occurs in traditional classroom environments where all class members meet together in the same physical space.

Objectives: Objectives are precise statements of what students are to master after the completion of a week or content module sometimes referred to as enabling objectives.

Online Course Components: These are activities and instructional materials that occur asynchronously through a learning management system or other web-technologies.

Outcomes: Outcomes are broad measurable statements of what students are to master after completing a course sometimes referred to as terminal objectives.

This work was previously published in Practical Applications and Experiences in K-20 Blended Learning Environments edited by Lydia Kyei-Blankson and Esther Ntuli, pages 43-55, copyright year 2014 by Information Science Reference (an imprint of IGI Global).

Chapter 35
A Framework for Promoting Complex Learning in a Blended Learning Environment

Jill E. Stefaniak
Old Dominion University, USA

ABSTRACT

Different learning outcomes warrant different learning strategies. Instructional sequencing is dependent upon the various learning outcomes that are intended for a particular course or instructional unit. Complex learning integrates a learner's knowledge, skills, and attitudes, newly obtained skillsets, and the transference of learning in an applied environment. A challenge that many educators face when teaching complex tasks is the ability to assist students to draw from prior knowledge from various subjects in order to approach problem solving. The intent of this chapter is to provide educators with strategies to promote complex learning within a blended learning environment.

INTRODUCTION

The demands of education are ever changing and the traditional classroom, as we know it, has been transforming into a digital learning environment. Online education has continued to grow with more and more educational institutions turning towards virtual schools. While many institutions still want to embrace the traditional classroom and face-to-face instruction, they are turning to a blended approach to instruction. Blended learning provides students with the opportunities to engage and interact with their instructors and peers in a more personal manner along with the convenience associated with self-directed online learning.

A challenge that many educators face is the ability to assist students with retrieving and drawing upon prior knowledge from various subjects in order to approach problem solving and critical thinking exercises. Students must be provided with supplantive learning opportunities to guide them through the process of organizing information that will foster complex learning skills. These instructional strategies are used to facilitate and

DOI: 10.4018/978-1-4666-8246-7.ch035

scaffold (van Merriënboer et al., 2003) information in order to assist the learner will the ability to transfer the information to other contexts. Instructors must find balance between "the need to require sufficient mental effort to lead toward learning, and the need to support the learners' processing sufficiently in a way that does not overload their working memory" (Smith & Ragan, 2005, p. 143).

The Four Component/Instructional Design (4C/ID) model provides a format for teaching complex learning by proceeding through 10 steps that are categorized within learning tasks, supportive information, procedural information, and part-task practice (van Merriënboer & Kirschner, 2007). This model can be incorporated within any education framework to teach students how to effectively solve problems utilizing a blended-learning approach. Teaching complex learning must be done using a scaffolded approach to alleviate intrinsic and extraneous cognitive load while identifying opportunities for students to engage in participatory and learner-centered activities in a blended learning environment.

The intent of this chapter is to provide educators with suggestions for instructional strategies to promote complex learning within a blended learning environment. The information discussed in this chapter will be applicable to educators in elementary, secondary, and higher education institutions.

BACKGROUND

Research has found that blended instruction significantly enhances learning outcomes compared to courses that are led solely online. Blended instruction provides the opportunity for both self-directed learning that can be achieved through online activities and face-to-face instruction where an instructor can have more interaction with a student and provide immediate feedback (Lim & Morris, 2009; Laurillard, 1993). Blended learning consists of a combination of traditional face-to-face instruction with learning technologies (Bielawski & Metcalf, 2003). Blended learning can consist of a mix of classroom instruction and online instruction that is taught in both synchronous and asynchronous formats. Synchronous and asynchronous instructional activities should be determined based on the learning goals for the course. Blended learning environments may consist of learning activities that are evenly distributed between face-to-face instruction and online learning activities or activities that are more heavily classroom-oriented. Carmen (2002) suggests that instructors must take into account the number of live instructional events they plan on incorporating within a course as well as the desired amount of self-paced activities and collaborative group learning experiences.

Research studies have identified a number of ways in which blended instruction improve or enhance the educational experience for students such as "improved pedagogy, increased access to knowledge, fostered social interaction, increased amount of teacher presence during learning, improved cost effectiveness, and enhanced ease of revision" (Lim & Morris, 2009, p. 282). Different learning outcomes warrant different instructional strategies regardless of whether they are being taught in a face-to-face traditional classroom, web-based, or blended learning environments. There are three premises that instructors must follow when selecting instructional strategies for a course: (1) there are different types of learning outcomes and each type calls for a different types of instruction; (2) instructional sequencing relies upon relationships among the various learning outcomes; and (3) instructional strategies should facilitate the internal process of learning (Richey, Klein, & Tracey, 2011, p. 105).

The sequencing of instructional activities is dependent upon the nature of the task and how that task fits into the greater picture of what is being taught. The alignment of instructional strategies and how they relate to one another must also be taken into consideration when sequencing instruction. The way in which instruction is presented to learners pertaining to complex tasks needs to be broken done into smaller components that integrate multiple sets of learning goals and performance objectives (van Merriënboer, Clark, & de Croock, 2002).

Complex learning involves "the integration of knowledge, skills, and attitudes; the coordination of qualitatively different constituent skills, and often the transfer of what is learned in the school or training setting to daily life and work" (van Merriënboer & Kirschner, 2013, p. 2). The Four Component/Instructional Design (4C/ID) model was developed to guide instructional designers and educators on the process required to teach novice learners complex tasks. The environments for complex learning can be described in terms of four learning processes:

1. Learning tasks.
2. Supportive information.
3. Procedural information.
4. Part-task practice (van Merriënboer & Kirschner, 2013).

The ability to master a complex task is a process that often takes a significant amount of time. The 4C/ID model was developed, keeping in mind, that it may take a learner several weeks, months, or even years, to fully master the complexity of the task presented to them. The four components (learning tasks, supportive information, procedural information, and part-task practice) have not been designed to be completed in a linear progression. In most cases, learning tasks will be comprised of the introductory knowledge that is presented to learners early in instruction; however, supportive information and procedural information are presented to the learners on an as needed basis. Keeping in mind that it may take a learner a significant amount of time to master a task, the supportive information phase may encounter a lengthy amount of time. Part-task practice should be introduced early in the instructional process so that the learner has an opportunity to familiarize himself or herself with the tasks and all of the sub-units or components that they've been broken down into. The 4C/ID model has been developed to assist instructors with categorizing instructional strategies as they increase in complexity and difficulty.

Issues, Controversies, Problems

The Four Component Instructional Design Model (4C/ID) was designed to address three deficits found in most instructional design models. The model:

1. Focuses on the integration and coordination of constituent skills that are task specific.
2. Distinguishes between procedural information and part-task practice.
3. Incorporates a mixture of part-task and whole-task practice (van Merriënboer et al., 2002).

Learning tasks consist of instructional experiences that present whole task experiences to a novice learner in order to promote schemata instruction. Tasks presented within this component of the 4C/ID model are led by the instructor and contain a high degree of learner-support. In order to promote schemata construction, mental models need to be constructed to assist the learner with organizing new information, and cognitive strategies need to be employed in order to facilitate problem-solving and the method by which problems are approached (van Merriënboer et al., 2002). "Mental models are declarative representations of how the world is organized and may contain both general, abstract knowledge and concrete cases that exemplify this knowledge" (van Merriënboer et al., 2002, p. 48). Learning tasks are organized in simple to complex tasks in order for the learner to construct a mental model and become comfortable with the task and it continues to grow in complexity.

Reigeluth's Elaboration Theory provides guidance on how to organize and sequence instruction from general units to more complex units. The Elaboration Theory suggests that instructors first provide a brief generic overview of the task being presented excluding any constraints and minute details when teaching learners a new task. As learners become more familiar with the content the instructor will gradually present more details related to the task in small segments or units until the detailed sequence has been presented to the learner (Reigeluth & Stein, 1983).

The second component of the 4C/ID model consists of supportive information. This phase consists of the instructor continuing to assist the learner with the development of mental models and providing the necessary support for their learning and performance. Instructors provide a great deal of support to learners early in the instruction as they are learning a new task and the instructor gradually diminishes their level of support so that by the end the learner is able to perform the task independently with no additional assistance. "This supportive information provides the bridge between what learners already know and their work on the learning tasks" (van Merriënboer et al., 2002, p. 46).

Examples of instructional strategies that promote supportive information may include the following:

- Asking the learners to compare and contrast different ideas pertaining to the task being presented.
- Asking the learners to make predictions of what may happen next depending on the solution that they choose to implement.
- Asking the learners to provide a generic description of the problem that is currently being presented to them.
- Asking the learners to provide a brief suggestion for how to organize the information that is being presented.
- Asking the learners to provide a more detailed suggestion by providing a list of steps of how to approach the problem.
- Having the instructor model how to perform a particular task.

Within the supportive information component, the instructor may deem it acceptable to demonstrate to the learner how to perform a particular task. Modeling how to perform a task provides a bridge between the learning task phase and the supportive information phase of the 4C/ID model. van Merriënboer et al. (2002) suggest that in order to be most effective at stimulating a learner's ability to think critically and develop problem-solving skills the example that is being modeled should be "interspersed with questions that require the learners to think critically about the problem-solving process that is being modeled" (p. 50).

Another element of supportive information to be considered is feedback. Instructors should be prepared to provide learners with continual immediate feedback as they are learning a new task. As the learner becomes more familiar with the task at hand, the instructor will begin to diminish the amount of feedback that is being provided. Feedback can be provided in the form of one-on-one discussions between the learner and the instructor, group discussions, written feedback, and debriefing sessions. Feedback sessions are most successful if the instructor is able to promote reflective practice amongst the learner so that they can critique the quality of their work and their approach to problem solving (van Merriënboer et al., 2002; Collins, Brown & Newman, 1989; Kluger & DiNisi, 1998).

The third component of the 4C/ID model is procedural information. Support is provided to learners within this component precisely when they need it and is a prerequisite to learning recurrent aspects of learning tasks. Instructors typically provide guidance to the learner on how to complete the routine tasks by providing them with "directive step-by-step instruction that is given by an instructor, a job aid, a quick reference guide, and so forth" (van Merriënboer, 2007, p. 79). Providing procedural instruction precisely when a learner needs it is also referred to as *just-in-time* information.

The fourth component of the 4C/ID model involves part-task practice. This component consists of the learner being all of the units or components of instruction together and practicing the task in its entirety. Within this component, the learner is expected to practice selective recurrent aspects of the task until he or she reaches a level of automaticity (van Merriënboer, 2007). Learners should engage in short part-task practice sessions that are spaced out over time as opposed to lengthy concentrated sessions. van Merriënboer et al. (2002) suggest that part-task practice sessions should be "intertwined with the learning tasks because this provides distributed practice and also enables the learners to relate the recurrent constituent skill to the whole complex skill" (p. 55).

It is important to remember that decisions we make as instructors pertaining to instructional sequencing are critical to the success of the learner in mastering the learning material. Instructors teaching in blended learning environments are challenged with determining what types of instructional support their learners need and which types of instructional strategies and instructional mediums are most appropriate for providing support. Drawing from the premises that guide conditions-based learning theory, several challenges come to mind when teaching in a blended learning environment (Table 1).

Challenges that many instructors may face while promoting complex learning within a blended environment include the following:

- Determining which activities will be taught during face-to-face instruction as opposed to online instruction.
- Providing prompt feedback to learners throughout the complex learning process.

Table 1. Challenges encountered adhering to the guiding premises of conditions-based theory in a blended-learning environment

Premises	Challenges
There are different types of learning outcomes, and each type of learning calls for different types of instruction	• Which learning activities are going to be presented in a face-to-face learning environment? • Which learning activities are going to be presented in an online learning environment? o Will the online format include asynchronous or synchronous learning activities • How are learning outcomes being assessed? • In what learning environment will learning outcomes be assessed?
Instructional sequencing relies upon relationships among the various learning outcomes	• Are instructional outcomes introduced during face-to-face instruction? • How will the instructor follow up with learners to determine their progress? • Will supportive information be provided in both face-to-face and online learning formats? • How frequently is feedback provided to learners?
Instructional strategies should facilitate the internal processes of learning	• How to assess students' learning? • Which instructional strategies best facilitate the internal processes of learning in a blended environment? o Which strategies are more suitable for face-to-face instruction versus online instruction? • How will feedback be provided to learners?

- Integrating enough time for practice in order for learners to familiarize themselves with the course material and reach a level of automaticity.
- Determining when to focus on part-task versus whole-task instruction.
- Selecting the appropriate instructional media to delivery instruction in both face-to-face and online environments.

The learning task component of the 4C/ID model encourages instructors to assist learners with organizing information in simple to complex tasks. Complex tasks are broken down into smaller components and presented to learners with a high degree of learner support. Key objectives within this component of the model are presenting instruction using a scaffolded approach, incorporating supplantive instructional strategies to provide learners with a general overview of the task being presented and gradually elaborated upon, and beginning to present opportunities for part-task practice. Instructional activities that are often incorporated within the learning task presentation require the learners to work with the constituent skills that contribute to the complex skill being taught. Tasks are broken down and presented to learners moving from simple to complex skills over time. Instructors often model examples for learners by demonstrating how to complete various tasks and then having the learner practice on their own. Worked examples are also used to promote the scaffolding of mental models during the learning process (van Merriënboer & Kirschner, 2013). It is important for the instructor to determine which instructional activities may be best suited for face-to-face instruction and which strategies a learner may feel more comfortable with participating in with more emphasis being placed on self-directed learning.

Supportive information needs to be woven into the learning process where the instructor is available to the learner to provide feedback and continue to assist with the construction of mental models. Within this component of complex learning, the instructor works with the student to build off of prior knowledge. As the instruction begins to grow in complexity, from simple to more complex tasks, the instructor is available to provide specific feedback on the smaller components of instruction that are being presented. In order to assist learners with constructing mental models, the instructor will begin bridging the foundational knowledge that was presented as a learning task to the expected performance outcomes that have been set for the learner. The amount of support that is provided within this component of complex learning will vary depending on the task as well as the individual learner. Instructional strategies may include prompting students to begin making connections and establishing relationships amongst the various sub-tasks that are being presented, presenting or demonstrating examples, distinguishing between different theories that are relevant to the complex task or making predictions of future states (van Merriënboer & Kirschner, 2013).

Supportive information is provided throughout the entire learning process. The expectation with teaching a complex task is that the instructor will reduce the amount of support as the learner begins to demonstrate competency. The goal is for the instructor to participate in this fading process so that eventually the learner is able to performance the complex task on their own without any guidance or support (van Merriënboer, et al., 2002).

Procedural information encompasses providing feedback to learners as needed throughout the learning process. Instructors may deem it necessary to provide feedback early in the instruction while the learner is engaged with the simple to complex breakdown of the learning tasks. The goals of procedural information to provide just-in-time training for learners in order to prevent them from making recurring mistakes (van Merriënboer et al., 2002). Instructors will intervene when they observe a learner making a mistake or if the learner has sought them out for assistance. Procedural information is another form of support that is provided to learners that is specific per recurrent constituent skill. van Merriënboer and Kirschner (2013) suggest that procedural support can be provided to learners in the form of job aids, information displays, demonstrations, and instant corrective feedback.

Practice sessions need to be interspersed throughout the entire learning process. A challenge for instructors teaching within blended learning environments is being able to determine when to focus on part-task versus whole-task instruction. It is imperative that instructors are able to provide prompt corrective feedback to their learners' and have a good understanding of where their learners are in terms of proficiency of performance. If learners have demonstrated competency, or even mastery, of a particular sub-task, the instructor may choose to have learners focus solely on the sub-tasks that they are experiencing difficulties mastering. Practice opportunities should be developed for both face-to-face and online environments so that there is a degree of flexibility for the learner to practice.

Solutions and Recommendations

The biggest decision an instructor teaching within a blended learning environment will face is determining how to divide the instruction of complex tasks between face-to-face instruction and online instruction. Learning tasks is the first component of the 4C/ID Model and warrants organizational skills on behalf of the instructor. It is within this component that the instructor designs the learning tasks that will be taught, identifies how tasks will be broken down into simple sub-tasks or learning units and sequences the aforementioned sub-tasks. Performance objectives are presented to the learner within this component early in the instruction so that expectations are clear as to what the learner is striving to complete by the end of the course.

Performance objectives should be presented and reiterated regularly in both face-to-face and online settings. Learners should be pre-briefed at the beginning of every instructional session in order to recap what the goals are for the session and what they have already accomplished. Pre-briefings can be used to assist learners with organizing information and constructing mental models. By reviewing what has already been accomplished, instructors are drawing from prior knowledge and ensuring that learners understand where they are at in the process. Performance objectives should be included with every online activity that is prepared for learners' to complete individually.

Modeling of complex tasks can be presented to learners in face-to-face learning environments by demonstrating how to perform or complete a complex task. Learners have an opportunity to watch the instructor and ask questions. Prerecorded videos can be provided to learners in online asynchronous learning environments. This will allow the flexibility for learners to view videos at their leisure. Online group discussion forums can be made available for learners to pose questions to the instructor that they may have after watching the video online. This is a great way for the instructor to gauge their learners' understanding of the material and potential difficulties they may experience throughout the course of instruction. The online discussion forums also allow for students to see what challenges their peers are encountering along with the instructor responses. While one or two students may pose a question to the instructor, other students may have encountered the same challenge and failed to seek advice on the matter.

One of the challenges with teaching complex tasks is that instruction will be variable depending upon the learners' abilities. Tasks are broken down and presented from simple to complex. While this allows for instructors to focus on particular sub-tasks that a learner may experience difficulty mastering, instructors cannot assume that all learners will experience difficulty with the same sub-tasks. The modeling of these sub-tasks is best suited for an online learning environment that can be self-regulated by the learner. Learners can focus on watching videos or instruction pertaining to the areas that are relevant to them. This allows for learner-centered customization of instruction that an instructor may have difficulty achieving in a traditional face-to-face classroom environment with multiple learners. The use of videos can allow for students to replay and watch demonstrations multiple times if needed.

Supportive information can be provided to learners in a variety of different formats. If an instructor is teaching complex learning within a blended learning environment, it is suggested that they provide supportive information in both face-to-face and online formats so that students can access information as they need it. Job aids can be presented in both traditional and online class formats. One form of supportive information involves the instructor prompting the students to answer particular questions prior to moving onto the next phase of instruction. The instructor may ask learners to provide their own examples to demonstrate particular concepts being taught within the course or distinguish between multiple theories to demonstrate their understanding. These prompts can be lead as a discussion in both a face-to-face classroom environment and a synchronous online environment where students are online at the same time as their instructor.

Online quizzes could also be developed for learners to practice and see their progress with how they are organizing the course information. Online quizzes could be used in an instructional environment but could be most beneficial to students in an asynchronous online learning environment where the instructor is not necessarily readily available. Quizzes could be programmed to provide learners with immediate feedback based on the answers that they provide. The instructor could make recommendations to different learners as to which instructional modules or quizzes they should practice based on their progress made during the class. This would allow the instructor to engage in the fading of feedback and customize instruction where learners do not necessarily have to complete the same online modules.

Part-task practice is the fourth component of the 4C/ID Model and needs to be integrated throughout the entire process of complex learning. Independent and dependent practice sessions should be provided to learners in a variety of different formats. van Merriënboer and Kirschner (2013) purport that independent part-task practice is easy to implement because it:

- Concerns only one well-defined recurrent skill or routine, with no need to organize the contents of the program for each individual learner.
- Often tasks the form of individual practice, with no need to form groups of learners on the fly.
- Can often be supported with drill-and-practice off-the-shelf computer programs, with no need to schedule teachers or instructors (p. 262).

During independent part-task practice, the learner decides which tasks he or she would like to focus on. Providing feedback during the learning tasks and procedural information phase promptly will help learners begin to self-assess their performance. Independent part-task practice is controlled entirely by the learners. They decide when they are going to practice, which tasks they are going to focus on, how much time they are going to allocate to different tasks, and the frequency of continued practice sessions. The onus is placed on the learner and does not require the instructor to create any instructional activities for them to engage in.

While the majority of part-task practice sessions will most likely be independent in nature, instructors must be weary of the fact that continual practice leads to permanence. Checkpoints need to be placed within the instruction where learners are required to demonstrate their knowledge and skills in order for instructors to provide feedback. This will prevent learners from establishing bad habits or making recurring mistakes that reach automaticity due to frequent practice sessions that have not been monitored or observed. It is suggested that instructors provide opportunities for dependent part-task practice sessions early in the instruction when learners are more apt to make mistakes. Like all other forms of supportive information that is provided to learners along the way, dependent practice sessions can diminish over time as learners begin to demonstrate independence and competence learning the material.

Dependent part-task practice sessions can take multiple forms. Class time can be sent aside in tradition face-to-face learning environments where learners are provided with free time to practice familiarizing themselves with the tasks being taught. Instructors can be present during the session to provide corrective feedback if solicited by students. Additional guidelines and supportive information can also be provided to learners during the initial dependent part-task practice sessions to ensure that they understand what they should be practicing and where they should be at in terms of competency at various stages of instruction. Guidelines presented during part-task practice sessions are necessary for assisting learners with the organization of information and the construction of mental models.

Dependent part-task practice sessions can also be organized for learners to interact and practice with a peer or with a small group of students. This provides learners with a collaborative learning environment and opportunities to provide immediate feedback to one another. Dependent sessions can also be established for online learning environments. With today's technology, instructors have the capabilities to communicate with students using video chat software. It is important that the instructor is able to check in and observe learners intermittently to ensure that they are grasping the new tasks that they have been practicing. Part-task practice sessions not only assist with increasing the learners' familiarity with the task or subject at hand, but it also allows for the instructor to interject and correct learners' when they are struggling with a particular task.

Learners can demonstrate the skills they are practicing to their instructor through the use of video chat. This would allow the learner to interact with their instructor in a synchronous learning environment and be provided with immediate corrective feedback. Instructors could host online office hours or tutorial sessions where they could be made available to assist learners with any challenges they were encountering during their independent part-task practice sessions. Instructors could also provide learners with delayed corrective feedback in an asynchronous learning environment by asking learners to video tape themselves performing a task or by submitting a written assignment depending on the subject matter being taught. While the instructor may not be able to provide instant feedback, they could still provide customized feedback to the learner without having to schedule a face-to-face meeting.

The same type of feedback could also be incorporated within a group setting, Small groups of learners could be provided with a group discussion forum where they could post videos, questions, and suggestions to one another and seek feedback. This could be done in both synchronous and asynchronous learning environments. A challenge with this particular strategy is that the instructor must feel comfortable with their learners' progress in learning the material. This is not a good strategy is learners are too confused with the course material and are highly dependent on supportive information. Learners could provide inaccurate feedback and begin making mistakes. The instructor needs to use his or her discretion if selecting this instructional activity for group feedback and practice-sessions.

Regardless of whether learners participate in independent or dependent part-task practice sessions, instructors should be reminding learners of the importance of practice. Instructors need to be cognizant of the challenges that learners often experience while learning new material. Practice-sessions need to be woven within the instruction intermittently between various sub-tasks so that learners can begin practicing the simple tasks and later progress to the more complex. Instructors should also try to establish a routine for following up with students to see how comfortable they are becoming with the learning material, the amount of time they have spent practicing, and additional areas where they could benefit from corrective feedback.

FUTURE RESEARCH DIRECTIONS

Empirical studies of how the 4C/ID model has been applied in a variety of different training environments teaching complex learning have been conducted over the years (van Merriënboer et al., 2002; van Merriënboer & Kirschner, 2013) suggesting that the four components (learning tasks, supportive information, procedural information, and part-task practice) are all amendable in any learning environment. Many instructors face the challenge of allocating enough time in their instruction for students to engage in achieving proficiency while learning a complex task. van Merriënboer and Kirschner (2013) preface the 4C/ID model by stating that teaching complex skills takes an extended period of time. The 4C/ID model was not designed to teach an individual how to master a complex task within one instructional meeting. The various components of the 4C/ID model can be stretched out to cover several months or even years depending on the task. Many of the studies focusing on the application of the 4C/ID model have appeared to focus on either face-to-face instruction or online instruction. Further research is needed that not only focuses on teaching complex learning within a blended learning environment, but also provides insight as to the amount of time required to progress through the model using the blended approach.

A premise of conditions-based learning theory is that different learning outcomes warrant different instructional strategies. We are able to determine the success of instruction by the measurable outcomes it may produce. There is a paucity of empirical studies that provide evidence of how evaluative methods were aligned with the 4C/ID model. While we know that there are four components pertaining to complex learning (learning tasks, supportive information, procedural information, and part-task practice), it is unclear as to how an instructor is able to determine when a learner has reached success with any of the four components. Demonstrating how assessment can be integrated within the complex learning framework will only continue to justify the utility of the 4C/ID model when teaching complex tasks.

CONCLUSION

The teaching of complex learning will always pose a certain degree of challenges to instructors due to the level of difficulty of the task, the individual capabilities of the learners, and the environment within which the instruction is occurring. We can only assume that the demand for blended learning environments will continue to grow as instructional technology advances. Educators must be equipped with the necessary tools to address the four components of complex learning during their time with their learners.

Instructors must be adaptable to providing guidance and feedback in a variety of different instructional environments. They need to be careful when selecting instructional media and take into account the logistics involved when teaching in blended learning environments. Instructional strategies that are successful in traditional face-to-face instructional environments do not necessarily yield to being successful in online environments. This chapter aimed at identifying some of the challenges that instructors face while teaching complex tasks within a blended learning environment.

Instructional strategies that are adaptable to the 4C/ID Model were introduced to provide guidance to instructors and break down the process of learning into four components: learning tasks, supportive information, procedural information, and part-task practice (van Merriënboer & Kirschner, 2013). The four components serve as checkpoints for instructors to help promote a scaffolded approach to learning complex tasks that alleviates any intrinsic or extraneous load that may hinder learner performance. The incorporation of instructional design models to teach complex learning to students will better prepare learners to deal with the complexity of learning while adhering to sound instructional design practices.

REFERENCES

Bielawski, L., & Metcalf, D. (2003). *Blended elearning: Integrating knowledge, performance support, and online learning*. Amherst, MA: HRD Press.

Carmen, J. M. (2002). *Blended learning design: Five key ingredients,* Retrieved from http://www.agilantlearning.com/pdf/Blended%20Learning%20Design.pdf

Collins, A., Brown, J. S., & Newman, S. (1989). Cognitive apprenticeship: Teaching the craft of reading, writing, and mathematics. In L. B. Resnick (Ed.), *Knowing, learning, and instruction: Essays in honor of Robert Glaser* (pp. 454–494). Hillsdale, NJ: Lawrence Erlbaum Associates.

Kluger, A., & DiNisi, A. (1998). Feedback interventions: Toward the understanding of a double-edged sword. *Current Directions in Psychological Science*, *7*(3), 67–72. doi:10.1111/1467-8721.ep10772989

Laurillard, D. (1993). *Rethinking university teaching: A framework for the effective use of technology*. New York: Routledge.

Lim, D. L., & Morris, M. L. (2009). Learner and instructional factors influencing learning outcomes within a blended learning environment. *Journal of Educational Technology & Society*, *12*(4), 282–293.

Reigeluth, C. M., & Stein, F. (1983). The elaboration theory of instruction. In C. M. Reigeluth (Ed.), *Instructional design theories and models: A new paradigm of instructional theory* (Vol. 2). Mahwah, NJ: Lawrence Erlbaum Associates.

Richey, R. C., Klein, J. D., & Tracey, M. W. (2011). *The instructional design knowledge base: Theory, research, and practice*. New York: Routledge.

Smith, P. L., & Ragan, T. J. (2005). *Instructional design* (3rd ed.). Hoboken, NJ: Wiley.

van Merriënboer, J. J. G. (2007). Alternate models of instructional design: Holistic design approaches and complex learning. In R. A. Reiser & J. V. Dempsey (Eds.), *Trends and issues in instructional design and technology* (2nd ed., pp. 72–81). Upper Saddle River, NJ: Pearson Prentice Hall.

van Merriënboer, J. J. G., & Kirschner, P. A. (2013). *Ten steps to complex learning* (2nd ed.). New York: Routledge.

van Merriënboer, J. J. G., Clark, R. E., & de Croock, M. B. M. (2002). Blueprints for complex learning: The 4C/ID model. *ETR&D*, *50*(2), 39–64. doi:10.1007/BF02504993

ADDITIONAL READING

Bonk, C. J., & Graham, C. R. (Eds.). (2006). *Handbook of blended learning: Global perspectives, local designs*. San Francisco: Pfeiffer Publishing.

Bonk, C. J., Wisher, R. A., & Lee, J. (2003). Moderating learner-centered e-learning: Problems and solutions, benefits and implications. In T. S. Roberts (Ed.), *Online collaborative learning: Theory and practice* (pp. 54–85). Hershey, PA: Idea Group Publishing. doi:10.4018/978-1-59140-174-2.ch003

Bonk, C. J., & Zhang, K. (2008). *Empowering online learning: 100+ activities for reading, reflecting, displaying, & doing*. San Francisco: Jossey-Bass.

Brunken, R., Plass, J. L., & Leutner, D. (2003). Direct measurement of cognitive load in multimedia learning. *Educational Psychology*, *38*(1), 53–62. doi:10.1207/S15326985EP3801_7

Hannafin, M. J., & Land, S. M. (1997). The foundations and assumptions of technology-enhanced, student-centered learning environments. *Instructional Science*, *25*(3), 167–202. doi:10.1023/A:1002997414652

Hannafin, M. J., & Land, S. M. (2000). Technology and student-centered learning in higher education: Issues and practices. *Journal of Computing in Higher Education*, *12*(1), 3–30. doi:10.1007/BF03032712

Hill, J., & Hannafin, M. J. (2001). Teaching and learning in digital environments: The resurgence of resource-based learning. *ETRD*, *49*(3), 37–52. doi:10.1007/BF02504914

Kester, L., Kirschner, P. A., van Merriënboer, J. J. G., & Baumer, A. (2001). Just-in-time information presentation and the acquisition of complex cognitive skills. *Computers in Human Behavior Journal*, *17*(4), 373–391. doi:10.1016/S0747-5632(01)00011-5

Mayer, R. E., & Moreno, R. (2002). Aids to computer-based multimedia learning. *Learning and Instruction*, *12*(1), 107–119. doi:10.1016/S0959-4752(01)00018-4

Mayer, R. E., & Moreno, R. (2003). Nine ways to reduce cognitive load in multimedia learning. *Educational Psychology*, *38*(1), 43–52. doi:10.1207/S15326985EP3801_6

Merrill, M. D. (2002). First principles of instruction. *ETR&D*, *50*(3), 43–59. doi:10.1007/BF02505024

Nicaise, M., Gibney, T., & Crane, M. (2000). Toward an understanding of authentic learning: Student perceptions of an authentic classroom. *Journal of Science Education and Technology*, *9*(1), 79–94. doi:10.1023/A:1009477008671

Osguthorpe, R. T., & Graham, C. R. (2003). *Strategies for building blended learning*. Alexandria, VA: ASTD Learning Circuits.

Quinn, C. N. (2005). *Engaging learning: Designing e-learning simulation games*. San Francisco, CA: Pfeiffer.

Renkl, A. (1997). Learning from worked-out examples: A study on individual differences. *Cognitive Science*, *21*(1), 1–29. doi:10.1207/s15516709cog2101_1

Renkl, A., Atkinson, R. K., Maier, U. H., & Staley, R. (2002). From example study to problem solving: Smooth transitions help learning. *Journal of Experiential Education*, *70*, 293–315.

Sweller, J., & Chandler, P. (1994). Why some material is difficult to learn. *Cognition and Instruction*, *12*(3), 39–60. doi:10.1207/s1532690xci1203_1

Sweller, J., van Merriënboer, J. J. G., & Paas, F. G. W. C. (1998). Cognitive architecture and instructional design. *Educational Psychology Review*, *10*(3), 251–296. doi:10.1023/A:1022193728205 van Merriënboer, J. J. G., Kirschner, P. A., & Kester, L. (2003). Taking the load off a learner's mind: Instructional design for complex learning. *Educational Psychologist*, *38*(1), 5–13. doi:10.1207/S15326985EP3801_2

van Merriënboer, J. J. G., Schuurman, J. G., de Croock, M. B. M., & Paas, F. G. W. C. (2002). Redirecting learners' attention during training: Effects on cognitive load, transfer test performance and training efficiency. *Learning and Instruction*, *12*(1), 11–37. doi:10.1016/S0959-4752(01)00020-2

van Merriënboer, J. J. G., & Sweller, J. (2005). Cognitive load theory and complex learning: Recent developments and future directions. *Educational Psychology Review*, *17*(2), 147–177. doi:10.1007/s10648-005-3951-0

Watkins, R. (2005). Developing interactive e-learning activities. *Performance Improvement*, *44*(5), 5–7. doi:10.1002/pfi.4140440504

KEY TERMS AND DEFINITIONS

Asynchronous Learning Environment: A group of learners enrolled in the same class do not have to participate online at the same time.

Constituent Skills: Subskills of a complex skill that are considered to be components of the skill as a whole.

Instructional Strategy: The instructional strategy entails the medium that will be used to deliver instruction.

Mental Model: A representation of how a task is organized.

Modeling: Demonstrating thought processes or tasks to a learner.

Scaffolding: Learning support that is provided during practice of learning tasks.

Sequencing: The ordering of instructional events.

Synchronous Learning Environment: A group of learners enrolled in the same class are required to participate in online activities at the same time.

This work was previously published in Practical Applications and Experiences in K-20 Blended Learning Environments edited by Lydia Kyei-Blankson and Esther Ntuli, pages 56-68, copyright year 2014 by Information Science Reference (an imprint of IGI Global).

Chapter 36
Shifting a Face-to-Face (F2F) Course to the Blended Environment:
A Framework for Transference

Tena B. Crews
University of South Carolina, USA

Kelly Wilkinson
Indiana State University, USA

Alexandria Howard
University of South Carolina, USA

ABSTRACT

Many educational experts predict that in the future blended learning will become far more common than traditional Face-to-Face (F2F) or online learning. With this in mind, instructors are being asked or required to move F2F courses to a blended environment. When doing so, there are a variety of issues to consider. Thus, a framework for transference is necessary. This framework includes the seven principles for good practice for undergraduate education. This chapter covers the essential topics to help educators conduct a successful transference and uphold the quality of their courses.

INTRODUCTION

Blended learning is utilizing teaching practice that combine teaching methods which incorporate both face-to-face and online components (Blackboard K-12, 2009; Watson, 2008). Other terms such as "hybrid learning, distributed learning, connected learning, and outside-inside learning" (Eiter & Woll, 2011, p. 2) are used to identify blended learning. The challenge is to find the right mix of these two components for a successful blended learning environment (Kerres & DeWitt, 2003). This chapter will help educators have a clearer understanding of strategies for delivering content in a blended environment based on Chickering and Gamson's (1987) seven principles for good prac-

DOI: 10.4018/978-1-4666-8246-7.ch036

tice in undergraduate education. Information will also be provided to help educators learn to modify course content for blended delivery and engage students in the learning process. The chapter will be based on the following three objectives:

1. Compare and contrast learning methods for the blended environment.
2. Describe strategies for modifying course content for blended delivery.
3. Implement effective teaching methods in a blended environment.

The connection between F2F and online components in blending learning is necessary for a smooth transition. Good facilitation skills are essential elements; however, there are other key factors. It is essential to make sure the layout of the online course matches the instructor's teaching style. This will make it easier for the facilitator to guide students through the content. It is also important to evaluate course content and then look at the delivery methods to be used to deliver content. When moving the content from a F2F environment to a blended environment, these questions should be asked:

- What do I want the student to learn?
- What is the best way to present the content?
- How can I use the strengths of the online medium, while minimizing the weaknesses?
- How can I create interaction – student/content, student/student, student/instructor?
- How will I assess the success of the learning?
- What process will I use to assess the course structure and make appropriate changes?

In answering the preceeding questions, instructors perform a course audit. This audit includes analyzing the content to help determine how to answer each question. When changing course delivery from F2F to blended, the instructor cannot simply create PowerPoint presentations and hope students will review them, then read the book, and find success in learning. Instructors must also reflect on how they traditionally teach their F2F classes and how they will alter their teaching for the blended environment and connect all the elements.

BACKGROUND

It is important for instructors to do their homework before converting a course from a F2F environment to a blended environment. There are many factors to consider during the transference process. Moving content to a blended environment is not simply about transferring content - it is about transforming content.

The instructor should utilize the seven principles for good practice in undergraduate education (Chickering & Gamson, 1987) as they teach in any environment. The seven principles are listed below.

- Encourage contact between students and the instructor.
- Develop reciprocity and cooperation among students.
- Encourage active learning.
- Give prompt feedback.
- Emphasize time on task.
- Communicate high expectations.
- Respect diverse talents and ways of learning.

However, the instructor should keep in mind that the following items are crucial to the success of the blended course. A quality blended course should:

- Be student centered.
- Combine the best elements of online and F2F learning environments.
- Be well-organized, easy to navigate and have an aesthetic design which presents and communicates course information clearly throughout the course.

Table 1. F2F components: sample storyboard

	SELF (Student)	INTERACTION		
Activity/Test/Etc.	**S**	**S2S**	**S2I**	**I2S**
• Instructor Lectures.				X
• Class discussion.		X		X
• Lab work.	X			
• Students complete tutorials and submit for evaluation.			X	
• Students research in groups.		X		
• Student presentations.		X	X	
• Instructor formative feedback.				X
• Tests.			X	
• Etc.				
• Etc.				

(Stealth Consulting, 2008)

- Include a dynamic course syllabus that identifies and clearly delineates the role that the online environment will play in the overall course.
- Address accessibility issues throughout the course.

Course Audit

To understand the learning methods for the blended environment and implement effective teaching strategies, a course audit needs to be performed. The storyboard below is helpful in deciphering how to transfer best F2F components effectively. The instructor should first complete the storyboard for their F2F course to determine the self-paced components and the interactions involved in the course. Interactions include Student-to-Student (S2S), Student-to-Instructor (S2I), and Instructor-to-Student (I2S). Only then can they consider how to transfer the components and processes (see Table 1).

Once the storyboard is completed based on the F2F course, the instructor must then ask themselves some questions before transferring the course to a blended environment. These questions may include:

- What content is best to address F2F and which content can be addressed online?
- How will contact and interaction between students and the instructor be accomplished?
- How will students work cooperatively and actively?
- How will feedback be provided in a timely manner?
- How will students be encouraged to spend an appropriate amount of time on task?
- How will expectations be communicated?
- How will diversity and differing learning styles be addressed

The use of previous syllabi, course storyboarding, and answers to the questions above will provide a course audit that will give instructors a detailed analysis of the components of the course and good fit for delivery.

The online component of blended learning removes the traditional boundaries of time and location to offer students flexibility not often found in other academic situations. To determine which tools to use to develop a blended course, it is essential to consider the learning outcomes, what level of performance must be achieved, and how achievement will be measured. A delivery method must be selected which allows for the accomplishment of the learning outcomes. If performance cannot be measured with a particular delivery method, then the delivery method may be unsuitable.

The Four Os of Course Design

When transferring course content from a F2F learning environment to a blended environment, consider the "Four Os" of course design. These include origin, organization, orchestration, and outcomes assessment (McConnell & Schoenfeld-Tachner, 2001).

- **Origin:** Audience analysis and suitability of course content for blended delivery which include analyzing audience, and evaluating the suitability of course content for blended delivery.
- **Organization:** Appropriate delivery system and organization of the course which includes choosing delivery system, getting organized, and appropriate online course navigation.
- **Orchestration:** Develop materials and revise as necessary which includes developing materials, testing materials, continually editing and modifying, and keeping pace with emerging technologies.
- **Outcomes Assessment:** Assess and evaluate the course which includes assessing and evaluating the course and learning outcomes.

When contemplating origins, remember the audience is the students. Instructors must consider issues such as what is the appropriate delivery method - synchronous or asynchronous; how long students will have to take the course; and the course content. This will determine how the content is presented. The instructor must ensure the content is appropriate for blended delivery. Reviewing the content to ensure students can master the outcomes is essential. It may be easier to create a new course than to convert a F2F course. This must be evaluated early to make sure the content can be transferred to the blended environment.

Organization is also an important consideration in preparing content for blended instruction. The first issue to address when assessing organization is to choose how to deliver the course and what is needed to successfully deliver course content. First, the instructor should make a list of important characteristics such as controlling student access and ease of access to course content. The instructor must also decide upon necessary features such as test-generating capabilities, and other features that are deemed important (i.e., whiteboard, space for student presentations, etc.). The instructor must also determine what collaborative tools to incorporate in addition to the delivery system and how the students will navigate the online and F2F system.

The organization and delivery of the content are driven by questions such as: 1) How should the course be organized? 2) What components should be online and or F2F? The transference process may begin by creating a detailed "to-do" list and writing down the goals to accomplish, and then breaking them down into small manageable components. It is then that the orchestration of putting the pieces together and building the course that reflects the instructor's teaching style, while meeting the course outcomes and students' needs must begin.

When preparing materials, instructors should keep in mind that they do not have to reinvent the wheel. The goal is to create a blended class, not a F2F and online course. The key word is "blended." The two components should appropriately support each other. For example, chat rooms and discussion boards can be used to simulate a classroom environment, but it requires advanced planning. For example, a list of content questions should be prepared before engaging in an online chat, in case students need prompting to stay on task. Acknowledging the textbook for support information needed beyond the lecture is critical to integrate, blend, the content. Therefore, if students engage in an online discussion, bring it into the classroom component as well.

Have others test the materials before going live. This feedback will provide valuable information and ideas for improvement. Feedback, particularly from students is also essential to continue to improve and edit the course or methodologies to enhanced learning. Student feedback provides realistic data based on what works within the course and what does not work.

Orchestration also involves keeping pace with emerging technologies which is also critical. Updated technologies can be used to enhance your course content and present material in ways that will accommodate a variety of learning styles and enhance the F2F component. However, simply using technology just because it is available or too many bells and whistles can become a distraction from learning course content.

Teaching innovations need to be tested in order to validate academic outcomes and benefit. This is especially true in educational settings. Ongoing assessment and evaluation are critical to success. In order to understand students' level of learning and to demonstrate academic rigor, instructors must gather objective data such as scores on exams and subjective data such as student feedback and preference for learning.

Table 2. Traditonal and technology related delivery methods

Print	E-text, e-journals, textbooks, online databases, etc.
Audio/Video	Voice only, music, streaming video,, virtual classrooms, electronic whiteboard, etc.
Communication	Asynchronous: email, Listservs, discussion boards, blogs, wikis, etc. Synchronous: online chat, virtual office hours, videoconferencing, etc.

MAIN FOCUS OF THE CHAPTER

Principles of Good Practice in Undergraduate Education

As this chapter is based on the following three objectives and the seven principles for good undergraduate education, this section is divided into the seven sections based on the principles. The objectives include:

- Compare and contrast learning methods for the blended environment.
- Describe strategies for modifying course content for blended delivery.
- Implement effective teaching methods in a blended environment.

Principle 1: Encourage contact between students and the instructor.

Instructors must consider how to accomplish the transference of the content from a F2F environment to a blended environment to assist students in achieving learning outcomes. Common delivery methods include both traditional and technology-related methods to provide content related information. Most blended instructors use a combination of both. Table 2 provides examples of traditional and technology-related delivery methods.

It is important to compare and contrast synchronous and asynchronous methods of delivery and decide upon the most appropriate way to provide content and provide for engagement in the blended environment. Synchronous learning is defined as a group of individuals learning at the same time as they work toward a common goal or outcome. This type of learning is conducted simultaneously in a real-time online environment. Synchronous basically means "at the same time," but not in the same place. The instructor and students can participate in a virtual classroom while they communicate and complete activities. Synchronous learning typically includes some type of videoconference software, virtual classroom, or chat areas in which communities of learning are developed.

Synchronous learning typically involves student engagement and the motivation of learners. Within the synchronous learning environment, users have the opportunity to get to know each other, be involved in real-time, quick response systems, and work in groups to exchange ideas.. However,, the instructor must schedule a time that is convenient for all students to meet at the same time. This is not as difficult in a blended environment as a pure online environment because students have a designated course time. The instructor must decide if it is necessary to meet F2F and synchronously online to achieve the perfect blend of learning.

Many instructors use asynchronous learning in addition to F2F learning to create their blended learning environment. Asynchronous learning occurs over time in which the instructor and students do not interact at the same time. Like synchronous learning, the instructor and students are not in the same place; however, with asynchronous learning there is a time delay in the communication. For example, an instructor may post course content which students access at a later time. Learning is based on individuals being online at various times reviewing content or submitting assignments. Instructors may make it challenging to engage students and develop a community of learners outside of the classroom with asynchronous learning. However, asynchronous learning is designed to provide students with the ultimate anytime, anywhere learning environment. This type of environment is designed to be more of a "student responsibility" environment in which course information is provided to students and it is their responsibility to read, analyze, and learn the information. Asynchronous learning can be effectively implemented in a blended environment when the instructor brings the discussion, analysis, or whatever is assigned back to the F2F classroom to take learning to a higher level.

Determining the appropriate blend of F2F and synchronous or asynchronous learning is essential to the livelihood of the course. Both methods have their advantages and disadvantages, but must be investigated to determine the likelihood of success in a blended environment.

Whether using synchronous or asynchronous methods in addition to the F2F environment in the blended classroom, guidelines must be developed. These guidelines must include both instructor and student guidelines and they must be communicated clearly. These guidelines enhance the communication process and outline expectations for all stakeholders. For example, students should be provided with due dates for communication and the submission of assignments/projects whether engaged F2F, synchronously, or asynchronously.

For example, in an asynchronous environment, students may be expected to participate in online discussions through some type of discussion board. Guidelines must be set so students understand what constitutes "proper discussion." For example, a student's response should enhance the discussion and should not simply include responses such as "I agree" or "That is a good idea" or "Ditto." Students should be provided with examples of appropriate responses that lead to further discussion.

In a synchronous environment, additional guidelines may be necessary. For example, if holding a virtual classroom in which all students are "live" in the same online classroom at the same time (i.e., using Adobe Connect Professional or another type of virtual meeting space), technology tools may be available within the virtual classroom that allow students to electronically raise their hands and use a camera/microphone so they can be seen and heard. Typically, the more technology involved in the virtual classroom, the more guidelines need to be developed and communicated to students. However, remember to connect the synchronous or asynchronous learning to the F2F classroom as well.

As noted earlier, synchronous learning is typically less common for the online component in a blended course as there is also a F2F component. However, asynchronous learning provides instructors an opportunity to record training sessions for students and not schedule a predetermined time to review the information. Instructors incorporating asynchronous learning can broadcast information through some type of audio/video technology tool so students can access the information at anytime, anywhere they have Internet access. No matter what the method, the instructor must make sure guidelines for learning are provided to all students.

Examples of asynchronous tools include the following. These are all considered asynchronous as students do not have to be logged in to a computer or on their phone when the sender sends the message. The student can check the message at their own time paying particular attention to set deadlines.

Email: The most popular and most easily used asynchronous communication tool is email. When teaching and learning in the online environment, instructors and students may use email as a main way of contacting and communicating with each other. It is important to be timely in such communication to alleviate confusion and frustration. Instructors should establish a routine and explain their routine to students (i.e., check email every 24 hours, check email during office hours, etc.). Instructors teaching in a blended environment must remember they will also see students during the F2F component of the class.

Many Learning Management System) have email built in to allow for easy contact among students and between the students and the instructor. If possible, personalize email messages by including the student's name. If you are providing feedback on an assignment through email, be positive, yet include constructive feedback. Consider the "sandwich method" of feedback. Positive-constructive-positive. A blended course has several interaction channels. These channels are: instructor to student (I2S), student to instructor (S2I), student to student (S2S), and student to content (S2C). All can occur in the F2F or online component. These channels have unique opportunities and challenges regarding the process for interaction. Interaction occurs with each channel and also among the channels.

Communication is essential in the online environment and S2S, S2I, and I2S communications can all be accomplished through email. The LMS may serve as a portal to all communication with students.

Discussion Boards: Discussion boards are also called discussion forums, message boards, or online forums. Most LMSs provide a discussion board. Discussion boards may allow for contact between the students and instructor in an asynchronous environment. Students may login at various times, post ideas, ask questions, and/or give their response to another student's or instructor's post and/or comment. It is important to develop a threaded discussion, which is an integrated discussion consisting of all postings related to a particular discussion topic.

Students can also post questions on the discussion board and the instructor and/or other students can answer the question. Providing an incentive for students to answer each other's questions, helps alleviate many emails from the students to the instructor. A good guideline to provide to students is to post their question on a Frequently Asked Questions (FAQs) discussion board instead of emailing the instructor. As the online instructor, it is essential that you provide a timeline for when questions should be answered. The discussion board typically remains open for all students to view the answers posted or additional information is provided for clarification or further explanation.

Timely response will also help instructors manage the communication of students as well as help ease student anxiety within the online component. Responding quickly and efficiently will prevent multiple posts in discussion regarding the same issue as well as reduce the number of emails and possibly the number of questions in the F2F component.. However, responding should not fall on the shoulders of the instructor alone; students should play an active part in responding to others.

Students responding to other students will not only enhance S2S contact but will build community with the course. Students are typically capable of solving problems or answering procedural questions with an open discussion that allows for general posting. Blended instructors may give extra credit to students who answer other students' questions. This does not mean instructors do not have responsibility regarding responses; however, it encourages students to communicate more often and provide responses in a complete fashion. Instructors must monitor the traffic on the general discussion board and correct any misinformation posted. Using this technique will allow instructors to reduce email from students as the questions/answers on the discussion board are public. Instructors may also have to interrupt and correct students when communication and discussion is dominated by one student of there is bullying involved.

Blogs: Blogs, also known as Weblogs, may also be public or private. Blogs are typically used like a journal for reflection. They are open in nature and typically allow for communication. However, blog members do not edit postings within the blog, but can comment on the postings. Blogs are typically recognized by the way the content is organized. New content (postings) is typically displayed at the top of the blog and older content moves down toward the bottom as new content is posted - hence, reverse chronological order. This is an excellent technology to allow students to discuss a topic publicly or privately communicate only with the instructor typically as a reflection on previous or ongoing work.

An LMS may have a blog feature embedded or it may be necessary to develop a blog through other Web sites such as Blogger, WordPress, LiveJournal, etc. Typically blogs are used for personal reflection much like a journal., However, students may be instructed to use them to reflect on course content, outside readings, etc. Blogs help develop a community of support; if all students can see all postings. Students sharing post personal opinions and/or their opinion backed up by research is an effective way to build knowledge and community. It is important to lead by example when using blogs in a blended course as the instructor should participate in the blogging in addition to the students and extend f2f discussions.

Text Messaging: When using text messaging as a method of contact with students, the instructor must limit the amount of information being provided due to the restriction on the number of characters that can be included in the message. Instructors may use texting simply as an announcement of a class time change or reminder of a text or assignment.

The use of abbreviated words or vowels are removed from words must be addressed in the expectations as the reader must interpret the string of consonants, adding vowels or numbers to re-create the words as they read. For example keyboard would be texted as kybrd. Abbreviations are also used in texting to shorten messages. Examples include TTYL (talk to you later) and LOL (laugh out loud). This type of technology communication tool should be used only when short, quick information needs to be relayed to others. It's important to remember that this type of text language with its abbreviations is not appropriate for email communication.

Phone: When considering using telephone communication, remember it is beneficial for students to hear a human's voice to help them feel like they are a part of the class and/or help develop the S2I relationship. Instructors may want to call students at the beginning of the course to introduce themselves and/or provide an overview of the course. Instructors may also want to call students to discuss assignments, projects, etc. When teleconferencing with multiple students, make sure all parties can hear and communicate.

Course Announcements: Using course announcements frequently is an excellent way to accomplish I2S contact. Instructors may want to post one to four messages each week, based on the content and the students' needs. Initially students may need to be reminded in the F2F class to check the discussion board on a regular basis. Make it clear to the students what will be posted (reminders, class changes, important topics, etc.) and how often students should check the discussion board. Instructors should also take advantage of the discussion board. Most online instructors use a discussion board, but not all are active in participation. It is important to get involved in the discussion and engaged in the conversation, commenting on students' posts and guiding their learning. The instructor should always continue to explore how to use discussions effectively. Instructors may find they may want to try including both group and class discussions; having a group leader facilitate the group discussion; summarizing the group discussion; and sharing with the rest of the class, using a rubric to grade discussions.

This enhances student engagement. Immediacy is a critical element in student engagement, and communication in real time often enhances student engagement as well.

Students learning in a blended environment see meetings as a way to develop a relationship with the instructor and feel more a part of the learning community. Connecting all aspects of the blended class is essential to enhance learningand to extend the f2f effort into the online effort

One method to begin the development of a community of learners through I2S, S2S, and S2I contact is to develop a welcome letter and email it to students or post it on the discussion board at the beginning of the semester. This will make online learners feel welcome and sense the instructor's virtual presence (a key component of the blended learning environment) from the beginning of the course. A personalized introduction adds a personal touch to the blended environment which may be new to students. Use a concluding remark and best-wishes statement in the letter. After the final exam or other type of final learning assessment at the end of the semester, remember to send all students a final email or a class announcement. This message functions as a thank you and conclusion of the class wrapping-up the best-wishes statement in the initial welcome statement.

Principle 2: Develop reciprocity and cooperation among students.

Web 2.0 tools may be used for effective collaboration in a blended environment. Many instructors utilies wikis or other Web 2.0 tools as vehicles for content creation and communication to assist in a cooperative learning environment between students. "Along with the surge in online learning has come a realization by many faculty that they need to focus on techniques to increase participation and collaborative learning" (Palloff & Pratt, 2003, xiii).

Wikis: Wikis are simply Web pages that can be designed, modified, and viewed by students. Students need a Web browser, Internet access, and the rights to view and modify the wiki. Wikis support asynchronous communication and collaboration. They are basically built for repository of information, but are also suitable for more complex uses such as e-portfolios and collaboration on various projects. Students can edit each other's work and work in a group setting through wikis. They are typically simple to use and allow I2S, S2I, and S2S engagement.

Wikis can be designed very simply as one Web page or can include several interlinked Web pages. Wikipedia is probably the best known example of a wiki. Using it as an example, you can see how complex the wikis may become. Providing students with specific guidelines is helpful especially when using wikis for the first time in an online course. Keep in mind that instructors must give the students the necessary rights to access and edit the wiki; therefore, wikis can be accessible to the public or only to students in the specific class or within a specific group within the class.

During the reciprocity and cooperation development stage, a goal should be to help students develop skill in evaluating others' work, as well as, develop skills in providing constructive criticism. Students may not have experience in judging others and it may take time for them to develop these skills, but it also allows for good discussion,

Table 3. Sample partial rubric

Change Happens					
Objectives: The student(s) will be able to:	**Excellent 4 points**	**Average 2 points**	**Needs Improvement 0 points**	**Peer-Assess-ment Score**	**Instructor Assess-ment Score**
Identify human barriers when dealing with change	Barriers are clearly identified and reasonable and clearly explained	Barriers are identified, but are not clearly explained or reasonable	Barriers are not identifed		
…	…	…	…	…	…
COMMENTS:					

interaction, and communication among students. When students are provided with the rubric for peer-assessment, the importance of the objectives is emphasized and the designated criteria to others' work. As the instructor, you will need to model good constructive criticism for them.

With the opportunity to review and provide comments to peers for revision purposes, peer-assessment provides for the opportunity for students to judge the work of others prior to submitting the assignment/project to the instructor for summative evaluation. Students work should then be completed at a higher level than may have been accomplished in the first version of their work. As the instructor, this should, in turn, save time, as the resulting better work should contain fewer errors. Students must, however, be given clear instructions. The rubric may be adjusted to include two columns for assessment: one for peer-assessment and one for instructor assessment. The example below provides one row of criteria as an example. The rubric developed for assessment of the entire case would likely have several rows of objectives and criteria. The rubric could also be designed with a third column for self-assessment. A comment section should also be provided for formative and summative feedback (see Table 3).

Peer-assessment provides students with an opportunity to assess the work of others and learn from others in the process. Such reciprocity and cooperation provide students with 1) examples of others' work to encourage a deeper level of learning; 2) a chance to view others' and their own mistakes as opportunities to make revisions; 3) an opportunity to transfer learning to future assignments and/or projects; and 4) an opportunity to develop constructive feedback skills.

Peer-assessment may also be developed to provide for anonymity so students feel comfortable providing constructive criticism and a complete review of the assignment. With anonymity, students are more likely to be honest in their review and provide more feedback to their peers. Without anonymity, students may not only provide less information in the review, but may also develop more of a tutor role with the other student. If developing a peer-tutoring relationship is indeed the goal, students may build personal relationships while developing additional skills in evaluating and judging others' work.

An example of guidelines for peer-assessment include: During the review of your peer's assignment/project: 1) complete the rubric, 2) list 1-2 strengths of how your peer completed the assignment/project, 3) provide written constructive criticism – how could your peer's work be improved, 4) clearly indicate specific edits that should be made, 5) discuss the information provided in #1-2 with the peer (if not an anonymous review), and 6) review your own project again and implement what you learned from this peer review.

Principle 3: Encourage active learning.

There are several technology-based tools to facilitate active learning. Some tools are more public in nature, such as discussion boards, wikis, blogs, and chat rooms. These tools are typically designed to allow multiple students to participate in the learning process, although the instructor can restrict usage and availability. These technologies provide a host of ways to engage within the larger group. As a variety of technology communication tools may be used, it is important to remember to assess and reflect on the tool's effectiveness to ensure proper usage and effective communication. Assessing the effectiveness of technology tools allows the instructor to identify the impact on active learning. Instructors obtain feedback on whether or not the technology tool enhances active learning on an individual basis or in small or large groups.

Before a tool is chosen, it is essential to plan how to enhance active learning whether in the F2F or online component. Careful planning provides for a smooth transition for those not familiar with blended learning. After careful planning, the instructor should observe students, ask for formative feedback from students, and make necessary changes.

Not only should students work individually, but be assigned to work in groups as well. Developing good teamwork skills, whether in a traditional or virtual environment, is essential to enhancing active learning. The instructor should design communication areas that students can collaborate on projects and communicate about assignments. Such an area may be "off limits" to the instructor, or the instructor may monitor it on a regular basis. However, providing students with areas to meet on their own time increases their ability to engage in contact.

Students can be engaged in active learning through the course content and the course process as well as interaction and feedback. Content-related engagement includes the delivery of and interaction with the content and communication to enhance understanding. For example, online lectures may be recorded, but students may still have questions about the content to achieve full understanding. The instructor or other students may lead online discussions or summarize content in a way that clarifies the content more appropriately. The online lectures may also be designed with interactive quiz questions or questions to consider and answer prior to the F2F component to engage students in a discussion or provide for a basis for student presentations. Process-related engagement includes communication and interaction to ensure students understand how to find course documents, navigate the LMS, submit assignments, attach files to specific communication areas, and communicate and interact with each other.

Feedback includes responses to emails, discussion board postings, and peer-evaluation provided through the course. Through the process of managing the overall interaction and providing meaning with feedback, engagement occurs.

When selecting specific technologies for the course, make sure students can perform the necessary function desired for appropriate and effective interaction. Choosing the appropriate technology tool can make the difference between whether or not students can effectively interact. It is essential that the instructor understand what tools are available for interaction purposes and provide students with protocols for interaction.

When matching appropriate technology tools with function, it is important to note a tool may be designed for one function, but the instructor may find another way to use the tool that is more viable. In this way, the technology tool function is expanded. For example, Facebook was designed as a social networking site in which people from across the world can network and find each other. However, the instructor may set up a group just for a particular course so students can engage through this tool.

Social Networking: Social networking sites such as Facebook and Twitter function as another way to engage students. If instructors want to develop a site that functions as a discussion board to answer students' questions or allow students to answer each other's questions, Facebook or Twitter can serve in this manner. If a more interactive site or gathering site functionality is necessary, Facebook or other similar sites such as Ning are viable tools.

Social networking sites were developed to provide a highway for communication between individuals. Friends, classmates, and other individuals access social networks for general communication; however, they can also be used for educational purposes. The advantage in using social networking sites for education is that many students are already familiar with the software, and the sites can be used for posting information, pictures, and/or videos online. With this familiarity also come challenges, such as making sure only students in your class participate in the group that you designed. The instructor must take the time to set up the site and verify students can enter the space each time a student requests admission. This can be time consuming depending on the size of the class.

A technology tool may have several functions, but that does not mean the instructor must use every function. For example, video conference software such as Adobe Connect Professional includes the following functions: camera, microphone, chat area, presentation area, whiteboard, polling, breakout sessions, etc., but the instructor should use only the necessary functions to help students be active in the learning process. Consequently, it is essential to match the tool with the function that is appropriate for learning and engaging in the content. It is not necessary to use every function within a technology tool, but to examine specific functions that meet course needs, the needs of the students, and provide for engaging in the learning process. Whatever technology is chosen or is available, it should enhance the facilitation of active learning.

As technology tools assist with student engagement, it is essential to identify the pros and cons for each type of tool. Without investigating the tools thoroughly, the wrong tool may be selected and the engagement process will deteriorate or be non-existent. Small group and one-to-one meeting software are useful to assist with engagement between a few students. However, there are other technologies, such as wikis or social media, which may enhance engagement of larger groups of students.

Student engagement is vital to successful facilitation in a blended learning environment. Student engagement should be an essential part of the planning process for effective course interaction and facilitation. The instructor should engage students in the learning process, particularly in the beginning. This sets the stage for students as they learn quickly that they are expected to participate and be active in the learning process. Using appropriate questioning, listening, and feedback skills can assist in this process. Throughout the engagement and facilitation process, instructors should provide direction and support to learners, manage online discussions, facilitate relationship building and motivate students.

Application Sharing: Application sharing is another way to engage students. It is described as the co-development of documents. It allows several students to work on the same document at the same time. Google docs is a well-known application sharing software. Application sharing software is typically described as collaborative software as it allows for such collaboration. Such software is also called groupware and group support systems. These software packages are designed to help students work toward a common goal while working together typically from a distance and from different locations.

Chats: Chats, also called online chats or synchronous conferencing, are text-based online areas in which students key information and upon hitting the Enter key on the keyboard, the text appears on the screen. Thus, the messages instantaneously appear on the screen one after another. Chats are good for short, informal communication to help engage students in the content or discussions. Instructors utilize a chat session to allow students to key questions or answers after an online lecture or video. If a blended course uses chat rooms developed for content discussion, slow typists typically do not have their questions asked and therefore answered as frequently or they are not able to answer as many questions as they would prefer. Instructors should take this into consideration when using chats as an engagement technique.

Conferencing: There are several different types of synchronous conferencing for online courses. They include audio, video, and Web conferencing. Audio conferencing involves the voice only and is good for discussions and basic dialogue. Video conferencing can involve more interaction as the participants can see and hear each other and provides a format for more in-depth discussions and/or teaching.

Web conferencing provides the opportunity for the students to give oral presentations or provide other information and information online. This serves more as a virtual classroom, as the instructor can speak to students and interact at a higher level through audio, video, and the sharing of the computer desktop to display PowerPoint slide, other software, or Web resources. Web conferencing can also be used for "virtual office hours." This gives instructors the opportunity to provide assistance to students online from their office and engage them in asking questions outside the classroom. Elluminate and Adobe Connect Professional are two commonly used Web conferencing tools.

Instant Messaging: Skype is one example of an instant messaging service that allows users to have audio and video conversations with others. Many online instructors use Skype to communicate with students and "bring" guest speakers into the online classroom virtually to engage students in content outside the textbook. Instant messaging software is also referred to as Voice over IP or VoIP. These types of systems are typically free or less expensive than other types of synchronous communication tools, but may not be as sophisticated or additional charges may occur. This type of synchronous communication is typically used for one-to-one communication or small groups.

White Boarding: White boarding is typically thought of as a shared space similar to an online "whiteboard" or "notebook." The software involved in such technology allows the users to engage by marking-up information in a collaborative environment. Scriblink is one such white boarding software that allows several users to draw, diagram, or key text on an online whiteboard. One user must open the whiteboard and then send a URL to other users to invite them to collaborate. This collaboration occurs in real time, as with other synchronous tools. When using an online whiteboard in a blended course, remember that all students can mark-up, annotate, and draw on the screen. Therefore, it is important to provide instruction on how to use the tool effectively.

Instructors should work to provide a safe environment in which all students can engage with other students and the content. Monitoring interaction and being proactive planning for engagement is essential. Setting high expectations for engagement at the onset of the course, and, as an instructor, engaging with students yourself, is key to setting the stage.

Principle 4: Give prompt feedback.

One of the ultimate goals of an effectively designed course from a teaching perspective should be to assess learning. As students complete assignments and/or projects, they must understand how they will be assessed – what are the expectations and learning outcomes? Criteria must be used as the basis of a framework for measuring growth in the learning process. To effectively complete assessment, rubrics are a key component for providing meaningful feedback to help students improve. Rubrics also allow for a more prompt timeframe for feedback tied directly to the learning objectives.

Rubrics should include a set of criteria that connect to specific course learning outcomes. Rubrics allow for standardized evaluation and make the evaluation process more simple and transparent. Rubrics provide students (through peer evaluation) and the instructor with a guide with which to provide feedback to others through formative or summative assessment. Rubrics should provide specific criteria and a range of performance so students more clearly understand what they are doing well and how to improve if needed.

This framework should assist instructors with consistency in assessment. A well-written rubric, for example, can help provide timely useful feedback regarding the effectiveness of a student's participation in threaded discussions and other assignments and offer assessment benchmarks and document progress. Actual implementation of a rubric for assessment will largely depend upon the instructor's preference for feedback, type of assessment and time of assessment.

Rating scales within rubrics vary, but typically range from zero or one for the low category in the rubric to whatever high level of points is needed based on the project. Instructors vary on their opinion of students earning zero or one point for the low category. However, whatever is decided upon, the instructor should be consistent from assignment to assignment. Categories may also vary from "poor" to "excellent" or "needs improvement" to "mastery of the content."

In any environment, rubrics should be provided to students when the assignment is introduced. Instructors use rubrics, not only to evaluate work consistently, but also to clearly communicate expectations to students. In a blended environment, the instructor can provide the rubrics F2F or online. LMSs now provide access to electronic rubrics which allow for more prompt feedback.

When students receive rubrics beforehand, they better understand the evaluation criteria and can prepare accordingly. Developing a grid and making it available as a tool for students' use will provide the scaffolding necessary to improve the quality of their work and increase their knowledge. Therefore, prepare rubrics as guides students can use to build on current knowledge, consider rubrics as part of your planning time, not as an additional time commitment to your preparation, and provide prompt feedback through the rubrics. Assessment should be student-centered, outcome based, and frequent.

Table 4. Sample syllabus statements

GENERAL INFORMATION
Dr. Franklin will check email and course information via Blackboard during office hours and other times when available.
Dr. Franklin does not consistently check email on Saturday or Sunday.
Any question regarding course content, assignments, projects, etc. should first be posted on the Frequently Asked Questions (FAQ) discussion board. Anyone may answer the posted questions and extra credit may be earned for complete answers.
If you have specific questions pertaining to the course, assignments, projects, etc., ask questions early and at appropriate times/days during the week.
Your questions will be answered within 24 hours Monday – Friday.
FOR DISCUSSION BOARD RESPONSES
Example to put in the syllabus: "In any online course, participation is crucial. Every student is expected to participate in all discussion boards. Peers and the instructor will also provide feedback in these open areas. The instructor will be monitoring your responses. Acceptable responses include your expressed opinion, information from readings, and/or information from your research. Unacceptable responses include: 1) no response; 2) simply stating "I agree" or "You are right" or "Good answer" and 3) not adding to a body of knowledge. You must "add to the conversation." Texting language is not appropriate. The discussion board is a professional discussion and professional language and respect of others is required. As noted in the syllabus, your participation will be graded with these guidelines in mind."

Instructors should define their idea of prompt feedback and be clear about their practices for responding to students. There must be a way for students to ask questions and receive timely answers, but guidelines can be set so the instructor does not become a 24-7 online instructor. The syllabus must clearly communicate those guidelines. For example, the syllabus may include the information shown in Table 4.

The assignment/project may determine the method of prompt or immediate feedback. For example, if students are taking an online quiz or test, feedback can be provided immediately in the format of a final score. Embedding specific feedback in the test to provide automatic, immediate feedback, is easy to do. Another example of when an assignment/project may determine the method of feedback is when students are required to develop a Web page. Printing the Web pages and writing feedback on each print-out is not the best method of providing feedback. It would be essential with a Web page assignment to verify that links on the Web page work and animation is appropriate. These are items that cannot be graded via a printed page. To provide meaningful feedback on a Web page assignment, using a screen capture software such as Camtasia, Captivate, or Jing would allow you to record screen movement as you clicked on links and also allow you to record your voice as you provided auditory feedback at the same time. Providing auditory and visual feedback would be more meaningful to the student than written comments.

However, feedback also includes responses to emails, discussion board postings, and any other questions, comments, or suggestions that arise in any communication area provided through the course. As students ask questions about assignments, prompt and complete feedback is essential. Through the process of managing the overall communication and assessment processes within a blended environment, the instructor should begin to establish a pattern of communication and feedback. This pattern of communication should become obvious to students and should be easy to follow.

All feedback does not have to be individual feedback. Email can be used in three ways: class email, group email, and individual email. Class email is "email broadcast." It can be used as feedback for announcements, correcting misunderstandings, or misconceptions. Group email can be used to provide students with ideas, guidance, or feedback on group projects. Individual email can be used for many situations, such as answering individual questions, providing feedback on assignments, motivating students to learn, and following up with students for special situations.

Key components of prompt feedback include the following. The feedback provided on assignments/projects should be

- Connected to learning objectives.
- Frequent and prompt.
- Positive in tone.
- Automatic, if possible.
- Provided in a variety of ways:
  - Written Peer and/or Instructor Feedback.
  - Auditory Feedback.
  - Visual Feedback.
- Individualized.
- Specific and detailed.

Principle 5: Emphasize time on task.

As noted by Chickering and Gamson (1987), time plus energy equals learning. This is the key to emphasizing time on task. This can be done through the development of materials and processes that attract students to spend more time on the task, planning carefully to reduce wasted time, and effectively communicating how much time students should be spending on the task at hand (TLT Group, n.d.). Many times students do not understand the amount of time expected or needed to complete an assignment, project or discussion board question.

Bartoletti & Restine (2008) note that elements to assist in organization and time tracking are essential to emphasizing time on task. An electronic course calendar through the LMS can assist students in developing time management skills or, at least, serve as a reminder the students who need it. The syllabus also serves as an excellent tool to help students stay focused and on task. Providing a one page summary at the beginning or end of the syllabus with all of the tasks and appropriate due dates will help students complete assignments on time. A checklist can also be developed. As students complete assignments, they can easily check them off to ensure completion.

Course organization can actually assist in emphasizing time on task as well. Clear, easy course navigation enhances the students' ability to find assignment, complete them and attach for assessment in a timely manner. When students have to "hunt" to find what they are looking for, they are not as eager to continue searching and completing the assignment. Course organization may be dependent on the faculty's teaching style and course content; however, it can be organized by module, topics, or in a weekly fashion. Utilizing the ability to hide modules after they are completed or opening modules only when they are needed helps eliminate a "busy" environment in which students must search to find necessary components and eliminates barriers.

Time on task is also dependent on the F2F time and online time in the blended course. It is imperative for instructors to delineate expectations of the time spent in class and online. It is easy for instructors and students to fall into the trap of preparing only for the f2f portion of the course and neglect the interaction and the learning that must be a part of the online course. Purposeful course organization must look at time on task holistically with time on task in both environments complementing each other to achieve appropriate contact hours and to meet course objectives.

Principle 6: Communicate high expectations.

The syllabus should be the first place to establish the expectations for all students. Instructors should ensure that expectations are clear and communicate the benefits of the course learning outcomes. Whatever the content, students must also understand how they will be assessed as they work toward achieving course goal. This is very important in a blended course. There should NOT be two sets of goals, one for the F2F component and one for the online component. The outcomes are blended and students must understand the expectations of both components.

To achieve high expectations tied to the learning outcomes, assignments and/or projects should include: 1) clear instructions, 2) varied tasks, 3) tasks of appropriate length, 4) tasks at the appropriate level of learning, and 5) tasks at the appropriate degree of difficulty. Learning outcomes should be based on Bloom's Taxonomy which is a classification system for various levels of learning (Bloom & Krathwohl, 1956). Assignments and/or projects should also be developed on such a system. The Bloom's Taxonomy was revised (Anderson, Krathwohl, & Airasian, 2001) and is noted in Figure 1. There are various levels, which can be implemented to increase the level of learning.

As the level of learning is increased, the expectations are higher. Clear communication in the F2F and online components are necessary. Clear criteria in rubrics also help students identify a higher level of expectations. Whether the rubric is designed to assess performance, process or product, the same rubric will be used by the instructor can also be used for self- and peer-assessment. Students can complete the assignment and use the rubric to self-assess prior to turning in the assignments and then use the same rubric for a peer assessment of another student's project as well. Thus, if students self-assess using the rubric and a peer provides feedback using the same rubric, the student will more completely understand the expectations of the instructor and objectives of the project.

Figure 1. Revised Bloom's taxonomy

HIGH LEVEL

Level of Learning	The student will be able to. . .
Creating	Create, Invent, Compose, Construct, Combine, Hypothesize, Originate, Forecast, Formulate
Evaluating	Judge, Justify, Debate, Verify, Argue, Defend, Recommend, Assess, Critique
Analyzing	Analyze, Contrast, Separate, Differentiate, Deduce, Examine, Subdivide
Applying	Apply, Solve, Illustrate, Choose, Classify, Manipulate, Calculate, Modify, Examine, Construct
Understanding	Explain, Outline, Discuss, Distinguish, Compare, Describe, Demonstrate, Translate, Restate, Interpret
Remembering	List Describe, Locate, State, Name, Label, Define, Match, Select, Recite

LOW LEVEL

The assessment process plays a key part in communicating high expectations. The key idea behind assessment is that it is something we do with and for our students, rather than to our students. Viewing assessment as a way to judge not only what the students have learned, but also what has been taught is essential.

Principle 7: Respect diverse talents and ways of learning.

Remember students are human too. Instructors should be conscious of their tone and language and teaching style; but know that not all students learn alike. Effective teaching takes into account the students' perspective; therefore, try to look at it from their point of view. It is typical to think about students learning through auditory, visual or tactile means; however, students may have dual learning styles (Butler & Pinto-Zipp, 2006) and learn through various means. Therefore, it is important to provide content to students in a variety of ways such as audio-graphic, video, text chat, Web tools, and collaborative writing tools (Felix, 2003).

Student-centered learning can become an effective component of blended learning.

"In the past, students were often considered the receptacles of the information that educators provided through lectures and other directed learning experiences. Today, students play a more self-directed role, and educators focus more on the facilitation of learning, emphasizing cooperative and collaborative efforts, self-initiated research, and guided discovery learning" (Huebner & Wiener, 2001, para. 1). It is important for faculty to understand, however, what the students do not understand to more fully provide content and enhance learning. The following techniques can assist.

Exit Tickets: Exit tickets can be created on a discussion board as an anonymous submission. Students are simply probed with two questions at the end of a lesson or unit. The two questions should require students to: 1) provide an answer to a factual question that deals with the overall idea of the lesson and 2) provide more explanation of a concept from the lesson. This method provides you with an opportunity to analyze the ticket information and get a feel for whether or not students understand the material or have misconceptions about specific aspects.

One-Minute Essay: One-minute papers also give you an opportunity to determine the level of understanding of course content. One-minute essays stem from open-ended questions such as "What was the most important thing we discussed today?" The muddiest-point papers are similar; however, the questions are developed around what the students do not understand. For example, "What is the one thing from this lesson that is still confusing to you?"

In the blended environment accessibility must be achieved in both f2f and online environments. Both environments provide opportunities and challenges for accessibility. One needs to consider the accessibility of at least three layers of information and interaction: the accessibility of the basic units of content (e.g. blocks of text, mathematical or chemical formulae, pictures, diagrams, etc.); the accessibility of the medium in which this content is delivered (e.g. a Word or PowerPoint presentation,); and finally the accessibility of the learning environment; LMS. All of these can create their own accessibility barriers, which are different for each different student, staff member or even institution.

The first place to investigate accessibility services is through the LMS. The LMS is often the link between the F2F and the online environment in a blended course. Most LMS offer tutorials that explain different types of accessibility needed by students as well as types of accessibility software that works efficiently in with the LMS . Most LMS frameworks and Web sites follow universal design that aid in accessibility of special populations.

If a student has special needs, for example is visually impaired, auditory feedback is essential. If a student is hearing impaired, visual and text-based feedback are appropriate. Providing such feedback is not expensive. Web camera and microphones are inexpensive and some free or inexpensive software packages are available. Do not discount actually providing verbal feedback in person or over the phone. This type of feedback provides a human touch and helps develop a positive instructor/students relationship.

FUTURE RESEARCH DIRECTIONS

As technology changes and innovated instructors look for new and better ways of developing learning spaces, the "classroom" will continue to evolve into a blend of technology and persona. Classes will neither be completely F2F nor online but will be somewhere on the F2F/online continuum. As the use of this delivery and learning space model continues, programs will immerge that will give students more choice in their educational options.

As with all new learning innovations, challenges arise and "old beliefs die hard." Although the push for learning environments is for the content and the communication to be "student centered" the term "student responsible" needs to be added. In the blended classroom, the instructor is no longer the "pitcher pouring knowledge into student vessels." The student has to take responsibility of the learning. The blended environment allows for differentiated learning that can focus on students learning strengths, and mediate weaknesses. The variety of learning opportunities can transform the students from a passive to an active learner.

Instruction must follow this evolution. To be successful in this environment, instructors must evolve from "lecturer" to instructional guide. The f2f meetings as well as the instructional design of the digital content and communication must work in concert to provide a complete student centered/student responsible learning environment. This takes planning and work. With the tools and techniques described in this chapter, the conversion to blended learning can be successful.

CONCLUSION

Transforming a F2F course to a blended environment provide unique opportunities to provide students with a rich multimedia experience that "blends" the best of F2F and online environments. Creating a blended course that meets quality standards is not easy and will require the adherence to the framework of transference outlined throughout this chapter. This framework, based on Chickering and Gamson's *Seven Principles for Good Practice in Undergraduate Education* (1987), can ensure that the blended course have the important elements to ensure effective student learning.

Overall, the framework for transference is composed of these steps:

1. Conducting a course audit.
2. Considering the 4 Os.
3. Encouraging contact between students and the instructor.
4. Developing reciprocity and cooperation among students.
5. Encouraging active learning.
6. Giving prompt feedback.
7. Emphasizing time on task.
8. Communicating high expectations.
9. Respecting diverse talents and ways of learning.
10. Closing the loop.

Closing the loop includes taking into consideration all that has been learned through teaching the course, student formative feedback and course evaluation and using that information to cycle back to step on (conducting a course audit) to continue the revision process. This is a continual loop that must persist to continue to develop effective blended courses. As faculty works through these steps, a thoughtful, well-developed blended course, with rigorous student expectations in both F2F and online environments, will emerge to meet the needs of all types of learners.

REFERENCES

Anderson, L. W., Krathwohl, D. R., & Airasian, P. W. (2001). *A taxonomy for learning, teaching, and assessing: A revision of Bloom's taxonomy of educational objectives*. New York: Longman.

Bartoletti, R., & Restine, K. (2008). *Promising practices in online teaching and learning*. Houston, TX: Connexions. Retrieved from http://cnx.org/content/col10559/latest/

Blackboard K-12. (2009). *Blended learning: Where online and face-to-face instruction intersect for 21st century teaching and learning*. Retrieved from http://www.google.com/url?sa=t&rct=j&q=&esrc=s&source=Web&cd=5&ved=0CFAQFjAE&url=http%3A%2F%2Fwww.blackboard.com%2Fgetdoc%2F1b9259b9-8cf4-4140-ba45-2a35eef6651c%2FK12_Blended-Learning_2011.aspx&ei=BxfrUMHTFIqx0QGR1IDgBA&usg=AFQjCNF09dNGieTeJNFtKb17_lIU3zpzUw&bvm=bv.1355534169,d.dmQ

Bloom, B. S., & Krathwohl, D. R. (1956). Taxonomy of educational objectives: The classification of educational goals, by a committee of college and university examiners. In *Handbook 1: Cognitive domain*. New York: Longman.

Butler, T. J., & Pinto-Zipp, G. (2006). Students' learning styles and their preferences for online instructional methods. *Journal of Educational Technology Systems*, *34*(2), 199–221. doi:10.2190/8UD2-BHFU-4PXV-7ALW

Chickering, A., & Gamson, Z. (1987). Seven principles of good practice in undergraduate education. *AAHE Bulletin*, *39*, 3–7.

Consulting, S. (2008). *T.I.P.S. for online learning: Total implementation of a practical system*. Stealth Consulting.

Eiter, M., & Woll, T. (2011). *Breaking the mold on blended learning*. A Unicon Research Study. Retrieved from http://uniconexed.org/2011/research/Blended_Learning_Report-Eiter-Woll-Nov-2011.pdf

Felix, U. (2003). *Language learning online: Towards best practice*. Dordrecht, The Netherlands: Swets & Zeitlinger Publishers.

Heer, R. (2012). *A model of learning objectives*. Center for Excellence in Learning and Teaching, Iowa State University. Retrieved April 8, 2013, from http://www.celt.iastate.edu/pdfs-docs/teaching/RevisedBloomsHandout.pdf

Huebner, K. M., & Weiner, W. R. (2001). Distance education in 2001. *Journal of Visual Impairment & Blindness*, *95*(9). Retrieved from http://www.afb.org/JVIB/JVIB950902.asp

Kerres, M., & DeWitt, C. (2003). A didactical framework of the design of blended learning arrangements. *Journal of Educational Media*, *28*(2-3), 101–113. doi:10.1080/1358165032000165653

McConnell, S., & Schoenfeld-Tachner, R. (2001). Transferring your passion for teaching to the online environment: A five step instructional development model. *e-Journal of Instructional Science and Technology, 14*(1). Retrieved from http://ascilite.org.au/ajet/e-jist/docs/vol4no1/mconnell.html

Palloff, R. M., & Pratt, K. (2003). *The virtual student: A profile and guide to working with online learners*. San Francisco, CA: Jossey-Bass Publishers.

Teaching, L., & the Technology (TLT) Group. (n.d.). *Seven principles collection of TLT ideas*. Retrieved from http://www.tltgroup.org/seven/5_Time_Task.htm

Watson, J. (2008). *Blending learning: The convergence of online and face-to-face education*. North American Council for Online Learning. Retrieved from http://www.inacol.org/research/promising-practices/NACOL_PP-BlendedLearning-lr.pdf

ADDITIONAL READING

Bath, D., & Bourke, J. (2010). *Getting started with blended learning*. Griffith Institute for Higher Education. Retrieved April 8, 2013, from http://www.griffith.edu.au/__data/assets/pdf_file/0004/267178/Getting_started_with_blended_learning_guide.pdf

Bersin, J. (2004). *The blended learning book: Best practices, proven methodologies and lessons learned.* San Francisco, CA: John Wiley & Sons, Inc.

Bostock, S. (2007). *How to design a blended e-learning course*. Retrieved April 8, 2013, from http://www.keele.org.uk/e-t/how%20to%20design.pdf

Dziuban, C. D., Hartman, J. L., & Moskal, P. D. (2004). Blended learning. *Educause Center for Applied Research Bulletin, 7*, 1-12. Retrieved April 1, 2013, from http://net.educause.edu/ir/library/pdf/erb0407.pdf

Horn, M., & Staker, H. (2012). *Blended learning training resources for teachers*.

Kitchenham, A. (2011). *Blended learning across disciplines: Models for implementation*. Hershey, PA: IGI Global. doi:10.4018/978-1-60960-479-0

Picciano, A. G. (2013). *Blended learning: Research perspectives*. The Sloan Consortium. Retrieved April 8, 2013, from http://sloanconsortium.org/node/921

Russell, M. (2013). *Blended learning—Designing & delivering blended courses while staying organized & building blended communities*. The Sloan Consortium. Retrieved April 8, 2013, from http://sloanconsortium.org/node/250746

KEY TERMS AND DEFINITIONS

Asynchronous: Not occurring at the same time, a time delay in communication, as students and the instructor do not interact at the same time, provides students with the ultimate anytime, anywhere learning environment.

Blended Learning: The utilization of teaching practices that combine teaching methods, which incorporate both face-to-face (F2) and online components.

Blog: Websites typically used like a journal for reflection, also known as Weblogs, can be public or private, in which members do not edit postings, but can comment on postings.

Bloom's Taxonomy: A classification system used for various levels of learning, includes the use of the revised six domains of complexity (remembering, understanding, applying, analyzing, evaluation, and creating).

Learning Management System (LMS): A software application used as a communication portal between students and the instructor, interact may occur through email, discussion forums, etc., information such as course content and classroom assessments (test and quizzes) may also be included in the LMS, other administrative classroom tasks may also be utilized.

Social Networking: Representation of a community of people who use an online area to communicate with other members of that site, communication can occur in various forms including posting messages and uploading photographs, communication can be informal or formal.

Synchronous: At the same time, but not in the same place, individuals learning at the same time as they work toward a common goal or outcome, learning conducted simultaneously in a real-time online environment, learning typically involves chat areas or videoconference software.

Whiteboarding: A technology tool feature typically included in videoconference software which allows users to collaborate (writing and drawing) on shared documents as if writing on a traditional whiteboard.

Wiki: A Web page that can be designed, viewed, and editedby users, many times used for collaborative assignments/projects.

This work was previously published in Advancing Technology and Educational Development through Blended Learning in Emerging Economies edited by Nwachukwu Prince Ololube, pages 59-79, copyright year 2014 by Information Science Reference (an imprint of IGI Global).

Chapter 37
Impact of Technological Advancement on the Higher Education Curriculum and Program Development

Snezana Scepanovic
University "Mediterranean", Montenegro

Vania Guerra
Zürich University of Applied Sciences, Switzerland

Maren Lübcke
Zürich University of Applied Sciences, Switzerland

ABSTRACT

The current educational structure was created in response to the demands of an industrial society, which, alongside workers, needed an elite of highly educated professionals. The knowledge revolution accelerated this trend: professionals are now not only the people who "have" the knowledge, but they should be also able to find it quickly and efficiently, and have the skills to apply knowledge in new situations, extending the scope of their initial field of expertise. With massive growth of free open educational resources, knowledge became available and accessible to everyone with a simple Internet connection. All these conditions currently call into question the role and operationalization of educational processes in Higher Education, since universities are no longer the one central source of knowledge generation. In this chapter, the authors analyze the current situation in Higher Education, in terms of why a demand for transformation of educational models has been almost entirely unable to generate sustainable changes in curriculum development. Aside from theoretical foundations, the authors also analyze literature and what the practitioners have to say in that respect. The ultimate goal of this chapter is to set the basis for an analytical framework for discussions about the transformative process of Higher Education in order to be able to bring curriculum development a step forward, in a sustainable way.

DOI: 10.4018/978-1-4666-8246-7.ch037

INTRODUCTION

Educational visionaries and reformers have long predicted a significant transformation of teaching and learning where technology would play a principal role. These visionary changes cover a spectrum that moves from cognitive approaches, such as customization of learning (e.g., Personal Learning Environments), to more socio-constructivist conceptions such as the latest challenges surrounding social learning and learning analytics. However, technological implementations in education have consistently fallen short of generating profound revolutions. Why have our most visionary dreams not been realized? Why hasn't technology dramatically transformed teaching and learning in Higher Education? The answer to these apparently simple questions is rooted in a complex combination of a variety of factors associated to the interplay between technological developments, scientific advancement and societal evolution.

The first strong impact of technology in higher education was at the time of the industrial revolution. Universities were changing their role from being scientific clusters towards being producers of highly qualified workers (professionalization and democratization of university studies), mainly specialists in the subjects' content, and hence the teacher's role was to be the expert in the subject. Professionals, including scientists and researchers, were expected to be 'experts' in their fields of expertise. When the advancement of Information and Communication Technologies (ICT) transformed industrial society into a networked and knowledge society (Castells, 2009), expert knowledge started to be at everyone's disposal. The demands from labor markets became more complex, since not only was expert knowledge needed, but also the development of social skills and autonomous learning, in order to cope with the new societal and workplace rules. The Bologna reform is a good example of changes in societal demands and those of the labor market (Leuven Communiqué, 2009). This is one of the biggest attempts to gather resources from all European higher education institutions, so as to cope with the complexity of educating professionals in a networked society and globalized market. One key point of this reform was the change from subject-centered curriculum toward a competences-based one. More than a superficial change, it turned to be a conceptual move from rooting formal education in behavioral and cognitivist learning theories, toward implementing socio-constructivist theories of learning as framework for understanding learning process and designing teaching practices. However, the appropriate implementation of socio-constructivist learning theories demands an adequate use of ICT and emerging technologies and devices. But most importantly: how do institutions cope with this demand, when their organizational and curriculum structures are rooted in the traditional behavioral understanding of learning? What shapes the understanding of teaching and educating? How is this competencies-based approach implemented? Which teaching competences are needed to successfully implement it? And what does faculty staff development look like in a competences-based era, settled in a subject or fields-centered institutional structure? These are questions that are still waiting for practical answers.

The transformation of teaching and learning in professional education nowadays certainly depends on the effective implementation of well-selected suitable technologies according to each educational situation. Although, innovation is the only clear learning outcome from the past 20 or 30 years of attempts to transform education by implementing different technologies. For achieving the dramatically different results that the educational community has longed for, innovators should change the rules, fundamentally altering the environment in which learning occurs. Particular technologies and technology standards are a key part of this process. However, no technology or standard has value in itself. Value comes from what is done through the implementation of those standards in the creation and use of effective and affordable learning materials; based on coherent and consistent implementation of learning theories, which will reflect how the learning processes is really understood.

In this chapter we will present an analysis of the impact of technology advancement in the evolution of curriculum and educational programs from the perspective of European and UK Higher Education. We will provide a review of the theoretical framework and existing applied research in order to define critical factors that influence the implementation of technology in curriculum development and a teacher's ability to successfully implement innovations in the classroom. Beyond seeking to answer key questions about the current use of technology (or the lack of it) in teaching practices, or the need of more transdisciplinary work in curriculum development, we also attempt to address some key research questions emergent from analyzing the current scientific results and practitioners' experiences reported in the literature.

Demand for Transformation

The interplay between science and technology, which intensified during the 90s and is constantly increasing due to the ICT revolution, has accelerated industry advancements exponentially. This advancement generated an escalation in demand for Higher Education, since it led to growth in occupations for which secondary school was no longer enough to fulfil the requirements of industry. The increase in technological skills demanded by the labor market (Hüsing et al., 2013), along with the increase in demands for professionalization, meant that access to Higher Education institutions was no longer reserved for an elite. In most Western countries, student numbers started to increase rapidly at the end of the 1960s and this tendency has not stopped until today. This phenomenon is the result of social and industrial structural changes, and has implications for the organization of modern services and activities offered by Higher Education. Trow (1973, 2000) has identified three phases in the evolution of Higher Education: elite system (participation less than 15% of the age group), massive system (participation between 15 - 50%) and universal system (participation of more than 50%). The OECD reported (2009) in 2009 that since 1998, tertiary attainment levels among young adults have increased significantly, to 34% among 25-34 year-olds on average across OECD countries.

Massification of Higher Education has an effect on almost all institutional aspects: financing, governance and administration, recruitment and selection of students, academic career programs and particularly on curricula and forms of instruction (Beerkens-Soo & Vossensteyn, 2010). The phenomenon of massification also has implications related to funding. Covering the expenses of Higher Education at mass level is a serious burden on a public budget. Although in most countries public funding in the period of massification increased, it did not keep up with the escalation of student numbers. As a result, funding per student dropped and staff per student ratio declined (Beerkens-Soo & Vossensteyn, 2010). John van der Baaren (2013) remarks that Higher Education today is too expensive, being one of the largest cost items for most national budgets. He also notes that education is the only major sector in society that has shown no increase in productivity in the past 50 years. On the contrary, costs have risen while the quality of output has remained the same (at best). The author concludes that Higher Education is of low quality regarding value for money that students receive, and has low relevance in terms of how prepared new professionals are to face the labor market demands; results expected of the formal curriculum do not correspond to labor market requirements.

Educating modern professionals for the high-tech industry and society is not the only demand that these institutions are facing. The fierce industrial economy demands scientific advancements and research to spearhead market innovation.

The new EU framework program for research and innovation Horizon 2020 echoes another demand of the desired transformation of Higher Education (European Commission, 2011). While Europe seems to be still leading in basic research, this new EU framework program focuses on innovation, "by helping to bridge the gap between research and the market." This emphasis on innovation as a driver for product development is more evidence of the stronger market orientation Higher Education is facing nowadays. Public education institutions have to learn to compete with research and development departments in the private sector.

As described by Ernst and Young (Bokor, 2012), Universities are "a thousand years old industry on the cusp of profound change." Higher education in general is nowadays facing tremendous challenges, fostering an historical demand for transformation. Most of these challenges emerge from heterogeneous demands of different sectors belonging to a society undergoing constant transformation and innovation. Different sectors are looking for solutions in Higher Education institutions, sometimes bringing into question the position they should take in the current and future societal and economic panorama. Still a core societal organization, when generating strategies, these institutions have to find an adequate balance between the different interest groups and their representatives, namely:

- **Science/Research/Innovation:** Higher Education institutions are still seen as a source for the generation of new scientific knowledge and independent research.
- **Administration/Business:** The administrative heads of the institutions have to react to a more competing environment and ensure their success. The definition of success is a problem of its own. For instance, traditionally there is a big difference between universities and universities of applied science. While the first assesses indicators from the scientific field (publications, award, grants), the latter is concerned with the number of students. But this difference is vanishing nowadays, since high research quality is usually perceived as an argument to attract more students.
- **Students/Professionals:** Are approaching Higher Education to build their personal future. The demands of students might be their longing for knowledge, but more often it is the demand for employability.
- **Economy/Market:** The economy requires employees and the market pursues innovations to keep up with competitors. How close this could be linked to the strategy of Higher Education depends on its goals and the local or global market.
- **Society/Citizens:** Ask for responsible citizens and political subjects. Because Higher Education is still a public task, this debate is not to be underestimated.

Higher education challenges no longer belong to the academic hegemony. Important actors of the economic sphere are also concerned with the future of this important institution. For instance, Ernst & Young have detected three broad lines of evolution for universities (Bokor, 2012).

- **Streamlined Status Quo:** Some established universities will continue to operate as broad-based teaching and research institutions, but will progressively transform the way they deliver their services and administer their organizations — with major implications for the way they engage with students, government, industry stakeholders, TAFEs, secondary schools, and the community.
- **Niche Dominators:** Some established universities and new entrants will fundamentally reshape and refine the range of services and markets they operate in, targeting particular 'customer' segments with tai-

lored education, research and related services — with a concurrent shift in the business model, organization and operations.

- **Transformers:** Private providers and new entrants will carve out new positions in the 'traditional' sector and also create new market spaces that merge parts of the Higher Education sector with other sectors, such as media, technology, innovation, venture capital and the like. This will create new markets, new segments and new sources of economic value.

Each of the aforementioned evolution lines imply different organizational strategies with different approaches to educational programs and curriculum development. Economic values and interests evidently drive this vision. To sum up, Higher education institutions, pulled by strong external and internal forces, have to make strategic decisions to defend or redefine their position in the societal and economical playground. One of the major challenges in Higher Education is to generate a new view on what its main purpose is.

Epistemology of Learning in the Knowledge Revolution

A clear task for Higher Education institutions is to educate modern professionals, including researchers and scientists that are able to cope with the industrial demands. Not only do adequate curricula and career programs have to be developed, but it is also necessary to prepare faculty staff to manage their time and resources to meet the demands of increasing teaching quality and scientific productivity.

The major driver of big European reforms is supplying the labor market with highly qualified professionals. Morrison (1997) already mentioned that educators need to rethink their basic assumptions about organizational structure and curricular programs. The Bologna agreement is the EU reform with the greatest impact in European Higher Education system (Terry, 2008). This reform has the focus on increasing the mobility of researchers, students and professionals around Europe. Facilitating the mobility of the 'users' of Higher Education aims to broaden the access to resources for education and research. Another aim of this reform is to increase professionals' availability in Europe. The standardization of the career path from undergraduate to PhD studies in all the participant institutions was designed to that end. This way it can be ensured that students and scientists have similar quality standards when they move around countries. This reform was created with the goal of providing responses to issues such as values and roles of Higher Education and research in modern, globalized, and increasingly complex societies with the most demanding qualification needs.

Departing from a labor market demands analysis, the Bologna process introduced one of the most relevant reforms regarding professional education: it represents a shift in the focus of curriculum design from subject-centered to competences-based. This is, with no doubts, the cornerstone of the professional education transformation (Hüsing et al., 2013), but also the source of a rainbow of questions on how to implement this curriculum development change and surrounding the role of the teacher. The emphasis on the development of skills and competences has become a headache for those charged with curriculum implementation (Leuven Communiqué, 2009).

In order to be able to implement competencies-based curricula, it would be necessary to make some fundamental institutional and organizational changes. The main problem faced in this regard is the inconsistency between the objectivist epistemology behind the current formal educational structures and the relativist socio-constructivist foundations that frame the design of the competences based curricula.

But why would the demands of society and industry need such deep changes in their education systems at all levels? Stephen Byers, former UK

Trade and Industry Secretary, described it to the Confederation of British Industry (CBI) in 1999 (as cited in Rikowski, 2005):

The first industrial revolution was based on investment in capital and machinery. The revolution we are going through now requires investment in human capital – skills, learning and education.

The current educational structure was created in response to the demands of an industrial society, which, alongside workers, needed an elite of highly educated professionals. These professionals had the role of experts in their subject matter and were a small part of the workforce. The knowledge society instead requires highly qualified professionals, who are able to find solutions, quickly and efficiently, with skills for applying new knowledge to new situations. This new knowledge has to be found or acquired by modern professionals and it most probably will extend its limits out of the scope of their initial field of expertise.

Access to scientific and practical knowledge is no longer a privilege of a few. The massive growth of free education offerings, online resources and open knowledge is not a secret (Wiley, 2007). Knowledge and information are freely available and accessible out there for anyone operating a simple Internet connection or who can afford a smartphone. This is one of the main changes in the epistemology of our society. Higher education institutions are no longer the one central source of knowledge generation, which implies that it is no longer the unique owner and distributor of knowledge either.

Knowledge Revolution

The fast evolution and expansion of ICT has progressively and dramatically steered the evolution from an industrial to a knowledge society. The knowledge revolution that steers the knowledge society is the result of an incremental reciprocal influence between technological developments and scientific advancement (Bell, 1999). The development of sophisticated ICTs from the 90s on allowed the general public and non-scientists to progressively collect, share and create their own knowledge (via online communities, social networks and lately the use of cloud computing for sharing and collaborating) (Sunstein, 2006). Scientists also use the same tools used by the non-scientific general public – as science2.0 - to expand their borders and generate scientific knowledge (Waldrop, 2008). Besides ICT, other technologies are also emerging as a product of this rapid knowledge access at all levels of society. The more technology evolves, the greater the number of tools there are for scientific exploration. New technologies are allowing all scientific fields a deeper and better understanding of natural and societal phenomena by using simulation and computer experiments (Gramelsberger, 2010). The better scientists understand their fields, the more refined are their technical demands so as to answer more complex scientific questions. This interplay between Science and Technology (S&T) is enabling the unprecedented creation of new materials and processes, which allows the design and implementation of ever more sophisticated technological tools at the service of science and society. The rapid dissemination of existing knowledge and know-how, coupled with the possibility to exchange ideas virtually with everyone everywhere, speed up the generation of new knowledge and know-how beyond the limits of the context in which it was originally created.

This expansive wave of knowledge generation is broadening the boundaries of the scientific field to such an extent that it intersects with the expanded limits of other fields. This phenomenon is creating new interdisciplinary territories of research and developments, giving rise to strong demands for transdisciplinary work (Gibbons et al., 1994). Researchers no longer have the image of the isolated scientist in a lab. The scientific fields are becoming so complex and vast that teamwork and networks are necessary. Hence, even in the academic area new skills are required even from junior researchers so as to be able to deal with economy's strong demands better and make the most of the knowledge and technology revolution.

The marriage between S&T is also creating new markets and generating new economic niches. Many of the technological developments created to resolve specific industry demands find their way to other markets. As it is the case with the 3D printer, which appeared in 1983 to meet a demand for cheap prototyping[1], and is nowadays entering the home printer sector, expanding the possibilities of general public for creating new tools and devices for their own use and purposes. Thus, new professional profiles are also required, either by the new academic research fields or by the new economic niches. But in any case, these new professionals should have the competences to be able to go beyond one specific knowledge field.

The aforementioned expanding S&T dynamics currently have an incremental momentum, which is very difficult for old and static organizations like big Higher Education institutions to follow. This is because the entire educational and administrative structure of these extremely traditional institutions has been historically rooted in the division of scientific fields and disciplines. Therefore, their internal organizational structure does not prepare them for meeting the increasing demand for interdisciplinary professionals (either academics or industrial professionals) (Robinson, 1996). The strong fields and discipline structures, which currently function as the skeleton of their research activity and their career offers, it is one of the most challenging situations to be resolved when implementing competences-based curricula.

Technology, Epistemology of Learning and Curriculum Development

We understand curriculum development as a framework that helps to structure instruction in formal educational contexts, and design that instruction pursuant to structuring a learning process in order to achieve determined learning goals. Hence, how instruction is conceptualized, designed and implemented has a direct relation with how the learning process is conceived, and has strong impact on how curriculum is developed. The relation between learning and knowledge depend on the epistemology taken. This is a fundamental conflict faced by curriculum development in the knowledge society, since the knowledge revolution has fundamentally modified the epistemology of our society.

On a theoretical level, epistemology of learning (and thus of teaching) has changed with the evolution of Web 2.0 and social media and its. Transition from individual and private exchange to social and public co-creation. and the current division of scientific fields and disciplines as the backbone of career programs and curriculum development is based on the epistemological belief that knowledge is an object, which is transferable from the head of the 'expert' or teacher to the head of the 'learner.' Learning is understood as the process of transmitting and receiving that knowledge in an individual and fragmented way. It is also based on the idea that knowledge can be segmented and separately delivered. Even the evaluations in the form of tests where the learner must be able to repeat the received information (the received object), reflect this 'knowledge as transferable object' epistemology. In this context, it is difficult to differentiate information from knowledge. The learning metaphor associated to this approach is known as "acquisition metaphor"(Paavola, Lipponen, & Hakkarainen, 2004), reflecting the idea that knowledge can be acquired from another one who has it. That is the reason why the curriculum design based on this metaphor of learning was subject-centered, since the learning process consisted of the transmission of the subject's content. When our current Higher Educational structures were designed, at the service of the industrial revolution (end of XVIII, beginning of XIX century), behaviorism could best explain how learning processes worked, since at that time the technology that nowadays helps us to understand learning process did not exist. No major attention was paid to individual cognitive processes, because there were no mechanisms or technologies to implement them, in terms of learning assessment. Thus, the only way to evaluate at that time was implementing summative assessment, which is based on the behavioral principle of punishment and reward (Harlen & James, 1997, pp. 365-379)

During all these decades, cognitivist and socio-constructivist theories of learning have had the opportunity to be explored more deeply, since technology is at the hand of social and human sciences. When technology first started to approach learning enhancement, the educational systems first tried to reproduce the role of experts in the learning processes of the learners, having their instructional design based in the classical behavioral methods of punishment (when answer is wrong) and reward (when answer is right). The microcomputer revolution in the late 70s and early 80s helped to revive computer-assisted instruction, where cognitivist approaches were implemented. Learning was about creating internal cognitive conflicts in the learner, to modify their internal cognitive structure resulting in learning. Thanks to the development of more advanced ways of combining multimedia interactive educational systems it was possible to create more complex learning scenarios with a broader range of interactions between the learner and the system. Due to the technology available at that time, educational technology was still thought as to be used in an individual way, because learning was also still understood as an individual process, more cognitive than only behaviorist, but still individual. It is at the end of the 90s when the concept of "Computer-Supported Collaborative Learning" or CSCL appears in the scientific scene (Stahl et al., 2006). It is not coincidence that this corresponds to the first boom of Internet based ICT (email, chat, Web 1.0, first eForums, etc.). It is then, when already existent constructivist learning theories, based on the socio-cultural constructivism lead by Vygotsky (Vygotsky, 1978) and its Zone of Proximal Development (ZPD) enter, to play an important role at the pedagogical scene.

Behaviorism, cognitivism and constructivism describe learning theories that are by no means new in the educational psychology field, they exist before the creation of current emergent technologies. However, it is the massification of ever new emerging ICTs and its influence in how communication processes in the daily life have changed that has recalled socio-constructivist theories and makes it nowadays possible (and desired) to put them into practice.

The recall for social-constructivist theories is not only related to the possibility of putting them into practice, but also related to the relativist epistemology underneath. Unlike behaviorism, where knowledge is something to be acquired from another one who has it, in constructivism knowledge has to be created. Here is where 'social learning' comes into play. However, to say: "knowledge is created and its creation is only possible in a social context," it says nothing about how the learning process can be fostered and supported in the practice. Why is social learning more than just getting students to work together? Why is the learning activity so important in order to reach learning goals? There are two general ways of understanding the social construction of knowledge. On the one side, the socio-cognitive constructivism explains that an individual needs the social interaction with the environment or others, in order to generate and resolve socio-cognitive conflicts and this way modify his/her cognitive structure, i.e. learn. From this perspective, although social contact is needed to foster learning, the knowledge creation process remains individual. Sfard (1998) called this the "participation" learning metaphor, where a dialogic process is needed between individuals in order to foster and support knowledge construction. On the other side, socio-cultural constructivism describes learning as a social process of co-creation of knowledge, where the knowledge created is distributed among the ones who participated in its creation, this approach talk about the existents of a 'distributed cognition.' It doesn't belong to one individual and it is represented by so called 'conceptual artifacts,' which are common understandings that allow the group to apply this knowledge and extend it in different situations. This process is called the "knowledge creation" learning metaphor. This process is also called '*trialogic*': since the conceptual artifacts are considered mediation tools of the dialogic process, there exists a third space of conversation where the knowledge is certainly created – the social space of co-creation (Paavola & Hakkarainen, 2004).

In both cases of constructivist approaches, what is needed to produce 'learning' is either generating the context where the individual-cognitive conflicts are created, or designing the appropriated activity where students are able to co-create knowledge. But, in spite of how the learning process is understood, or which learning metaphor is used to describe it, in both cognitive and socio-cultural constructivism, the learner needs to develop social competences or capabilities in order to create knowledge. Hence, even when content is important, the competences to be developed are what defines the most suitable design for the learning activity to be implemented. In this case, segmentation of fields and disciplines that shape the curriculum structure in Higher Education, is one of the main limitations for the appropriate implementation of new pedagogical approaches that allow new professionals to develop the social and knowledge creation competencies needed in the networked knowledge society and produce radical transformation at curriculum development and programs level.

Although the technologies exist for implementing more constructivist approaches, there is a need for changing fundamental structures of Higher Education systems in order to be able to use social learning technologies in an adequate way.

Current Situation Analysis

Universities have for a long time struggled with the use of digital technologies for educational purposes(Hall & Keynes, 2010; Pantò & Comas-Quinn, 2013; Sharples et al., 2012; Stahl, Koschmann, & Suthers, 2006). One of the biggest problems faced is that technological changes are happening faster than the reaction capacity of the educational institutions. The trends of technological development with potential educational uses are changing faster than the institutions' capacity to make decisions regarding cost investments and technological infrastructure. Institutional administrations do not really know the implications of adopting any given technology besides its economic implications. It is out of their scope to analyze pedagogical models and their relation to the institutional business model or goals. Hence a new trend is set before the institution had time to define which would be the most suitable technology for their institutional goals and strategies (Arassham, 2013, para. 2).

Unfortunately, most Higher Education institutions are trying to define their future business models in terms of what technology they will adopt. It has become more a marketing issue than a question of enhancing learning (Collins, 2002, pp. 181-202). Introduction of emerging technologies in Higher Education has broader implications than just selecting the kind of technology to be used. In first place, institutions have to make decisions on their role in the societal scene and define educational models accordingly.

One clear example is the complex decision making process on the arising trend of Massive Open Online Courses (MOOC). This could mean opening up distance learning units. This might be a way to approach new target groups. The idea seems to be simple: the content as well as the didactics are already developed, thus the university has to adapt it to these new technologies. Nonetheless, what that exactly means for the institution is to re-think their educational model, to make decisions on the possibility of offering distance learning besides their regular practice (which differs from the blended learning model). Not all organizations have the enormous structure that MIT has regarding availability of technology and human resources to support the production and distribution of MOOCs. Educational organizations have to make the decisions on where and how they invest their resources (economic, infrastructural and human resources) before defining if they will ride the MOOCs wave and, if so, how they will do it.

It is evident that massification of education challenges the education system in terms of accommodating alternative study needs and providing more flexible teaching modes, such as online learning activities, individualization of education, self-study activities and so forth. It is also clear that MOOCs seem to be a good alternative to face this challenge, but as in many other potential solutions, the implementation of MOOCs is going beyond the acquisition of technical infrastructure to produce and/or host massive online courses, it also has strong implications on the education model adopted by the institution, which of course has implications for curriculum development and teaching. The study Open Education 2030 – Part III Higher Education (2013), looks at open education as a way of to overcome the weaknesses of Higher Education today, and maintain its relevance in society, economics and science. The study points out that open education is, at the moment, to be considered a strategic development of modern Higher Education organizations and suggests an inclusion of open education practices as part of a strategic transformation and not the complete transformation of Higher Education institutions into open education ones. Nevertheless, open education has challenges of its own, for example how to incorporate always-emergent ICTs in their daily practice or how to deliver certifications in the online world (a problem related to online assessment).

Over the last few years, we can also see an rapid increase in the use of social computing applications for blogging, podcasting, collaborative content (e.g., Wikipedia), social networking (e.g. MySpace, Facebook), multimedia sharing (e.g., Flickr, YouTube), social tagging (e.g., Deli.cio.us) and social gaming (e.g., Second Life) among Internet users. Use of online tools and digital media is considered one of the possible opportunities for renovating education and training as well as for contributing to re-skilling and continuing professional development. Social computing applications (Web 2.0, Social Web) have a profound effect on behavior, particularly that of young people whose medium and métier it is. They inhabit it with ease and it has led them to a strong sense of communities of interest linked in their own Web spaces, and to a disposition to share and participate. The challenge for educational institutions is to locate relevant communities of interest since many of these communities of interest will operate across national borders (Higher Education in a Web 2.0 World, 2009, pp. 9-10).

There are many more projects trying to integrate Web 2.0 applications into the overall Higher Education institutional architecture. However, most of them are still at the pilot stage, which makes it difficult, at this point in time, to assess factors for failure and success. Drawing on the analysis of several UK universities' experiences with Web 2.0 applications, Franklin and van Harmelen (2007, pp. 5-6) point out that universities have to address a wide variety of issues in integrating Web 2.0 tools.

Several studies conducted in research project learning 2.0 (2008-2009) by the Institute for Prospective Technological Studies (IPTS) suggest that the high take-up of social media applications outside of formal educational settings provides new opportunities for innovating and modernizing Education and Training institutions and prepare learners for the 21st century. The study "Learning 2.0: The Impact of Web 2.0 Innovations on Education and Training in Europe" by Redecker and colleagues (2009, p. 49) investigates the ways in which social media are and can be used in formal educational settings and illustrates that social media can be, and are, used by Education and Training institutions to:

- Facilitate access by current and prospective students to information, making institutional processes more transparent and facilitating the distribution of educational material.
- Integrate learning into a wider community, reaching out to virtually meet people from other age-groups and socio-cultural backgrounds, linking to experts, researchers or practitioners in a certain field of study and thus opening up alternative channels for gaining knowledge and enhancing skills.
- Support the exchange of knowledge and material and facilitate community building and collaboration among learners and teachers.
- Increase academic achievement with the help of motivating, personalized and engaging learning tools and environments.
- Implement pedagogical strategies intended to support, facilitate, enhance and improve learning processes.

The second study, again by Redecker and colleagues (2010), relates learning to informal (online) learning networks and communities, concluding that social media applications provide easy, fast and efficient ways to access a great diversity of information and situated knowledge. Research on informal learning activities in online networks and communities further suggests that informal Learning 2.0 strategies facilitate the development of key competences for the 21st century.

While the evidence collected in both studies confirms that social media applications have not yet been exploited widely for learning purposes, the research identifies a substantial number of Learning 2.0 opportunities outside and inside formal Education and Training institutions, indicating that Learning 2.0 approaches facilitate the acquisition of key competences and foster technological, pedagogical and organizational innovation. Both IPTS research studies point to the fact that social media can lead to innovations in four different dimensions that have been labeled as the four C's of Learning 2.0 in IPTS research (Redecker et al., 2010, p. 8):

- **Content:** Supports learning and professional development in a lifelong learning continuum; contributes to equity and inclusion and puts pressure on Education and Training institutions to improve the quality and availability of their learning material.
- **Creation:** Digital content themselves and publish it online, giving rise to a huge resource of user-generated content from which learners and teachers can mutually benefit, also encouraging more active and pro-active approaches to learning.
- **Connecting:** Learners with one another, and to experts and teachers, allowing them to tap into the tacit knowledge of their peers and have access to highly specific and targeted knowledge in a given field of interest.
- **Collaboration:** Between learners and teachers on a given project or a joint topic of interest, pooling resources and gathering the expertise and potential of a group of people committed to a common objective.

Nowadays, with ICT being used in learning, classrooms are converted into "virtual" social spaces for learning, where students socialize when experimenting, reading, reflecting, discussing, creating and peer reviewing. Moreover, teaching spaces are becoming learning spaces and use of ICT in courses has become more natural. In practice both "distance" students and campus students are in the same courses. In the authors' opinion there is no suitable definition of the current process that is happening in Higher Education today. "Blended learning" is one of the few expressions that can be used to describe the current process in Higher Education, allowing new teacher-created, bottom-up interpretations, using both the online environment and the physical surroundings

(Sharpe, Benfield, & Francis, 2006, pp. 18-21). Most University courses today are a mix of "face-to-face" and online learning, focusing on online distribution of content and teaching in classrooms as a kind of "half-distance" education.

Even when technology is available, as for example in online courses, social networks analysis for learning analytics, or diversity of social media applications, there are still open questions about how to use it in an efficient and effective way. There is even the question of "what does successful deployment of technology mean when talking about teaching and learning processes in the knowledge society?" We try to answer these questions below.

Factors for a Successful Deployment of Technology in Higher Education

Digital technologies available to education have already expanded dramatically in recent years, but it takes more than technological infrastructure to transform a profession. Teaching staff of Higher Education organizations are trying to understand their new working context. On the one hand, they have to align their practice with institutional requirements like implementing competence-based curricula and using pre-defined institutional learning environments and technologies. On the other hand, they are trying to understand what teaching and learning in the knowledge society means, where students have free access to the information that they are supposed to deliver. Moreover, their knowledge can be put into question by any student on the basis a different perspective found in an expert online community. As a member of Higher Education teaching staff, the question should not be "how should I use the institutional technology?" or "what kind of technology should I look for?", but "what is my role in the learning process?" or better "what does teaching in the knowledge revolution mean?"

The educational researcher Laurillard (2012) in her book "Teaching as a design science," redefines teaching in Higher Education as a science. Laurillard recalls the times when teaching was considered an art, a product of pure inspiration. However, as happened with science, technology has expanded the limits of pedagogy, offering opportunities for implementing alternative learning approaches based on constructivist learning theories. These theories are indeed far from new. Vygotsky already introduced in the 1930s the idea of socio-cultural constructivism, but the possibility of putting it into practice has opened new research questions related to learning processes as well as individual and collective knowledge construction.

Historically, Higher Education teaching staff would deliver content and evaluate how much of this content was caught by students. Therefore, the first approach to the use of digital technologies was oriented to finding different ways of delivering content and evaluating its reception, in a more efficient, effective or even just more enjoyable way (from slides presentations to multiple choice Web-based tests). As Laurillard (2012, p. 2) remarked:

Education could easily be sidetracked into the inappropriate uses of technology if we are not clear what we want from it.

The author describes very well what the current problem that teachers face is, they simply do not know what they should expect from technology. Hence, they have to develop a vision of what they want from it. Furthermore, if we consider the rapid evolution of technologies, they should be able to make strategic decisions on what pedagogical models they will go for, and which kind of technologies will be the most suitable for it. This capability could also be called "foresight thinking."

While educational researchers will better understand what teaching in the knowledge society means, teachers could use those findings and their foresight thinking to imagine new technologies and pedagogical models. Scenario building seems to have a high potential to allow teaching staff also to make better choices about the combination of digital technologies and pedagogical models.

But teachers are not unattached to the organization, and they must be in line with its strategic plan. At the same time, organizations are not able to go forward without considering the teachers' ideas. This needs a good combination of top-down and button-up strategies, in order to better master the future of Higher Education organizations (Morrison, 1997). Therefore participatory methods are necessary in the case of Higher Education institutions, including not only experts but also teaching staff and technicians of the organization. The ultimate goal of the foresight process, besides supporting the strategy development process, would be bringing about a foresight organizational culture (Giaoutzi & Sapio, 2013).

FUTURE TRENDS

A shift in the conception of education has already begun to occur: from being largely governed by the intuitions of individual practitioners to a technology-enabled science of individualized learning. "If this transition signals the initial stages of the deconstruction and reinvention of the university then we are witnessing the educational equivalent of a Copernican revolution: a paradigm change from the previous millennium's orthodoxy of place-centric instruction toward a scientifically grounded network of technology-enabled learning" (Open Education 2030 – Part III Higher Education, 2013, pp. 27-31). In its 2011 Joint Research Centre Report, "The Future of Learning: Preparing for Change" the European Commission endorses a model "shaped by the ubiquity of Information and Communication Technologies (ICT)" as its "central learning paradigm" (Redecker et al., 2011). It predicts that embedding assessment "in the learning process and pedagogy will rely increasingly on interaction, including the interaction with rich technological environments, which will be responsive to learners' progress and needs" (Redecker et al., 2011b).

Using technology in ways that individualize learning will not only serve the educational needs of traditional school-age populations, but the lifelong and life-wide needs of adults as well as they seek flexible options for upgrading and expanding their knowledge, skills, and employment credentials.

"Life-long learning and "distance education" had been the University "project idea," driven by technology or political discourses, and its use of ICT focused as "transportation of education" to a broader range of students. Distance learning made some motivated students happy to finally access education, but other students ended up lonely and lost with half-completed courses, ensuring they would never try again. Teaching on campus went on like before, but with shrinking resources and with ICT as an "add-on" for rationalizing tedious functions in traditional courses. (Jahnke & Norberg, 2013, pp. 129-134)

People with older educational conceptions, meaning that relevant information should to be memorized, had almost all drowned in information already, but the associated teaching methods were still there, with the teaching classroom as the natural home. This model failed to succeed since Higher Education institutions did not come through these challenges.

With the rise of Open Educational Resources (OER) movement and MOOCs new possibilities for life–long learning outside of universities, self-directed and in communities, are produced. The new usage of the education material proposed by the Open Education model and the new associated facilities questions the traditional model of knowledge delivery and in particular the usual flow of material produced by the experts (from the academia or the practitioners) and delivered to the users (students or participants). This raises issues of quality but also changes the current landscape and relations *in* teaching and learning as new actors now appear within the science. The Open Education movement breaks down traditional barriers, which have favored the consolidation of

Table 1. Comparison of "final 12" topics across three NMC horizon research projects (technology outlook for community, technical, and junior colleges 2013-2018, 2013, p. 1)

Time-to-Adoption Horizon	NMC Horizon Report 2013 Higher Education Edition	Technology Outlook for Community, Technical, and Junior Colleges 2013-2018	Technology Outlook for STEM+ Education 2012-2017
One Year or Less	Flipped Classroom Massive Open Online Courses Mobile Apps Tablet Computing	BYOD Flipped Classroom Online Learning Social Media	Cloud computing Collaborative Environments Mobile Apps Social Networking
Two to Three Years	Augmented Reality Games and Gamification The Internet of Things Learning Analytics	Badges Games and Gamification Learning Analytics Next-Generation LMS	Augmented Reality Learning Analytics Massive Open Online Courses Personal Learning Environments
Four to Five Years	3D Printing Flexible Displays Next-Generation Batteries Wearable Technology	The Internet of Things Natural User Interfaces Virtual Assistants Virtual and Remote Laboratories	Collective Intelligence The Internet of Things Natural User Interfaces Wearable Technology

the closed education system, based on top-down provision and built around teacher-centered and classroom-based concepts of learning. The future of life-long learning will not be about MOOCs as they are today. But as MOOCs already show, new dimensions of flexibility and non-linearity are already within reach today.

More and more parts of what we today call "tacit knowledge" are being made explicit in metadata, and have to be shared with others. This means the discipline so essential to learning will be pervasive in all our activities. The authors of this paper argue that the learning activities we will do in the future will be self-explaining, like most software today which has become so user-friendly that even complex image enhancement can be done on a smartphone by virtually anyone taking a photo. This requires immersive learning approaches.

For instance, many people already use social media as informal learning settings or have created trusted networks of professionals using the Internet and other social tools to communicate, collaborate and share resources, experiences, knowledge and ideas. People can also use various online tools and their own devices (ranging from pen and paper to cameras and smartphones, iPads, etc.) to address their own learning and performance problems - particularly where access to formal education and public social sites has been blocked. As Floridi (2007) argues, we are the last generation to make a clear difference between online and offline worlds.

The New Media Consortium (NMC) Horizon Project, as the centerpiece of the NMC Emerging Technologies Initiative, charts the landscape of emerging technologies for teaching, learning, research, creative inquiry, and information management. The 2013 NMC Horizon Report Technology Outlook for Community, Technical, and Junior Colleges 2013-2018 (2013) identified the emerging technology trends and key drivers of technology adoption for the period of 2013 through 2018. When looking at Comparison of "Final 12" Topics Across Three NMC Horizon Research Projects (Table 1), we can see that 12 "technologies to watch" overlap in interesting ways among Higher Education, Community, Technical and Junior Colleges and STEM[2] Education.

Mobile learning, in some form, is a trend that will span Higher Education across much of the world within the next year. Researchers in three Advisory Boards are in consensus about learning analytics being positioned two to three years away from widespread adoption. However, the Internet of Things is in the far-term, except for the Higher Education group where this technology is more imminent and is predicted for adoption within two to three years. Current concrete examples of the Internet of Things are mainly taking place in research departments at four-year universities. Further we see that games and gamification did not have clear implications for teaching and learning in the STEM group. Online learning, whether in the form of MOOCs or other opportunities, is positioned on the near-term horizon. Also, there is a clear and mounting emphasis on online learning and more pervasive access to learning opportunities at two-year institutions.

A number of technologies distinguished the viewpoints expressed by the 2013 Horizon: BYOD, social media, badges, next-generation LMS, virtual assistants, and virtual and remote online laboratories, although mostly considered by other recent panels, were seen as likely developments for two-year institutions over the next five years. As online learning gains more traction, Higher Educational institutions will have to find ways to engage learning analytics in order to recognize student accomplishments and skill acquisition.

Meanwhile, virtual and remote laboratories are taking the pressure off of colleges to purchase and maintain expensive, high quality lab equipment, and allowing learners to conduct experiments with greater flexibility. We can say that a key trend is ubiquitous learning allowing learners to have the freedom to work and study from any location and on any device they choose. With the rise of mobile learning and social computing applications, educators will need to develop educational models that make learning experiences more personal.

For a long time, Universities used technology to record, broadcast, and recreate classroom practices and structures in virtual learning environments (VLE), streamlining them. But in future, the traditional teaching space may not be the central metaphor for education, and not meaningful to augment with technology. What is the place for future "open" Higher Education if we have to call it something? It won't be the "teaching place" any longer, nor the "classroom as learning place" (that was long ago), not only a "student collaboration place," not really all in the "cloud" but probably there will be a sort of "ICT-supported social information sphere" between teachers and learners, always using places as tools as well as books, OER, and social computing applications as tools.

CONCLUSION

Education in the 20th century was mainly oriented towards socialization as it is the "universal" gate to citizenship and social inclusion. While socialization dominated, individualization and professionalization were also important in a steadily growing economy. Nowadays education policy might be requested in the short-run to turn to professionalization and "employability" as its primary short-term goal. In the second decade of the 21st century, schools and education policy-making are trying to enhance their means to meet this challenge, by focusing somehow more on the autonomy of the learner and ownership of the learning process, preparing pupils to become autonomous, creative and critical learners (and thus citizens) rather than good re-producers of knowledge. Self-expression of the learners, in view of encouraging autonomy and creativity, is to be stimulated in classrooms; with multi-cultural integration representing the big challenge on the socialization side.

The knowledge society requires education to raise autonomous (lifelong) learners and critical citizens rather than recipients of content. It pushes towards more learner-centered processes - able to support individual differences and autonomy in learning. This includes active learning strategies, challenge and problem-based learning and collaborative learning experiences.

A university curriculum for the future should emphasize differentiation, flexibility and quality, it should provide students with the capacity for lifelong learning which will become more and more important in the competitive knowledge society of the future, it should develop key skills like critical thinking as well as specialized knowledge and it should combine theory and practice.

Education is rapidly approaching the time when educators of limited vision will be weeded out and instructors dedicated to life-long learning and educational advancement are left to design future curricula. In order to impact students in an effective manner, strategies must be developed which coincide with real-time and relevant information systems. Life-long education is the key for future successful educational delivery. The future is steeped in virtual pedagogy and educators must be able to integrate technology with curricular design in order to be successful contributors to the future of education. Addressing Web-based curricula is quickly becoming the new trend in educational mainstream thinking. “There is rapidly becoming a calling for educators who can facilitate online forums, navigate the Web for application, design and implement virtual curriculum, and come away with successful outcomes” (Eberwein, 2013, p. 5).

As mentioned in the Open education 2030 – Part III Higher Education (2013) report “Higher education may seem to be undergoing disruptive change, but is not yet undergoing radical innovation, at least not at scale” (p. 5). The analysis of emergent trends or scenario building seems to not have been exploited sufficiently for supporting organizational strategic development in Higher Education.

Future careers will require new levels of education compared with the past. That future education must enable individuals to discover what they need to know rather than just having static knowledge. Society will need college graduates with meta-cognitive skills, agility and adaptability to changing society needs.

If this is the goal of education, colleges and universities must re-examine how that goal is achieved. In current educational technology training for university teachers, theory is separated from practice, curriculum lacks a certain pertinence, means of evaluation are few and other such problems are prevalent. There are so many directions, disciplines, methodologies, and interpretations, the implications are staggering. One thing is for certain though: “The best instruction digitally and the best curriculum digitally can turn any resource-poor learning environment into a classroom of the future” (Rivero, 2006, p. 56). The integration of technology pedagogically is the true future of curricula and all prospects associated with educational direction. Educators are challenged with the necessity to keep pace or perish. There is actuality no choice in the direction for future educational doctrine, in the authors’ opinion. Teachers need to become proactive participants referencing their continued life-long education. There is no room for complacency, as the educational world now developing in cyberspace becomes the main delivery system for our very near future. So educational planners need to heed the obvious implications presented, and actively entertain a new era for pedagogical presentation.

REFERENCES

Arassham, H. (2013). *Interactive education: Impact of the internet on learning & teaching*. Retrieved from: http://home.ubalt.edu/ntsbarsh/interactive.htm

Beerkens-Soo, M., & Vossensteyn, H. (2010). *Higher education issues and trends from an international perspective*. Center for Higher Education Policy Studies, University of Twente. Retrieved from http://www.oecd.org/education/skills-beyond-school/educationataglance2009-survey.htm

Bell, D. (1999). *The coming of post-industrial society: A venture in social forecasting*. New York, NY: Basic Books.

Bokor, J. (2012). *University of the future*. Ernst & Young. Retrieved from http://www.ey.com/Publication/vwLUAssets/University_of_the_future/$FILE/University_of_the_future_2012.pdf

Castells, M. (2009). The rise of the network society: Vol. I. *The information age: Economy, society, and culture*. Chichester, UK: John Wiley &Sons.

Collis, D. J. (2002). New business models for higher education. In S. Brint (Ed.), *The future of the city of intellect: The changing American university* (pp. 181–202). Palo Alto, CA: Stanford University Press.

Eberwein, D. (2013). *Curriculum trends in education*. Retrieved from http://www.examiner.com/article/curriculum-trends-education

European Commission. (2011). Horizon 2020–The framework programme for research and innovation. *Communication, COM808*. Retrieved from http://ec.europa.eu/research/horizon2020/pdf/proposals/communication_from_the_commission_-_horizon_2020_-_the_framework_programme_for_research_and_innovation.pdf#view=fit&pagemode=none

Floridi, L. (2007).The future development of the information society. In Akademie der Wissenschaften zu Göttingen (Eds.), *Jahrbuch der Akademie der Wissenschaften zu Göttingen 2007* (pp. 175-187). Retrived from http:/ /num.math.uni-goettingen.de/schaback/info/mat/Floridi-InfSoc.pdf

Franklin, T., & Van Halmen, M. (2007). Web 2.0 for content for learning and teaching in higher education. *JISC*. Retrieved from http://www.jisc.ac.uk/media/documents/programmes/digitalrepositories/web2-content-learning-and-teaching.pdf

Giaoutzi, M., & Sapio, B. (2013). *Recent developments in foresight methodologies*. New York, NY: Springer. doi:10.1007/978-1-4614-5215-7

Gibbons, M., Limoges, C., Nowotny, H., Schwartzman, S., Scott, P., & Trow, M. (1994). *The new production of knowledge: The dynamics of science and research in contemporary societies*. London, UK: SAGE Publications.

Gramelsberger, G. (2010). *Computerexperimente: Zum wandel der wissenschaft im zeitalter des computers*. Bielefeld, Germany: Transcript.

Hall, W., & Keynes, M. (2010). *A literature review of the use of web 2.0 tools in higher education.* Retrieved from http://www.heacademy.ac.uk/assets/EvidenceNEt/Conole_Alevizou_2010.pdf

Harlen, W., & James, M. (1997). Assessment and learning: Differences and relationships between formative and summative assessment. *Education: Principles*. *Policy & Practice*, *4*(3), 365–379. doi:10.1080/0969594970040304

Higher Education in a Web 2.0 World. (2009). *JISC independent committee of inquiry report into the impact on higher education of students' widespread use of web 2.0 technologies*. Retreived from http://www.jisc.ac.uk/media/documents/publications/heweb20rptv1.pdf

Hüsing, T., Korte, W., Fonstad, N., Lanvin, B., Cattaneo, G., & Kolding, M. …Van Welsum, D. (2013). *E-skills for competitiveness and innovation vision, roadmap and foresight scenarios*. Retrieved from http://eskills-vision.eu/fileadmin/eSkillsVision/documents/VISION%20Final%20Report.pdf

Jahnke, I., & Norberg, A. (2013). Digital didactics -Scaffolding a new normality of learning. In *Open education 2030 -Contributions to the JRC-IPTS call for vision papers. part III: Higher education*, (pp. 129-134). Retreived from http://blogs.ec.europa.eu/openeducation2030/category/vision-papers/higher-education/

Laurillard, D. (2012). *Teaching as design sciences: Building pedagogical patterns for learning and technology*. New York, NY: Routledge.

Leuven Communiqué. (2009). *The Bologna process 2020-The European higher education area in the new decade*. Retrieved from http://www.ond.vlaanderen.be/hogeronderwijs/bologna/conference/documents/leuven_louvain-la-neuve_communiqu%C3%A9_april_2009.pdf

Morrison, J. L. (1997). Transforming educational organizations. *Horizon*, *5*(1), 2–3.

OECD. (2009). Education at a glance 2009. *OECD Indicators, 472*. Retrieved from www.oecd.org/dataoecd/32/34/43541373.pdf.

Open Education 2030 Directorate – Part III Higher Education. (2013). *Directorate general of the European commission oppening up education initiative report*. Retrieved fromhttp://is.jrc.ec.europa.eu/pages/EAP/documents/All_OE2030_HE_v%204_author%20revised_OK.pdf

Paavola, S., & Hakkarainen, K. (2004). Trialogical processes of mediation through conceptual artifacts. In *Motivation, learning and knowledge building in the 21st century*. Retrieved from http://www.academia.edu/533526/_Trialogical_processes_of_mediation_through_conceptual_artifacts

Paavola, S., Lipponen, L., & Hakkarainen, K. (2004). Models of innovative knowledge communities and three metaphors of learning. *American Educational Research Association*, *74*(4), 557–576.

Pantò, E., & Comas-Quinn, A. (2013). The challenge of open education. *Journal of e-Learning and Knowledge Society, 9*(1).

Redecker, C., Ala-Mutka, K., Bacigalupo, M., Ferrari, A., & Punie, Y. (2009). *Learning 2.0: The impact of web 2.0 innovations on education and training in Europe, IPTS policy brief*. Retrieved from http://ftp.jrc.es/EURdoc/JRC55629.pdf

Redecker, C., Ala-Mutka, K., & Punie, Y. (2010). *Learning 2.0 - The impact of social media on learning in Europe*. IPTS Policybrief. Retreived from http://ftp.jrc.es/EURdoc/JRC56958.pdf

Redecker, C., Leis, M., Leendertse, M., Punie, Y., Gijsbers, G., & Kirschner, P. … Hoogveld, B. (2011). *The future of learning: Preparing for change*. Retreived from http://ftp.jrc.es/EURdoc/JRC66836.pdf

Rikowski, R. (2005). *Creating value from knowledge in the knowledge revolution*. Retrieved from http://libr.org/isc/articles/20-R.Rikowski.html

Rivero, V. (2006). Teaching your students. *The American School Board Journal*, *193*(9), 56–5.

Robinson, J. B. (1996). Falling between schools: Some thoughts on the theory and practice of interdisciplinarity. In L. Salter & A. Hearn (Eds.), *Outside the lines: Issues in interdisciplinary research* (pp. 85–92). Quebec City, Canada: McGill Queen's University Press.

Sfard, A. (1998). On two metaphors for learning and the dangers of choosing just one. *Educational Researcher*, *27*(2), 4–13. doi:10.3102/0013189X027002004

Sharpe, R., Benfield, G., Roberts, G., & Francis, R. (2006). *The undergraduate experience of blended e-learning: A review of UK literature and practice*. The Higher Education Academy. Retrieved from http://www.islamicstudiesnetwork.ac.uk/assets/was%20York%20-%20delete%20this%20soon/documents/ourwork/archive/blended_elearning_full_review.pdf

Sharples, M., McAndrew, P., Weller, M., Ferguson, R., FitzGerlad, E., & Hirst, T. …Whitelock, D. (2012). *Innovating pedagogy* (No. 1). Milton Keynes, UK: The Open University. Retrieved from http://www.open.ac.uk/personalpages/mike.sharples/Reports/Innovating_Pedagogy_report_July_2012.pdf

Stahl, G., Koschmann, T., & Suthers, D. (2006). Computer-supported collaborative learning: An historical perspective. In R. K. Sawyer (Ed.), *Cambridge handbook of the learning sciences* (pp. 409–426). Cambridge, UK: Cambridge University Press.

Sunstein, C. R. (2006). *Infotopia: How many minds produce knowledge*. Oxford, UK: Oxford University Press.

Technology Outlook for Community, Technical, and Junior Colleges 2013-2018. (2013). *NMC horizon project sector analysis report.* Retrieved from http://www.nmc.org/pdf/2013-technology-outlook-community-colleges.pdf

Terry, L. S. (2008). Bologna process and its impact in Europe: It's so much more than degree changes. *The. Vand. J. Transnat'l L., 41*, 107. Retrieved from http://heinonlinebackup.com/hol-cgi-bin/get_pdf.cgi?handle=hein.journals/vantl41&section=11

Trow, M. (1973). *Problems in the transition from elite to mass higher education.* Carnegie Commission on Higher Education. Retrieved from http://eric.ed.gov/?id=ED091983

Trow, M. (2000). From mass higher education to universal access: The American advantage. *Minerva*, *37*(4), 303–328. doi:10.1023/A:1004708520977

Van der Baaren, J. (2013). *Cheaper, better and more relevant higher education using shared online courses*. OECD Publishing. Retrieved from http://www.openuniversiteit.nl/Docs/Expertise/OTEC/Publicaties/john%20van%20der%20baaren/ContributionOE2030.pdf

Vygotsky, L. (1978). Interaction between learning and development. *Mind and Society*. Retrieved from http://www.psy.cmu.edu/~siegler/vygotsky78.pdf

Waldrop, M. M. (2008). Science 2.0. *Scientific American*, *298*(5), 68–73. doi:10.1038/scientificamerican0508-68 PMID:18444327

Wiley, D. (2007). *On the sustainability of open educational resource initiatives in higher education*. Retrieved from http://www1.oecd.org/edu/ceri/38645447.pdf

KEY TERMS AND DEFINITIONS

Curriculum Development: Curriculum development is the process of designing and creating structures for instruction in formal education. It is based on pedagogical approaches and learning goals. It covers a broad spectrum from structuring a career program to designing classroom lesson activities.

Educational Technology: Educational technology is the area of study that focuses on effective processes to facilitate learning using technologies and understanding the impacts of technology on enhancing teaching practices and learning processes. The idea behind this term is that every kind of technology can be used for teachers or learners for educational purposes, and its effects on the learning process depend on the instructional design in which the technology is implemented.

E-Learning 2.0: E-learning 2.0 refers to a model of e-learning developed with the emergence of Social media applications and the influence of new practices in e-learning. E-learning 2.0 assumes that the traditional model of e-learning where content is produced by courseware authors, organized and structured into online courses, and consumed by students, is transformed. Increased use of social media applications has resulted in new practices in e-learning and social networks are used to foster online learning communities around learning subjects. From an e-learning 2.0 perspective knowledge is socially constructed so that content is used rather than read and is more likely to be produced by students than courseware authors.

Epistemology of Learning: Epistemology is a branch of philosophy that investigates the origin, nature, methods, and limits of human knowledge. Epistemology of learning is the understanding of what is knowledge acquisition, how knowledge is created and what shapes the understanding of the learning process.

Knowledge Revolution: Knowledge revolution refers to paradigmatic, societal change that affects most spheres of a society. The knowledge revolution is considered to follow the industrial revolution by changing the emphasis from labor, capital and resources towards knowledge as the basis of innovation, and innovation as the main driver of modern society.

MOOC: Massive Open Online Course provides open access without charge to an online course of study over the Web to a very large number of people. MOOCs provide learning and assessment materials, videos, readings and interactive features for users like forums that help build a community for the students and professors.

Online Learning (E-Learning): Online learning (e-learning) is the Web-based training model which uses Learning Management Systems (LMS) to create, design, and manage online courses, as well as supporting content delivery, user registration, monitoring, and certification. The focus of the system is on content delivery to learners, with less consideration for the learning process. There is not much scope for communication and collaboration. Even though tools for collaboration are available in LMS, their application in learning is negligible.

Open Education: Open education describes institutional policy and learning philosophy that eliminates barriers and brings opportunities to participation and recognition of learning resources traditionally offered through formal education systems. With the development of Web technologies, learning resources become accessible online through formal and informal open education programs.

Social Media Applications: The term "social media application" refers to the range of Web applications based on Web 2.0 technologies that enable users to socially interact with one another online. These applications allow users to gather, represent, process, use, and disseminate information online in diverse ways and through a variety of media, producing dynamic virtual spaces - "online communities" - which share information on the Web. Some examples of social media sites and applications include Facebook, YouTube, Del.icio.us, Twitter, Digg, blogs and other sites that have content based on user participation.

ENDNOTES

1. For further information see http://www.3dprinterprices.net/history-of-3d-printing/
2. Science, Technology, Engineering and Mathematics.

This work was previously published in Andragogical and Pedagogical Methods for Curriculum and Program Development edited by Victor C. X. Wang and Valerie C. Bryan, pages 362-381, copyright year 2014 by Information Science Reference (an imprint of IGI Global).

Chapter 38
Blending in the Humanities:
Course Model and Assessment Results

Astrid Klocke
Northern Arizona University, USA

Danielle Hedegard
Northern Arizona University, USA

ABSTRACT

Does technology de-place opportunities for meaningful engagement? Is the reduction of face-to-face time in a blended course a loss to students? And if so, what students are most affected by this shift? Can a blended course only work in disciplines that rely on teaching "facts" or can the recent emergence of digital humanities serve as a framework and provide disciplinary-specific insights for the use of teaching technology in the humanities? This chapter explores the use of learning technology and blended design in an introductory humanities course. Further, the chapter presents a blended course model, assessment data, and ideas for contextual reflection about how change in higher education paradigms is affecting the humanities in order to address them in a cooperative, non-disruptive way. Finally, the unique context, assumptions, and causes for resistance to change in the humanities with regard to technology and blended pedagogy are discussed. This chapter is intended to help readers anticipate and address particular disciplinary perceptions of blended learning.

INTRODUCTION

Why blend in the humanities? This chapter will explore the use of learning technology and blended design in an introductory cinema studies course offered in the humanities. Often it is asserted that technology does not allow for types of learning contexts deemed central to humanities such as social and communal interaction, spontaneity, and embodied presence. Does technology de-place opportunities for meaningful engagement? Is the reduction of face-to-face time in a blended course a loss to students? And if so, which students are most affected by this shift? Can a blended course only work in disciplines that rely on teaching "facts" or can the recent emergence of digital humanities serve as a framework and provide disciplinary-specific insights for the use of teaching technology in the humanities? Surveys of students, faculty and administrators have shown distinct perceptions of

DOI: 10.4018/978-1-4666-8246-7.ch038

the effectiveness of blended courses, in contrast to fully online courses (ECAR, 2013; Allen, Seaman, Gerrett, 2007).

This chapter will present a blended course model, assessment data, and ideas for contextual reflection about how change in higher education paradigms is affecting the humanities. The chapter seeks to address these issues in a cooperative, non-disruptive fashion. It will also discuss the unique context, assumptions, and causes for resistance to change in the humanities with regard to technology and blended pedagogy. It will help readers anticipate and address particular disciplinary perceptions of blended learning.

The pace of change in higher education is increasing. Competition to the traditional undergraduate residential model comes from more than for-profit universities; it comes from MOOCs, competency-based/personalized learning programs, and from online degree programs, some largely built by corporate partners of universities. This chapter will not discuss the merits or even pace of this change. Rather, the guiding questions are: How will the humanities be affected by the inevitable changes? How will the call for professionalization and the pressures to prepare students for specific careers with specific skills be answered? How can the core values of the humanities for all students' education be preserved while ongoing changes seemingly privilege "fact-based" knowledge? Furthermore, how can humanities scholars and teachers be in charge of the changes that affect the field? How can we answer the call to be more efficient while preserving the quality of instruction and student learning outcomes? The basic premise of this chapter is to enable colleagues in higher education to take charge of change rather than resign to passive resistance. Our blended course design model permits preservation of the essential core values of teaching the humanities for student success with institutional demands for efficiency in mind through the use of teaching technology.

COURSE MODEL: CINE 101, INTRODUCTION TO CINEMA, AND VISUAL CULTURE

At Northern Arizona University in 2012, a course in Cinema Studies was redesigned as a blended course in the first round of the President's Technology Initiative. The course has since served as a pilot and model across all disciplines, as faculty redesign more courses in the second and third rounds of the initiative. Total enrollment in the multi-section course (and thus the number of class sections offered) since the blended redesign was implemented has increased by over 1000%, from 31 to 347 in just two years, and helped bolster a small humanities program (Cinema Studies).

The course has increased efficiency in delivery—one of the main institutional goals of the President's Technology Initiative—through its hybrid schedule: it meets once a week, instead of twice, for 75 minutes of face-to-face time. The other half of the course is conducted online. The utilization of classroom space has thus increased by 100%, as the course can share a 150-minute time slot in the same classroom among pairs of its sections. The course has also been able to more than double enrollment capacity in each section (from 30 to 70), increasing efficiency for the university and the department. (However, it has not reached its goal of conserving faculty effort, as managing the higher number of students in each section has more than outweighed the in-class time saved for the instructor.)

The course was designed for two programs, and its design principles were aligned with their respective student learning outcomes: 1. The Liberal Studies program at Northern Arizona University and 2. The new interdisciplinary minor in Cinema Studies, housed in the Department of Comparative Cultural Studies.

1. Liberal Studies: Design for Student Success

The course bears Liberal Studies credit at Northern Arizona University, within the "Aesthetic and Humanistic Inquiry" (AHI) block, with a focus on the skill of effective writing. Courses in this block involve students in the study of the human condition through philosophical inquiry and in analysis of the various forms of creative expression. The course specifically focuses on film and the various forms of visual culture. Students develop an understanding of the relationship between the historical, political, social, and aesthetic context and the human creative expression of visual culture and cinema. The course makes use of major conceptual frameworks and concepts such as the theories of representation and agency. It explores the diversity of cinematic expressions informed by national, global, ethnic, and gender identities. Students also develop their capacities for analysis and ethical reasoning through a variety of means, including close reading of film texts and comparative explorations of the materials of visual culture. The course incorporates key design principles from the First Year Learning Initiative (FYLI) at Northern Arizona University, an innovative program that is geared toward socializing freshmen for success and excellence. (The course gained official FYLI certification during its initial redesign phase in summer 2012.)

The course explicitly addresses critical practices such as time management and study skills. The syllabus includes a section on the types of meetings to expect in this blended class. It also urges students not to fall behind. Class assignments are scheduled on a regular and thus predictable basis, due on the same day of the week, at the same time. This encourages routine and easier time management. There are no pop quizzes, additional assignments, or modifications to the assignments listed on the syllabus so students are not blindsided with a change in expectations or deadlines. (Revisions to the class assignments are made, if necessary, between semesters.) All class materials are easily accessible via BlackBoard Learn, including all films assigned for this class and additional ones mentioned in the textbook. Students can work at their own pace and complete tasks and assignments when it is convenient for them.

The course offers a realistic understanding of the time and effort that is needed to succeed. Students respond to a question about their expectation of time involved in taking this class in the initial survey. The instructor then directly addresses misconceptions during the first week of the semester. The learning activities and assignments are structured in a way that emphasizes their connection and scaffolding. Students have a clear understanding of progression. In addition, the headers on each BlackBoard Learn chapter page tell students what to expect in a chapter, how it relates to the last one, and what parts of it will be used later in the course, i.e. what will be on the exams and what will come in useful for the essay. Furthermore, all these future assignments are already visible at the beginning of the semester so that students can build realistic expectations about the effort involved in succeeding.

The course explains how to access class materials and other academic support programs. All class materials, except for the actual textbook, are made available to students in the class shell on BlackBoard Learn. This includes all supplemental readings, all films assigned for this class, all extra credit assignments, and optional online resources. Students also know from day one how to work with the teaching assistants. A paragraph is included on the syllabus in which it states that meetings with the teaching assistants have the status of "class meetings," i.e. they will be mandatory and should be expected on a regular basis (sometimes during scheduled class time, which the blended format allows for). This tactic focuses students' attention on the main skill this Liberal Studies course is supposed to build: writing. Instructors identify groups and individual students to work closely with the teaching assistants on editing and revising all their written assignments throughout the semester, not just the final essay.

The course work is challenging and rigorous: Within the first two weeks of class, students are required to invest considerable effort. Students are assigned to fixed groups for the semester and work with their peers on the experiential part of the course. In order to reinforce the importance of this group set-up and to engage students with their respective group's dynamics from the very beginning, the first group assignment has been designed to be both fun and connected to the interest in movies that most students bring to this class. As a group, they go to a commercial movie screening and report and reflect on the marketing strategies they were exposed to before they saw the movie. A short written report has to be handed in by all members of the group by the end of week 2. This assignment is low-stakes yet ensures that students engage from day one with the class material and, most importantly, with their peers. The assignment also requires basic writing, one of the focus areas of the class. During the same time, weeks 1 and 2, students also read the first textbook chapter and complete a basic reading comprehension quiz and a short written assignment. Both of these assignments are also low-stakes and students have the option of dropping the quiz grade should it prove to be the lowest of the semester.

Challenging and rigorous course work also maximizes student time on task. Readings and viewings are guided by and immediately reflected in the quizzes and assignments. All assignments are "open book." Students know what they have to do with the material before they start engaging with it. Similarly, students connect with a local film event/series/festival with the goal to develop a marketing strategy for an on-campus audience. This clear goal is set from the beginning and the outcome is later demonstrated in an oral group presentation. Students know the "what," the "where," and the "why"—before they start the project.

The course develops the experiences that students need to succeed in more complex tasks, assignments, or analyses. Within each class module, assignments are scaffolded: from reading comprehension quizzes to short written assignments to exams. The modules build on each other and culminate in module 4, which guides students toward putting the individual pieces together for a complex film analysis essay—the disciplinary signature assignment for a cinema studies class. In the experiential part of the class, the students at first describe their own response to movie advertising. In the next step they analyze the marketing needs of a local film event. And in the final step, they themselves create a targeted marketing strategy. They execute this marketing strategy and report on its effectiveness in their final group presentations during the last two weeks of the semester.

The class is designed to actively engage students in multiple ways: with each other, with the material, and with the instructor. In addition to the group work in the experiential part students also engage with each other during the peer editing phases of the essay in module 4. Students engage with the content material in a direct way, by scheduling assignments immediately following the readings and viewings. There is no lag time between completing a reading, for example, and applying the new knowledge to a written assignment. The blended format allows the instructor to meet with students individually and in small groups on a frequent basis, rather than solely in full-frontal discussions in the lecture hall or in limited office hours. Toward the end of each module, as students progress from basic comprehension to more complex, higher learning activities, the instructor is able to provide more guidance and feedback than in a regular lecture class.

The course requires attendance and/or participation to give students the best chance to succeed and to set up the expectations for success. In line with the university attendance policy, attendance in this class is mandatory and counts 12% of the final grade. Students are informed of this policy in the syllabus and also during class on the first day. They are also reminded of this policy via the Grade Performance Status (GPS) tracking system used at Northern Arizona University if they miss meetings. TAs report to the instructor about students who do not show up to scheduled meetings. In addition, attendance is taken the old-fashioned way in the face-to-face meetings and in meetings with the instructor. Furthermore, students have to "attend" virtually in a very structured fashion, and if they do not complete quizzes or chapter assignments the instructor intervenes immediately and contacts students about missed online sessions.

The course uses lectures strategically, if at all. Full-frontal lectures are used for part of the first class meeting: to give an introduction to the class format and content and to go over the class rules on the syllabus. After that, there are few traditional face-to-face lectures for the entire class. Content is processed online and students engage with the class material via tasks other than listening, such as group discussions, collaborative work, with in-class follow-up presentations.

To set clear expectations the course uses rubrics extensively and exclusively for the chapter assignments, for exams, and for the film analysis essay. These rubrics are presented on the syllabus and explained on the first day and again later in the semester, as students prepare for the exams and essay. The rubrics are used within BlackBoard Learn and linked to the assignments. They are used for online feedback.

The course offers early and formative feedback and frequent low stakes assessments. The chapter quizzes and assignments begin in week 1, build on each other, and are only worth 2% of the final grade for the class. Each module's chapter quizzes and assignments then lead to a more complex module assignment, the exams. Students thus receive not just regular but scaffolded, formative feedback, as assignments get more complex. Students also receive early feedback for their group work. The first project is due at the end of week 2. During weeks 3-10 the instructor checks in frequently with each group to see how they are progressing on the marketing project. The groups then present their final reports and receive peer feedback during the last third of the semester.

The course addresses the current interests and conceptions that shape how students approach the discipline. Students take a survey at the beginning of class that asks them to reflect on what interests and conceptions they bring to the class. They are asked a similar question about how their ideas have changed on the two midterm surveys. During the introductory lecture, the instructor addresses common ideas students have about the study of film and provides examples of what students can expect to do in this class. For example, most students expect to watch films during class meetings in a film class. We tell them that this passive activity will happen outside of class, online, and that the different types of class meetings are used for more active and especially collaborative types of tasks.

The course takes into account students' diverse cultural backgrounds. All online material has been designed and made accessible following Universal Design standards. All foreign films included in this class have subtitles to aid all students' comprehension. Films have been chosen from a variety of global cultural and language contexts. Peer TAs help students with English language problems on the written assignments.

The course assesses the critical skills and/or knowledge students have when they enter the course. The first group assignment challenges students to put to use the knowledge they have about the movie industry and its marketing. They have to reflect on a process that most of them have been exposed to in an unconscious fashion: advertising for blockbusters. They have the knowledge of what it is but might never have thought about what effect it has on them and their viewing experience through the creation of expectations. The instructors also assess students' level of proficiency in basic writing through this first assessment and guide selected students to use tools available to them through the university-wide MyWriting Lab as deemed necessary.

The course effectively utilizes student learning outside of the classroom. The experiential part takes place outside of the classroom. It is a learning experience in the form of a mini-internship with a local film festival, film series or film event. It counts for 10% of the total grade. Additional encouraged activities include campus film events and Cinema Studies Club. These events vary from semester to semester, as programming changes. The course thus promotes social interactions among students. Students work intensely in assigned groups and also meet with other groups. In addition, they interact with students outside of the class at film events, e.g. students talk to people in the audience, at the receptions, and post-screening discussions. As part of some of the internships, students interview attendees at those events. Students also give presentations in other classes and student clubs on campus about the film festivals and series where they function as interns. They field questions from other students about these events.

The coordination scheme is prescriptive for the whole semester and ensures consistency, alignment, and student success. One experienced faculty member coordinates all sections during a given semester. Each section instructor meets on an ongoing basis with the coordinator to discuss the structure of the class, to ask questions about the assignments or online modules, and also to report student performance to the coordinator. Communication as a team is accomplished for those involved in delivering the course through regular meetings with all instructors and TAs of the individual sections. Consistency in course outcomes or objectives is accomplished by all sections using the same master syllabus and master BlackBoard Learn shell. Individual sections' due dates of assignment vary, but the learning outcomes, modules, chapters, assignments, textbook, and other class projects are the same for each. All sections are taught in a blended format. In the case that individual instructors want to make changes to the course, they keep a log of ideas and thoughts for future semesters. An item that is invisible to students at the top of each chapter's BlackBoard Learn content page serves as a journal for this purpose. Any entries made during the semester are easily extracted from each section and compiled at the time that revisions are made for the next semester. The coordination scheme also allows coordinators to take advantage of meaningful, actionable data about student engagement, achievement, and progress in the course. All section instructors use the university's Grade Performance Status system at the same intervals during the semester (after each course module) so that students receive consistent and regular feedback. Assignments, grading rubrics, and attendance requirements are same for all sections and each instructor collects this data and shares it for reporting and assessment purposes.

2. Design for Disciplinary Conventions in Cinema Studies and Humanities

The course is the sole core, required course of a new interdisciplinary minor in Cinema Studies. It introduces students to the basic elements of formal composition, organizational structures, and historical periods of international filmmaking. The course provides a foundational understanding of discipline-specific terminology and conventions in the study of cinema and visual culture. Students also engage with cinema culture on the Northern Arizona University campus and in the larger Flagstaff community through mini-internships with film festivals and guided immersion in local film culture. The course prepares students for further study of film in Humanities, English, Philosophy, Electronic Media and Film, and Ethnic Studies, to name just the programs with the most popular film courses on campus. The course was also designed according to disciplinary conventions in cinema studies and humanities with regard to its signature assignment: the critical analysis essay, oriented to disciplinary expectations for effective writing in humanities courses. All other, shorter, written assignments prepare students for this signature assignment by focusing on particular elements of film analysis and essay writing.

In the signature assignment, students demonstrate the core learning outcomes of this course: reflection on a film's production and the impact of distribution, promotion, and exhibition on the film experience; application of film-specific technical concepts, such as mise-en-scène, cinematography, editing, lighting, sound, and genre. They also demonstrate the ability to critically evaluate the film's narrative plot, characterization, use of genre conventions, and historical context.

In terms of disciplinary modes of writing, students show that they are able to formulate a thesis that is easily identifiable, plausible, novel, sophisticated, insightful, and clear. Their analysis needs to be exciting, pose new ways of thinking about the material, and their work must avoid simple description or summary of information. Students' use of evidence from the films and readings demonstrates in-depth understanding of ideas and critically evaluates concepts in an analytical, persuasive manner. The structure of their essay is evident (e.g. through strong topic sentences) and appropriate for the thesis. Ideas flow logically. Arguments are identifiable and reasonable. And finally, the essay needs to be written with excellent grammar, sentence structure, and correct use of punctuation and spelling. These expectations correspond to the basic requirements of good writing in the humanities. The rubrics used for grading and assessment in this class elaborate these expectations.

3. Blended Design Principles

The preceding paradigms (liberal studies and humanities) are integrated through the flipped structure of the course content, learning activities, and assignments and guided by the principles of blended design, based on case studies presented in Glazer (2012) and guidelines from Garrison and Vaughan (2009) and with the use of the Blended Learning Toolkit provided by the University of Central Florida.

The course is divided into content modules that correspond to the student learning objectives. All student in-class tasks and online written assignments are scaffolded with the ultimate objective of writing the three-page analysis essay. Each week a different element of essay writing is the outcome of students' work. For example, in week 3, they focus on learning how to give evidence for a thesis. They are guided through the following stages, in accordance with Bloom's (revised) taxonomy of learning:

1. Students acquire basic factual and conceptual knowledge of mise-en-scène through reading an assigned textbook chapter. If needed, they consult with the peer tutor who has taken the class before and helps students with specific reading comprehension problems.
2. They then retrieve and check their memory and understanding by taking an online, open book, low-stakes, multiple-choice quiz that provides immediate feedback. If necessary, they can retake the quiz once.
3. They watch one of the films used as an example in the textbook to illustrate the elements of mise-en-scène: Spike Lee's *Do The Right Thing*.
4. In the online forum, due a few days later (but still before they come to class in person), students interpret and discuss the mise-en-scène of this particular film, applying basic knowledge. The online discussion posts are graded by the teaching assistant, with online rubrics.
5. Then, the next day in the face-to-face class meeting, students work in groups to analyze evidence from the film (again, with a focus on aspects of mise-en-scène) to support a thesis that the instructor has provided for them at the beginning of the face-to-face meeting.

6. At the end of class, the groups organize their findings and present the thesis and their evidence to the whole class for feedback and questions.
7. On the midterm exam, giving evidence for a thesis is one of the skills assessed, with formative feedback.
8. In the analysis essay, students demonstrate their skill of giving evidence for a thesis: they are asked to transfer their knowledge to an analysis and evaluation of another film.
9. They receive more formative feedback, through critiquing each other's essays (peer review) and individual tutoring with the teaching assistant, and revise their essay.
10. They create their final version of the essay and receive summative feedback from the instructor.

The blended and flipped design of the course allows more time for and focus on the higher learning tasks (5 - 10) than a course designed around lectures and discussion. Here, the basic content comprehension and application (1 - 4) is done online and requires relatively little intervention from the instructor. A peer tutor (focus on reading) and teaching assistant (focus on writing) help facilitate and assess at the lower stages. As the level of learning and stakes increases so does the level of face-to-face interaction of the instructors with students.

In summary, technology and the CMS BlackBoard Learn are used as a strategic tool to facilitate student learning. Online class activities take the place of traditional content lectures and ensure students' acquisition of knowledge. Assessment of basic levels of student learning also takes place online. Face-to-face activities (in a whole-class setting) focus on modeling and practice of critical film analysis, analysis of sample essays, student (group) presentations of group projects, and discussion/feedback. Individual or small group meetings take place face-to-face with the following goals: Instructor intervention to ensure student success, student consultations with instructor about writing projects, development of thesis statements for critical essay writing assignment, and discussions and organization of creative group projects, such as making short videos and guest presentations in other classes.

ASSESSMENT

1. Research Design

The course redesign included a rigorous assessment plan. The redesigned course was implemented over three semesters: fall 2012, spring 2013, and fall 2013. After each semester, data were analyzed, feedback was collected from the instructors, and revisions were made to the course. This implementation schedule allowed for a phased growth in class capacities: from 35 to 50 to 70 students on average in each section (with some variation due to classroom availability). As enrollment grew, more sections were offered. As a result, more freshmen and sophomores were able to enroll in the course—since they enroll later and over the summer—while seniors and juniors have early spring enrollment appointments and used to take most available seats in the only offered course section.

Each semester after the redesign, the teaching assistants evaluated the signature essays with the use of standard rubrics, for *assessment* purposes (whereas the instructor evaluated the same essays with the same rubrics in a separate step, for *grading* purposes). This allowed the course designers to standardize evaluation. To control for variation, the course coordinator held a training workshop with all teaching assistants on how to use the rubrics to guarantee consistency. As stated above, this signature assignment represents the culminating task of the course and measures students' ability to write effectively and integrate complex analyses into one assignment. As such it serves as the best indicator of student learning in a writing-focused Liberal Studies class in the humanities.

Data from these redesigned sections were compared to a control group: the pre-redesign section of this class taught in the fall of 2011, where the same signature essay assignment was given and the same assessment rubrics were used. The teaching assistants (of the fall 2012 redesigned course) were asked to re-evaluate all signature essays from the fall 2011 section with the same assessment rubrics, to establish the control group. Though the course had been offered in other past semesters (fall 09, fall 10, spring 12), these sections were not standardized—they used a variety of assignments, no assessment rubrics, and did not require electronic submission of the final papers. No means of comparing these sections with the redesigned course was available.

In addition to this assessment of student learning, official institutional data on course grades and DFW rates, as well as qualitative data from surveys and reflective essays were collected to assess the success of the course redesign. To control for variation in overall instructor grading across sections, each blended section (which varied by instructor and time of day) was compared to the Fall 2011 lecture course separately.

2. Methodology

Basic t-tests for statistical significance of independent samples were run to compare the Fall 2011 section with each blended section on the following outcomes: average course grade excluding those students that received a ‘W’ (withdrawal), average freshman course grade, average junior/senior course grade, and average scores on the signature assignment. Except for the signature assignment, data for the analysis were extracted from the NAU data warehouse Enterprise reporting, and all analyses were run in SPSS software.

3. Findings

Overall enrollment increased exponentially. In the unblended version enrollments had been steady around 35 per section. Since the blended redesign, enrollments have grown to 347 students in fall 2013, in 5 sections of 70+ students each. As more sections were opened, and thus available to freshmen and sophomores, the percentage of lower division students increased.

Overall, as Table 1 shows, scores on the signature assignment remained consistent or improved compared to the fall 2011 control section of the course. In both fall 2012, spring 2013, and fall 2013, scores on the signature assignment improved compared to the fall 2011 group in all sections of instructor #1. For the second course instructor,

Table 1. Assessment scores, Fall 2011 lecture compared to blended sections

	Fall 2011	**Fall 2012**		**Spring 2013**		**Fall 2013**			**All Blended**
Instructor	1	1	2	1	2	1	2	3	-
Num. Responses	34	78	66	50	85	86	100	44	509
Average Assessment Score	**8.9**	**9.6*** **	**8.9**	**9.5*** **	**7.3*** **	**9.3*** **	**8.9**	**8.8**	**9.1**
Statistical Comparison, Fall 2011 to Each Blended Section	Base	Improvement	Same	Improvement	Decline	Improvement	Same	Same	Same

*** Indicates statistical significance at the .001 level.

Table 2. Average course grades, Fall 2011 lecture compared to blended sections

	Lecture	**Blended**											
	Fall 2011	**Fall 2012**				**Spring 2013**			**Fall 2013**				
Instructor	1	1		2		1	2		1		2		3
Section	1	1	2	1	2	1	1	2	1	2	1	2	1
Enrollment[1]	29	38	36	37	33	54	70	36	71	64	72	72	68
Freshman Enrollment	10.3%	39.5%	52.8%	13.5%	57.6%	11%	43%	44%	17%	34%	75%	63%	46%
DF rate	7%	2.6%	8.3%	5.4%	9.1%	9.3%	12.9%	11%	8.5%	7.8%	8.3%	20.6%	20.6%
DFW rate	7%	2.6%	11%	5.4%	12%	17%	17%	25%	14.1%	18.8%	28%	23.5%	23.5%
Average Course Grade[2]	3.4	3.2	3.0	3.3	3.0	2.9	2.9	2.9	3.1	2.9*	2.8*	2.8*	2.4***
Average Freshman Grade[2]	3.0	3.2	2.6	3.4	2.8	2.2	3.1	3.0	3.0	2.4	2.6	2.6	1.8
Statistical Comparison of Average Course Grade, Fall 2011 to Each Blended Section	Base	Same	Same	Same	Same	Same	Same	Same	Same	Decline	Decline	Decline	Decline

[1]Assessment Scores for these terms could not be separated by section. Number of assessment scores available may vary from actual course enrollments listed inTable 1.

[2]Excludes grades of W.

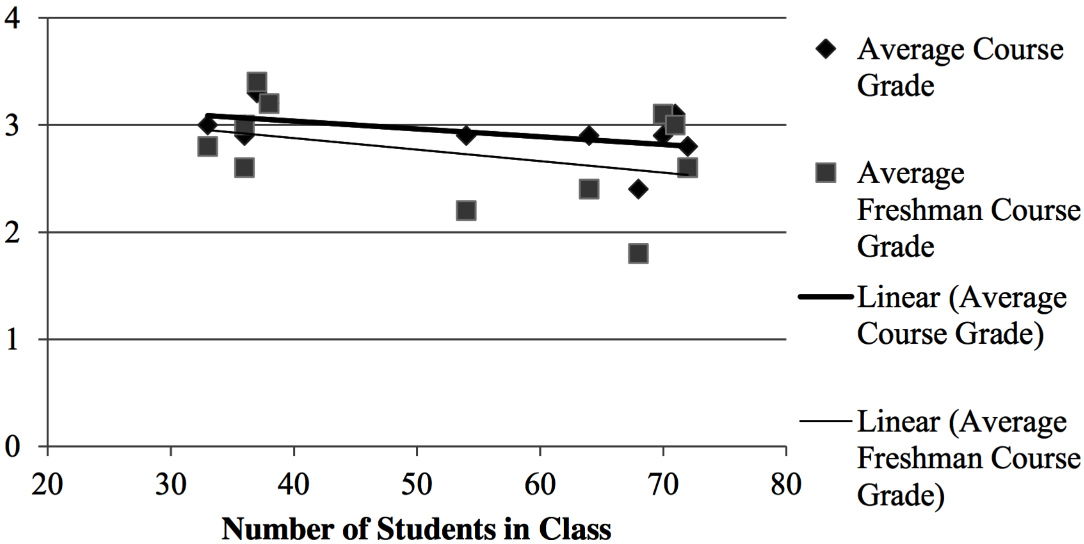
Indicates statistical significance at the .05 level. *** Indicates statistical significance at the .001 level.

scores remained consistent with the fall 2011 section (taught by instructor #1) in fall 2012 and fall 2013, but declined in spring 2013. In fall 2013, a third instructor was added due to increased enrollment, and scores for this instructor also remained consistent with the fall 2011 section.

This shows that, despite reduced face-to-face classroom time, students are still able to accomplish the primary course learning objectives of demonstrating proficiency in writing critical film essays by producing an original interpretative analysis of a film in its historical context of production. The improved essay scores in instructor #1's sections further demonstrate that careful planning and scaffolding of assignments in blended courses can even improve student learning. This is likely due to increased time for meaningful interaction between faculty and students during f2f class meetings with regard to higher learning tasks such as analysis, evaluation and creation, rather than focusing on lower learning tasks such as content understanding and application.

While signature assignment scores showed improvement or consistence, overall course grades in blended sections revealed greater variation when compared to the fall 2011 control section. As Table 2 shows, average course grades for blended sections of the course, from fall 2012 and spring 2013, were statistically consistent with the fall 2011 lecture section. This was true for all instructors and sections. Average course grades for blended sections in fall 2013 were statistically lower than the fall 2011 lecture section. This was true for all but one section of the course in fall 2013. When all blended sections were considered together, average course grade in blended versions

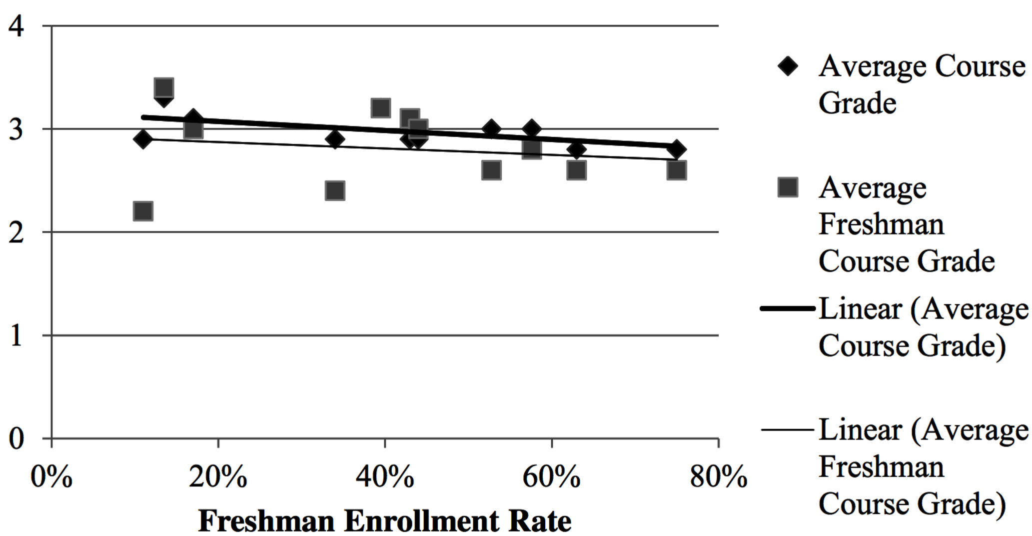
Figure 1. Correlation between class size and average course grade, hybrid sections



of the course were statistically lower than the fall 2011 lecture section. When average course grades for juniors/seniors were considered separately, no statistical difference was found between grades in the fall 2011 lecture and blended sections. Because the fall 2011 control section included only three freshmen, no conclusions can be drawn regarding the effect of the blended format on this student group.

We interpret this decline in average course grades in the fall 2013 sections to the interaction of both large class size and high freshman enrollment. While neither high freshman enrollment nor a large class size alone produces a steep decline in course grades (or assessment of student learning as evidenced by the assessment data), the combination of the two tips overall grades below those of the fall 2011 control section—which

Figure 2. Correlation between freshman enrollment and average course grade, hybrid sections



had neither high freshman enrollment nor high overall enrollment. Figure 1 relates class size to average course grade and average freshman grades. Overall average course grade and freshman average course grade both decline slightly as class size increases. DFW rates show a parallel relationship to class size—rising as class size increases. Figure 2 below relates freshman enrollment rate to average course grade. Again, both overall average course grade and freshman average course grade decline slightly as freshman enrollment increases. DFW rates show a parallel relationship to freshman enrollment—rising as freshman enrollment increases. This suggests that both class size and number of students in the class have a negative effect on grades for students of all class levels.

Factors we could not control for include: 1. Honors sections were taught concurrently with instructor #1's section 1 in fall 2012 and spring 2013 but no longer in fall 2013. Honors students received consistently high grades and had 0% DFW rates. As their number decreased, the overall average grade and DFW rates were affected. 2. Instructor #3 in fall 2013 had not previously taught at the college-level or with Blackboard Learn CMS. The high DFW rate in this section is most likely due to a lack of consistency and technical expertise common of new instructors, despite intensive mentoring by the course coordinator.

One of the design features of the course is learner self-reflection. Three multiple-choice surveys and a reflective essay are systematically built into the course and ask students to express and explain their expectations, preparation, performance, perceptions, and challenges with regard to the blended course. While an in-depth, systematic analysis of the data (1000+ survey responses) and written material (500+ essays) is beyond the scope of this article, some recurring comments speak directly to the blended course design. Students

- Like the flexibility of the blended format for their scheduling of classes, work, and personal time.
- Find the rigor challenging but see value in sticking to set due dates and frequent, low stakes assignments, which "made it feel like a real job".
- Experience frequent, short writing for the first time and see value in it for building up to the longer film analysis essay.
- Have taken online classes before and thus know the CMS well (sophomores and up) or can learn to use it quickly (freshmen).
- Appreciate being able to access class materials online and watch the assigned films multiple times, especially those with subtitles, while having personal access to each other and to the instructor in group and class meetings.
- Do generally not enjoy working in groups but experience the many collaborative tasks in this class as positive; they especially like the online group discussions and group project with the local film festival.
- Realize that preparing for class (online) helps them get more out of class (f2f).

WHY BLEND IN THE HUMANITIES?

Often reservations about the use of technology in (online and blended) humanities classes are voiced in terms of discipline-specific concerns about student learning and preferences. (Restad, 2013, Freeman, 2013) It is feared that students do not like online or blended classes and that offering them will drive students away from our programs. However, a recent large-scale "Study of Undergraduate Students and Information Technology" showed that students prefer blended courses over purely face-to-face or purely online courses (ECAR). Other claims made by opponents of online or blended learning include assertions that only face-to-face education can lead to paradigm-shift thinking and mental changes while online/blended education leads only to accumulation of skills and information. Also, face-to-face teaching is seen as the only way of engaging students socially, responsibly and spontaneously. It is hard to argue with these claims without establishing reliable ways of assessing student learning in all modalities. Yet humanities faculty are often the first to argue that such assessment is impossible and should not even be attempted, while maintaining that they know how and where learning happens.

In addition, how is the blended design of a humanities course justified, in terms of the humanities? First, blended learning is a paradigm shift in that it attempts to empower students and lead to creative projects that are based on solid knowledge of the discipline's core works (of literature, art, music, etc.), methods, disciplinary ways of thinking, and values. It starts with students' needs, objectives, and aspirations and emphasizes their learning. It does not privilege the instructor as the authority on knowledge in the classroom (Bransford, Brown, Cocking, 2000). It rather makes use of the instructor's training and experience for the purpose of selecting and providing content from a variety of sources and applying best practices to content delivery and processing that lead to higher student learning. Second, technology is both a means and a goal in this context. As students learn to use technology to retrieve, process, and create disciplinary content they reflect on the transformative changes brought on by it (Sands, 2010). In the field of Digital Humanities new technological tools and methods are applied to the work in traditional humanities and publically discussed in blogs (Frost Davis, 2013) and the forums of the Humanities, Arts, Sciences, and Technology Alliance and Collaboratory (HASTAC), at the Institute for Advanced Technology in the Humanities (IATH), the Maryland Institute for Technology in the Humanities (MITH), and funded by grants from the National Endowment for the Humanities, Office of Digital Humanities (NEH ODH) and the National Institute for Technology in Liberal Education (NITLE). Students benefit from critical reflection *about* these tools, both for career preparation and discipline-specific understanding (Parry, 2014). Meaningful exchanges of ideas mediated by technology are not inferior to social interaction and presence in the classroom, but different. Technology empowers different students and engages a generation of digital natives by using technology as a tool and to reflect on its values (Prensky, 2001).

Furthermore, blended learning integrates the content of the traditional humanities with the digital literacy needed by humanities graduates to succeed in their chosen professions. For example, one of the basic principles of blended course design is to engage a wide spectrum of students (Picciano, 2009) with technology in an active way (Prince, 2004). In the course described in this chapter, students learn about and reflect on the conditions of film distribution and exhibition in the United States, in module one of the course. They transfer that knowledge onto a group project that grows out of their mini internship with a film festival. They are asked to demonstrate rather than recount their grasp of the conditions of film exhibition and marketing. The goal of this active, collaborative, practical project is in line with the larger learning outcomes of the humanities: to guide students to a creative level of learning—beyond consumption and mere appreciation of cultural products. They also engage with the local community and apply knowledge to actual professional activities. The blended format of the course allows for time to do this internship, and the student projects presented during the last three semesters have all included online components (web pages, Facebook Pages, Twitter, Instagram, Pinterest, Tumblr).

How does the blended design of a humanities course benefit instructors? Technology is seen by many not as supplementing and enriching but as imposed by the administration, as driven by the corporate model of education, and as a way of disempowering tenured faculty "teachers" and ultimately replacing them with mere "mentors" of student learning. One of the goals of the President's Technology Initiative at Northern Arizona University had been to "conserve faculty effort." While well-intentioned in light of recent increases in teaching load (during the budget crisis) and promising to free up time for research and scholarship, this goal was perceived as yet another way to entice faculty to replace themselves—this time in terms of their presence in the classroom. Faculty who did participate in the initiative were scrutinized by colleagues in terms of their more flexible schedule—a perspective rooted in the notion that in-class seat time is more involved than time spent interacting with students online.

However, not only does the initial blended redesign require time for training and implementation/revision but the actual course delivery in a blended format requires as much time grading weekly assignments (despite the TA support), providing frequent formative feedback, and managing group tasks as a traditional lecture class requires for delivery of content and leading a full-class discussion. In addition, the initial learning curve is steep, as instructors have to learn to use the CMS effectively and rethink their role in the flipped classroom. Both require mentoring and support from the course coordinator on an ongoing basis. The increased flexibility, just like for students, is seen as an advantage by those involved in the teaching of blended courses. Highly experienced, trained, and full-time faculty leaders will always be needed to design, implement, coordinate, and assess blended courses.

CONCLUSION

Blended design of humanities courses opens up opportunities for embattled humanities programs to stay viable, current, and aligned with institutional priorities. They can serve as models for other programs on campus, provide valuable professional experience for students, and invigorate faculty teaching by incorporating active pedagogy and principles of student success. Most of all, blended design can help increase student learning, as our data have shown, a goal that any course design has to live up to.

REFERENCES

Allen, E. I., Seaman, J., & Garrett, R. (2007). Blending In: The Extent and Promise of Blended Education in the United States. Sloan Consortium.

Blended Learning Toolkit, University of Central Florida. (n.d.). Retrieved from http://blended.online.ucf.edu/

Bransford, J. D., Brown, A. L., & Cocking, R. R. (Eds.). (2000). *How People Learn. Brain, Mind, Experience, and School*. Washington, DC: National Research Council.

ECAR (EDUCAUSE Center for Analysis and Research) Study of UG Students and Information Technology. (2013). Retrieved from http://www.educause.edu/library/resources/ecar-study-undergraduate-students-and-information-technology-2013

First Year Learning Initiative, Northern Arizona University. (n.d.). Retrieved from http://nau.edu/University-College/First-Year-Learning-Initiative/

Freeman, W., & Tremblay, T. (2013). Design Considerations for Supporting the Reluctant Adoption of Blended Learning. *MERLOT*, *9*(1), 80–88.

Frost Davis, R. (2013). Blog. Retrieved from http://rebeccafrostdavis.wordpress.com/2013/05/24/challenges-of-blended-learning-in-the-humanities-ancient-greek/

Garrison, D. R., & Vaughan, N. D. (2009). *Blended Learning in Higher Education: Framework, Principles, and Guidelines*. San Francisco, CA: Jossey-Bass.

Glazer, F. S. (Ed.). (2012). *Blended Learning: Across the Disciplines, Across the Academy*. Sterling, VA: Stylus.

Parry, M. (2014, January 6). How the Humanities Compute in the Classroom. *Chronicle of Higher Education*. Retrieved from http://chronicle.com/article/How-the-Humanities-Compute-in/143809/

Picciano, A. G. (2009). Blending With Purpose: The Multimodal Model. *Journal of the Research Center for Educational Technology*, *5*(1), 4–14.

Prensky, M. (2001). Digital Natives, Digital Immigrants Part 1. *Horizon*, *9*(5), 1–6. doi:10.1108/10748120110424816

President's Technology Initiative, Northern Arizona University. (n.d.). Retrieved from http://nau.edu/Blended-Learning/What-is-the-Presidents-Technology-Initiative/

Prince, M. (2004). Does Active Learning Work: A Review of the Research. *Journal of Engineering Education*, *93*(3), 223–231. doi:10.1002/j.2168-9830.2004.tb00809.x

Restad, P. (2013). 'I don't like this one little bit.' Tales from a Flipped Classroom. Faculty Focus. Retrieved from http://www.facultyfocus.com/articles/teaching-with-technology-articles/i-dont-like-this-one-little-bit-tales-from-a-flipped-classroom/

Sands, P. (2010). Blended Classrooms: Hybridity, Social Capital, and Online Learning. In S. J. Hoffman (Ed.), Teaching the Humanities Online: A Practical Guide to the Virtual Classroom. Armonk, NY: M. E. Sharpe.

KEY TERMS AND DEFINITIONS

Blended: The design principles and pedagogy underlying hybrid courses that combine face-to-face (f2f) and online class time.

Course Coordination: A way to organize multi-section courses so that student learning outcomes, materials, assignments, and rubrics are aligned. Allows for mentoring of new instructors and ensures consistency and predictability for students taking the same course in different semesters or from different instructors.

DFW Rate: Percentage of students whose recorded grades are D, F, or W (=Withdrawn after the deadline). Students do not get credit towards Liberal Studies or major requirements with these grades. Thus, this rate is used to assess student success: the higher the rate, the lower the success.

Digital Humanities: Newest field of the humanities that applies technology to the study of cultural products and also examines this use as a cultural product itself.

Engagement: Active, critical, and self-motivated work mode of students.

Flipped: The inversion of time spent by students in class and online on knowledge acquisition and higher learning activities such as analysis and creation.

Grade Performance Status (GPS): An online monitoring system used at Northern Arizona University to track student performance. It allows instructors to enter grades, messages, and automated notifications. Students, advisors, and academic support staff can access this information and act accordingly.

Master Syllabus: As part of a coordinated course it allows for consistency and reduces time for instructors to design a new course every time it is taught.

Scaffold: As principle of backward course design to align student learning outcomes, assignments, and tasks. Often represented in a diagram, resembling a construction scaffold.

This work was previously published in Models for Improving and Optimizing Online and Blended Learning in Higher Education edited by Jared Keengwe and Joachim Jack Agamba, pages 173-188, copyright year 2015 by Information Science Reference (an imprint of IGI Global).

Chapter 39
Optimizing Blended Teaching and Learning in Brick-and-Mortar Institutions

Joachim Jack Agamba
Idaho State University, USA

ABSTRACT

The increase of blended instructional offerings in brick-and-mortar institutions provides leverage for the appropriate utilization of technology for instruction to optimize learning and serve a generation of learners who prefer such environments. However, the question of appropriate use of technology to improve student performance rests on teacher belief. Where faculty believe that they are content experts who should be trusted to deliver instruction as they see fit, the integration of technology becomes a choice. Some faculty see a clear demarcation between curriculum development and instruction as two separate processes involving separate activities (Heinich, 2011). The missing link appears to be a lack of appreciation for the benefits of instructional design principles that increase learning outcomes as a result of interactivity. This chapter focuses on the need for the inclusion of instructional design principles for in-service and pre-service teacher professional development to assist faculty transition effectively to blended instructional delivery. Barriers that impede the appropriate use of technology for blended delivery need to be identified and alternative approaches need to be applied to assist instructors and increase the effective use of technology in blended learning environments that are more learner-centered.

INTRODUCTION

Rogers' (2003) observation that it takes time for a new innovation to be adopted and implemented appropriately is still relevant today, particularly with the integration of Course Management Systems (CMS), in brick-and-mortar institutions of higher education. In spite of the widespread use of CMS for blended instructional delivery, and the positive claims on learning gains associated with it, problems still abound on their proper implementation. For brick-and-mortar institutions, blended learning environments are a natural fit because they provide a bridge between traditional practice and online education. Blended instructional offerings also provide revenue (Yuan & Powell, 2013) as some students prefer the benefits of a traditional face-to-face and online combination.

DOI: 10.4018/978-1-4666-8246-7.ch039

Teaching and learning with blended formats provides a learning environment that enhances "real time" interaction with learning materials, discussions with instructors and among colleagues, and the facility of providing actionable feedback without having to wait until the "next class meeting", as is the case with the traditional learning environment alone. A driving factor for the increased use of blended learning environments is that majority of students currently attending college consist of a generation who are accustomed to experiencing real time results from interacting with technological tools (Hartman, Dziuban & Brophy-Ellison, 2007). Such learners have therefore come to expect the similar experiences of "convenience and flexibility" from their learning process (Lin, 2009, p. 58).

However, it is this expectation that is driving two competing legacies of thought and fundamental preferences, among others, on teaching and learning practices in the 21st century. This is mainly because many faculty who are accustomed to traditional delivery and have learned that way themselves, see nothing wrong with continuing the same practice (Heinich, 2011). Yet interaction with content, as made possible by the distance aspect of blended environments is central to learning outcomes (Rhode, 2009). This reality is consistent with expectations of the current generation of learners who prefer technology to play similar roles in their learning the way it does in their lives. Educational technology, through the use of CMS, provides essentials for these alternative learning environments, making learner interaction with knowledge objects possible (Nycz & Cohen, 2007). As a consequence, CMS also dictate alternative methods of instructional delivery that are necessary for their successful adoption.

The goal of this chapter is to focus on the use of Course Management Systems as a student-centered learning environment, particularly with regard to issues concerning its effective and appropriate use as a blended learning environment for instructional delivery in brick-and-mortar institutions. The discussion centers on current practices in the utilization of blended learning environments with a focus on values of "student-centered learning environments (SCLEs)" as discussed by Land, Hannafin and Oliver (2012, p. 3). I argue that faculty professional development on CMS use should first focus on assisting instructors understand technology tools and their inherent variations relative to applicable theoretical frameworks as a precursor to the standard practice of assisting faculty learn to implement those tools.

Course Management Systems, through a collection of software applications, provide a virtual environment for learning and interaction not only between instructors and students, but among students as well (Betrus, 2008). Course Management Systems therefore provide access to course materials such as syllabi, assignments and quizzes, grades, links to related websites, tracking tools, feedback, and discussion forums that facilitate communication. The range of CMS available in higher education include, but are not limited to, Blackboard®, Moodle®, CourseInfo®, Desire2Learn®, eCollege®, Moodle, Sakai®, and Brain Honey®. Course Management Systems is sometimes used interchangeably with Learning Management Systems (LMS) because the latter is a corporate version of the former (Betrus, 2008). Moodle, an abbreviation for Modular Object-Oriented Dynamic Learning Environment, is used to provide examples where necessary. Nonetheless, the discussion is applicable for other CMS.

In a recent study on mobile learning practices, Chen and Denoyelles (2013) reported that although students continue to own mobile devices at a higher rate, learning with those devices occur outside the classroom, mostly without guidance from instructors. However, these students are not accustomed to utilizing technological tools for learning. They expect guidance from instructors on such use. Higher education institutions have responded to such expectations by increasingly embracing technology for teaching and learning because the 21st century market place requires graduates who can compete in a technology-directed global market place (Oblinger & Murayama, 1996). Brick-and-mortar post-secondary institutions see the need to provide alternative, and improved methods of instructional delivery. However, many instructors continue to underutilize inherent instructional tools in blended environments, which in essence is inappropriate use, thereby underserving their students.

The question of appropriate use of technology to improve student performance rests on: a) teacher belief, and b) the quality of support available for appropriate technology integration. Where faculty believe that they are content experts who should be trusted to deliver instruction as they see fit, then the use of technology becomes a choice. Such faculty see a clear demarcation between curriculum development and instruction as two separate processes involving separate activities (Heinich, 2011). The other inhibiting factor can be found in the level and quality of support provided by administrators through technology support centers. In both cases, the missing link appears to be a lack of appreciation for the benefits of instructional design principles. This is particularly more so in an era where collaboration between instructional designers and subject matter experts has almost disappeared. The need for the inclusion of instructional design principles for in-service and pre-service teacher professional development is therefore evidenced.

Assisting faculty, regardless of their notions on teaching with technology, can remove barriers that impede the appropriate use of technology and thereby increase its effectiveness in blended learning environments (Jonassen & Easter, 2012). Technology is increasingly shaping how we learn and teach in the 21st century at a faster pace partly because it drives innovation in educational practice. For brick-and-mortar institutions, blended learning environments are a natural fit, as they complement traditional delivery methods and meet the needs of different types of learners.

With regard to outcome-based instruction, evidence from studies on the efficacy of traditional delivery versus blended or distance delivery indicates the former is no more beneficial than the latter (Simonson, 2011; Land & Hannafin, 2000). It seems reasonable, therefore, to focus on the *appropriateness* of technology use. Betrus (2008) observed that “a shared focus of the field of educational technology remains on the *appropriate* use of emerging *technological resources* to facilitate learning and improve performance” (p. 238). As such, it is the limited use or non-use of CMS features by faculty which can impair its effectiveness as a learning environment and consequently compromise its potential to enrich learners’ experiences.

TEACHER BELIEF

To begin with, university and college faculty for the most part have no say in which CMS their institution chooses for them. Administrators may choose particular technologies based on financial reasons (Hall, 2010) while faculty may choose to integrate such technologies based on convenience (Surry & Land, 2000). As a consequence, faculty may feel compelled (pushed but not ordered) to use CMS as directed by administrators. This can lead to ineffective use of CMS which results in undesirable learning outcomes and can frustrate learners and instructors alike (Hirumi & Kidney, 2011). More so, ineffective or inappropriate use of CMS translates into missed opportunities to capitalize on improved forms of delivery. Perhaps for such reasons, the capacity of teachers as individuals and as a group to adapt and implement technological innovations at an optimal level has been a focus of several research studies which have resulted in the proposal of several models on the process of effective implementation for increased learning outcomes (Jonassen & Land, 2012; Hirumi & Kidney, 2011; Pollard, 2005).

A focus on changing teacher belief resides in the comparison of the fundamental aspects of teaching and learning between traditional and blended learning environments and the associated modification of behaviors that are necessary (Power, 2014). In addition, evidence of desirable learning outcomes from distance education need to be a part of the conversation, as faculty who believe in the efficacy of traditional face-to-face instruction do not see the advantages of technology-mediated instruction. As a result, some teachers still prefer the physical presence of learners and the direct interaction that results from it (Simonson, 2011). Repurposing instruction for the distance aspect of delivery and facilitation for blended delivery may therefore not appeal to them, including the fact that the current generation of learners prefer to learn and communicate differently from traditional practice. Such beliefs are at the core of faculty resistance to transition from face-to-face to blended environments.

FACULTY RESISTANCE TO CHANGE

Two factors affecting the appropriate use of technology in education that highlight this chapter are faculty resistance to change and the need for alternative forms of appropriate support in the utilization of CMS for blended instructional delivery (Jonassen & Land, 2000; Reigeluth, 1999; Januszewski & Molenda, 2008). Faculty resistance to change is an endearing reason for the underuse of technology (Simonson, 2011). Such faculty are therefore likely to utilize CMS mainly as a repository of learning materials and for convenient access by their students (Heinich, 2011).

Faculty who resist change discount the benefits of distance education, partly because they fail to see how effective instruction can take place outside of the physical classroom where the learner and teacher are separate (Simonson, 2011). Those faculty fail to see that learning experiences supersede that of mastering goals and objectives (Tessmer, 1998). As a consequence, the role of technology as an enabler of teaching and learning is dismissed. For reasons such as this, it is necessary to include relevant theoretical frameworks that support and validate the appropriate use of technological tools in a CMS, as part of faculty professional development on technology integration.

Rogers' (2003) classic analysis of how people adopt innovations is relevant to this discussion in that he describes instances affecting such adoption that are relevant to the adoption and appropriate integration of CMS for blended delivery. The first instant is that of time. The literature is replete with arguments that time is a constraining factor that impedes the appropriate application of technology. Although universities and colleges provide technology centers and personnel to assist faculty (Heinich, 2011; Betrus, 2008), not all faculty members take advantage of such resources. Rogers' (2003, p. 20) analysis of time as an impeding factor in the adoption of an innovation is applicable to the adoption of CMS but even more complicated because it is not rejected outright but used inappropriately at various stages and dimensions. Faculty adopt CMS at varying rates with varying quality. So even though numbers may paint a bright picture, in terms of faculty who use a CMS on a given campus, the quality of adoption may not. Resistance, as such, therefore relates to several variables besides time, as Rogers' (2003) indicated.

Knowledge and attitudes toward an innovation such as CMS use is another factor that aligns with the resistance to use CMS for blended delivery. According to Rogers (2003), "knowledge" (learning about and understanding how it works), "persuasion" (whether an individual is convinced or not of the innovation), "decision" (activities leading to adoption or rejection), "implementation" (putting an innovation to use), and "confirmation" (seeking reinforcement to improve quality of use) may work in sequence, as a process of innovation (p. 20). However, for faculty, such a sequence may not occur. "Conflicting messages" may occur sooner, even though the adopter wants to use it but does not have the expertise to make it happen. The certainty that faculty need in order to fully adopt a CMS is sometimes lacking. In such a case, the advantages of the innovation are not fully conveyed because thought-process was not a part of the professional development PD process, if that indeed took place.

ALTERNATIVE SUPPORT FOR FACULTY

The second discussion in the literature that informs this chapter is that of the provision of PD on CMS integration. There is a need for faculty PD frameworks to shift from a predominant focus on how to apply technological tools to that of first assisting faculty understand the utility of CMS tools and their inherent benefits over traditional delivery methods. Only by first understanding the benefits of each tool for instruction, can faculty then become stakeholders and want to learn their application.

While universities and colleges provide technology centers and personnel to assist faculty members with technology use (Heinich, 2011; Betrus, 2008), the necessary changes in instructional practice required for the optimal implementation of this new framework for teaching and learning, which Abel, Brown, and Suess (2013, p. 1) describe as "a new architecture for learning" has been undermined, partly leading to or reinforcing faculty resistance. Some faculty view the time associated with taking advantage of these resources as a constraint. The need for continued efforts to hypothesize strategies for instructional improvement and to conduct research and intervention to achieve such (Richey & Morrison, 2011) is therefore necessary.

In the race to join the for-profit higher education sector in the virtual delivery of education, traditional brick-and-mortar institutions will serve their students well, if not better, by re-envisioning how to effectively assist faculty embrace CMS technology just as online learning rethinks areas for improvement (Bowen, 2013). Such a focus would reside in the design, delivery, mediation, and assessment of learning materials and technological tools that have been proven to enhance student learning outcomes. This can be achieved through "sound design principles" in how content is organized for distance delivery (Mohammed, 2004, p. 2). Existing frameworks for best practices such as design principles found in Danielson (2007) and the Quality Matters Rubric, for example, are not fully exploited to improve course design. By understanding alternative methods, faculty can embrace options that work for them. Such an effort would also go beyond current predominant practice of simply providing virtual platforms such as CMS and expecting faculty to adapt.

The time has never been more pressing, but yet ripe, for higher education faculty to become more comfortable with exploring and using available technology, especially through CMS, for alternative technology-mediated instruction because it can be more effective in reaching college students. Yet the factors that impeded distance education in the past, as documented by Simonson (2011) persist and confound the appropriate adoption and integration of blended delivery in the 21st century.

First, faculty have to be convinced that teaching a blended course requires a paradigm shift in the conceptual framework that guides traditional planning and delivery of instruction. This requires behavioral change toward embracing the fact that instructional delivery will involve face-to-face instruction and facilitation as well as distance guidance and communication. Faculty who are already enthusiastic about the benefits of blended delivery and have varying degrees of experience, would require PD that focuses on optimizing CMS integration. That form of assistance resides in elevating the knowledge base. For faculty who dismiss blended instructional delivery, it requires PD that will distinguish traditional face-to-face instructional practice from blended delivery.

For this group of faculty, the practical demands of added time and work required for planning, organizing, designing and delivery of content (Simonson, 2011) for blended instruction is a significant consideration.

Two impeding factors, among others, play a fundamental role that affect the optimal or appropriate use of CMS for instructional delivery. First, is the critical role that faculty support systems on technology use (i.e., technology support centers, deans, heads of department, and administrators) need to play to assist faculty transition from a belief in traditional face-to-face delivery to that of technology-mediated delivery. The second factor resides in practical alternative approaches that are faculty-centered and data-driven.

LIMITATIONS OF A ONE-SIZE-FITS-ALL PD APPROACH

Technology centers that assist faculty on blended and online course development have the tendency to focus on a one-size-fits-all approach to their faculty development programs. Although teaching faculty on how to implement CMS tools (usually the basic ones) is necessary, that manner of approach requires revision. Typically, technology centers provide a calendar on topics that will be covered each week or month during each school term. Such instruction and activities are usually focused on assisting faculty navigate and apply CMS tools. In addition, technology centers are also open for consultation with faculty on their varying needs. In spite of these accommodations, time to devote to learning and or improving instructional design for delivery remains a key confounding factor that impedes faculty ability to attend training workshops (Heinich, 2011; Betrus, 2008). Conflicts with instructional time and preparation impede faculty attendance of such workshops. As such, faculty only go to technology support centers physically or call for assistance via phone when the need arises.

Although technology support centers are undergoing transformation due to faculty demands and input, much still remains to be done to make faculty stakeholders of appropriate technology use. Much of these changes reside in first making faculty stakeholders of the benefits of the appropriate use of technology tools in CMS over traditional instructional methods. This will involve a process of diffusion (Rogers, 2003) whereby faculty at various stages of CMS tool use can observe demonstrations on tools and their inherent variations with specific emphasis on differing circumstance of use based on learning objectives and the pedagogical underpinnings of such use. Faculty exposure to relevant pedagogical frameworks and theories that justify the selection of CMS tools is likely to appeal to them. Every CMS has tools with variations that can serve the needs of different types and levels of learners, for example. Abel (2013) has noted how a particular use of technology can be appropriate for foundational courses or concepts but not suitable for advanced courses or concepts. An example is the use of the "Q & A" choice for discussion forums for upper division or graduate courses in favor of other options in Moodle because that particular option requires that students first post their discussion before they can see other posts. Therefore, it is by understanding the rationale for the utility of each tool that faculty are then likely to embrace and try them out. In order for this to occur, however, it would require technology support personnel who are not only knowledgeable in how the tools of a CMS works but conversant in the different circumstances of appropriate use in order to persuade such utility. When faculty are exposed to the differing functions of CMS technology tools, especially with regard to the attainment of desirable learning outcomes, skepticism on the value of technology for teaching and learning is more likely to change. This type of support for faculty can also lead to collaboration and useful feedback to administrators on what works and what does not.

The analysis here is that if, for instance, faculty only go to technology centers to get assistance with uploading syllabi and course materials at the beginning of the term, and pay another visit to learn how to enter grades at mid-term or toward the end of term, then what perpetuates is that faculty are not even aware of the other beneficial tools in a CMS that could enhance teaching and learning and make them become more learner-centered. If technology support staff are not familiar with pedagogical frameworks and their relevance to CMS tools, they fail to promote optimal use by not making the case for links between the two and why their utility in certain circumstances provide more desirable results over traditional face-to-face practice. As a consequence, "the concepts and principles related to 'using technological *resources*'" as explained by Molenda (2008, pp. 141-156) get undermined.

For this reason, it is necessary for some technology support personnel to be trained in the pedagogical rationale for the utility of CMS tools to provide initial training that will then be complement by training on tool implementation.

The second reason why technology support personnel need to go to faculty at their own departments is that colleges and departments in any given institution will have differing needs even on the same CMS. Even where such needs do not vary much, faculty exposure to relevant pedagogical frameworks and theories that justify the selection of CMS tools could influence improved application significantly. For example, faculty within a college or department of education can be expected to be knowledgeable in learning theory and its role in education, instructional alignment principles, and the philosophy of being learner centered as compared to faculty in other disciplines because the former receive training in writing goals and objectives, in addition to frameworks for designing instruction. This is in part because the former is expected to teach these skills to pre-service teachers as part of their curriculum. Such faculty are therefore more likely to embrace more appropriate tools in a CMS whereas faculty who are not immersed in learning theory and its practical relevance to CMS may become content with utilizing tools that only provide the convenience of a repository for course materials.

Faculty are subject matter experts but they may lack the complementary expertise to select appropriate CMS tools that can best meet the pedagogical needs of instruction (Gentry, 2011). As such, it would require technology support staff who are not only knowledgeable in guiding faculty on how to navigation the various tools in a CMS but in addition, be knowledgeable in the practical applications of learning theory, including andragogy.

A quick exposure of faculty, where necessary, to the differing utilities of a CMS tool that reflect perceived differences or intersections between the behaviorist and cognitivist perspectives versus the constructivist perspectives (Molenda, 2008), for example, have implications for appropriateness of use. In addition, such choice of use reflects the difference between teacher-centered practice which is predominant in traditional delivery versus the constructivist perspective which is learner-centered and which appropriate use of CMS tools tends to espouse. Understanding the different types of use for one CMS tool therefore lays the foundation for appropriateness of choices based on faculty content management. It is the manner of content management with a CMS which establishes the difference between traditional delivery practices and learner-centered, technology-directed practice. Providing answers to the following questions by an instructor who uses a CMS for instructional delivery puts this analogy in perspective:

- Is there alignment between course objectives and utility of choice tools?
- Is there evidence of interactive opportunities for learners to make meaning?
- Is faculty optimizing use of tools based on manner of use? Where is the evidence?

- How does the material gain or maintain the learner's attention with regard to interactivity?
- How is productive feedback provided?

ALTERNATIVE APPROACHES FOR CMS USE

The following processes for appropriate tool use are available, however, it would take their implementation by technology support centers for success to happen. First, it is necessary to identify the baseline of CMS tools and their inherent variations in order to foreground their use. Such identification should go beyond ordinary practice such as how to add an activity, file or folder to a course, setting up quizzes, using grade book or adding a discussion forum. Different ways of utilizing a tool through its variations should first be established. Following this, it would be appropriate to verify tools that faculty actually use. Utilizing Hall's (2010) innovation configuration mapping concept, for example, can place faculty with regard to current use of CMS tools and therefore, form the basis for providing appropriate and effective assistance toward optimal use. Such a framework would help to explore faculty integration of CMS to: (a) describe the manner of use; (b) choice processes; and (c) faculty perceptions of optimal use (i.e., how they think they utilize CMS resources). Such theoretical/pedagogical rationales for CMS tool selection and alignment reflects views of best practices (Heinich, 2011; Betrus, 2008).

Professional development training workshops on selecting CMS resources based on performance objectives and established learning outcomes would provide faculty with opportunities for a focused examination of their CMS course sites and help to validate any alternative recommendations for resource selection. Such an approach is also likely to win faculty receptivity to alternative resource utility and integration. Effects of such efforts by technology support centers would also lead to data-driven information on faculty choice selection of CMS tools and provide accurate information on barriers, concerns, and constraints that impede optimal implementation of technology tools, and register impacts of PD on appropriate CMS use for learner-centered instruction. Also, by identifying and classifying faculty use of each CMS tools and their variation of use, it is possible to collect data that would verify individual as well as general faculty use for analysis. The analysis of such would also provide data for the comparison of CMS tool use from one school term or year to another, for noticeable differences, especially for faculty who teach the same course(s) with such frequency. This practice will also make it possible for the type of feedback interactions at a micro level that Jacobsen and Kapur (2011, p. 304) discuss with regard to theoretical application of learning environments.

CONCLUSION

A significant body of students who are immersed in information technology populates traditional brick-and-mortar universities and colleges. Technology and modern media have shaped the environment that this generation of learners live in. The efficient and reliable technological devices and associated software afford this generation a latitude and convenience to communicate, access information and interact at unprecedented rates. Universities and colleges, in response to the need to provide technology-mediated environments to support learning, have generally embraced CMS to optimize learning (Nycz & Cohen, 2007). However, faculty in post-secondary institutions provide technology-mediated platforms such as CMS to support blended learning, faculty are yet to utilize CMS tools appropriately to enhance learning and increase learning outcomes are As a result, their lives are driven by mobile devices which they largely use within the context of social media. Consequently, technology, with particular regard to blended delivery in particular and online learning in general, provides opportunities that also pose problems. It appears that the problem lies in how to connect with, not discourage the social connections that students have with their world (Abel, Brown, & Seus, 2014). In spite of these inherent problems, many (Bowen, 2013; Carr-Chellman, 2011; Chen & Denoyelles, 2013) are optimistic about the appropriate use of technology to increase learning outcomes that reflect the needs of our society today.

For brick-and-mortar institutions of higher education, it means taking advantage of alternative delivery methods to serve students who are physically on campus as well as those who choose to study from distance. The key to success for these traditional institutions is to focus on assisting faculty design courses that are student-centered that also meet "best practices" with their stipulated CMS. Designing and delivering instruction for traditional teaching and learning environments are different from that of blended environments. The paradigm shift in assisting higher education faculty transition from traditional to blended environments is to empower instructors with the necessary resources and incentives to take ownership of technology-mediated instructional design as they do with their traditional processes (Carr-Chellman, 2011).

Blended environments provide opportunities for brick-and-mortar institutions to expand their student outreach through optimal assistance to faculty. The focus must be on how to increase the number of students who succeed through the achievement of desirable learning outcomes. For this to occur there is a need to go beyond the traditional face-to-face learning environment alone. The mantra must be that "A" students are made and not born. For this to be realized, it means that traditional delivery modalities alone will not assist in this endeavor. The increasing success of distance learning, and as an emerging force in education, must not be lost in the current debate on MOOCs. Heed must be paid to students as consumers, for they will ultimately decide where to pursue their education. For brick-and-mortar institutions, technology is not a threat if faculty are properly assisted on the appropriate use of technology-mediated blended environments. The actual and potential benefit of students depends on how faculty have been prepared to utilize blended environments for learner-centered instructional delivery and facilitation to achieve desirable learning outcomes.

REFERENCES

Abel, R., Brown, M., & Suess, J. (2013). *A new architecture for learning*. Higher Education in the Connected Age. EDUCAUSE.

Betrus, A. K. (2008). Resources. In Educational technology: A definition with commentary (213-240). New York, NY: Lawrence Erlbaum Associates.

Bowen, W. G. (2013). The potential for online learning: Promises & Pitfalls. EDUCASE Review, 48(5).

Carr-Chellman, A. A. (2011). Power, expertism, and the practice of instructional design. In Instructional technology: Past, present, and future (pp. 105-115). Santa Barbara, CA: Libraries Unlimited.

Chen, B., & Denoyelles, A. (2013). Exploring students' mobile learning practices in higher education. *EDUCAUSE Review, 49*(1).

Danielson, C. (2007). *Enhancing professional practice: A framework for teaching* (2nd ed.). Alexandria, VA: ASCD.

Gentry, C. G. (2011). Educational technology: A question of meaning. In Instructional technology: Past, present, and future (pp. 1-9). Santa Barbara, CA: Libraries Unlimited.

Hall, G. E. (2010). Technology's Achilles heel: Achieving high-quality implementation. *Journal of Research on Technology in Education*, *42*(3), 231–254. doi:10.1080/15391523.2010.10782550

Hartman, J. L., Dziuban, C., & Brophy-Ellison, J. (2007). Faculty 2.0. *EDUCAUSE Review*, *42*(5), 62–77.

Heinich, R. (2011). The proper study of instructional technology. In Instructional technology: Past, present, and future (pp. 31-54). Santa Barbara, CA: Libraries Unlimited.

Hirumi, A., & Kidney, G. (2011). Contemporary issues facing distance educators: An e-learning perspective. In Instructional technology: Past, present, and future (pp. 145-160). Santa Barbara, CA: Libraries Unlimited.

Jacobsen, M. J., & Kapur, M. (2011). Learning environments as emergent phenomena: Theoretical and methodological implications of complexity. In Theoretical foundations of learning environments (2nd Ed.). New York: Routledge.

Januszewski, A., & Molenda, M. (2008). Definition. In Educational technology: A definition with commentary (pp. 1-14). New York, NY: Lawrence Erlbaum Associates.

Jonassen, D. H., & Easter, M. A. (2012). Conceptual change and student centered learning environments. In Theoretical foundations of learning environments (pp. 95-113). Academic Press.

Land, S. M., & Hannafin, M. J. (2000). Student-centered learning environments. In Theoretical foundations of learning environments (pp. 1-23). Mahwah, NJ: Lawrence Erlbaum Associates.

Land, S. M., Hannafin, M. J., & Oliver, K. (2012). Student-centered learning environments: Foundations, assumptions and design. In Theoretical foundations of learning environments (pp. 3-25). Academic Press.

Lin, Q. (2009). Student views of hybrid learning: A one year exploratory study. *Journal of Computing in Teacher Education*, *2*, 57–66.

Mohammed, A. (2004). *Theory and practice in online learning.* Athabasca University.

Molenda, M. (2008). Using. In Educational technology: A definition with commentary (pp. 141-173). New York, NY: Lawrence Erlbaum Associates.

Nycz, M., & Cohen, E. B. (2007). The basics for understanding e-learning. In Principles of effective online teaching (pp. 1-17). Santa Rosa, CA: Information Science Press.

Oblinger, D. G., & Maruyama, M. K. (1996). Distributed learning. Boulder, CO: Cause Professional Paper Series.

Pollard, J. S. (2005). *Measuring implementation in schools: Innovation configurations*. Austin, TX: Sedl publications.

Power, T. M. (2014). John Falkin: Designing an online graduate seminar. In The ID case book: Case studies in instructional design (pp. 105-112). Academic Press.

Reigeluth, C. M., & Moore, J. (1999). Preface. In Instructional design theories and models: A new paradigm of instructional theory (vol. 2). Mahwah, NJ: Lawrence Erlbaum Associates.

Rhode, J. F. (2009). Interaction equivalency in self-paced online learning environments: An exploration of learner preferences. *International Review of Research in Open and Distance Learning*, *10*(1), 1–23.

Richey, R. C., & Morrison, G. R. (2011). Instructional design theory construction. In Instructional technology: Past, present, and future (pp. 253-280). Santa Barbara, CA: Libraries Unlimited.

Rogers, E. M. (2003). *Diffusion of innovations* (5th ed.). New York, NY: Simon & Schuster.

Simonson, M. (2011). Distance education yesterday, today, and tomorrow. In Instructional technology: Past, present, and future (pp. 79-104). Santa Barbara, CA: Libraries Unlimited.

Soares, L. (2013). *Creating an environment for learning technologies: Toward a generative model of state policy and institutional practice*. EDUCAUSE.

Surry, D. W. & Land, S. M. (2000). Strategies for motivating higher education faculty to use technology. *Innovations in Education & Training International, 37*(2), 145-153.

Tessmer, M. (1998). Meeeting with the SME to design multimedia exploration systems. *ETR & D*, *46*(2), 79–95. doi:10.1007/BF02299790

Yuan, L., & Powell, S. (2013). *MOOCs and open education: Implications for higher education*. The University of Bolton. Retrieved from http://publications.cetis.ac.uk/2013/667

KEY TERMS AND DEFINITIONS

Adoption: The process or act of using something new.

Blended Instruction: The combination of traditional face-to-face with online instruction.

Course Management System (CMS): The utilization of technology platforms for the delivery and assessment of learning. This is synonymous with Learning Management System (LMS).

Instructional Design: A framework for organizing instructional content.

Instructional Technology: The utilization of technological tools to assist learning. Synonymous with educational technology.

Learning Environment: Conditions that influence the acquisition of knowledge, skills and attitudes or their improvement.

Optimize: Increasing outcome to high level(s) as possible.

Professional Development: Assistance provided to an individual or group of people that leads to growth and enhancement in their work.

Technology Tools: Applications within a Course Management System (CMS) for selection and implementation.

This work was previously published in Models for Improving and Optimizing Online and Blended Learning in Higher Education edited by Jared Keengwe and Joachim Jack Agamba, pages 1-11, copyright year 2015 by Information Science Reference (an imprint of IGI Global).

Chapter 40
Designing Sustainability Curricula:
A Case Following Chemical Engineering Curriculum Redesign

Madoc Sheehan
James Cook University, Australia

ABSTRACT

Developing an engineering student's awareness of sustainability through the embedding of sustainability curricula is widely considered to be essential to modernising chemical engineering degree programs. In this chapter, the chemical engineering program at James Cook University is used as a case study to illustrate the design and sequencing of embedded curricula associated with developing a students' awareness of sustainability. There are a wide range of examples of skills, techniques, and characteristics associated with developing this awareness. In this chapter, an approach is described whereby a set of generic and interdisciplinary capabilities are developed to provide a degree of flexibility in how sustainability is interpreted and taught. A cognitive learning matrix is utilised as a design tool that facilitates determination of new subject learning outcomes aligned with the sustainability capabilities. A variety of curriculum examples are introduced and described.

INTRODUCTION

Sustainability is widely acknowledged to be essential to creating a more equitable future. An ability to incorporate sustainability into engineering design is also important for engineering graduates to be able to innovate and deliver improvements in the economic, environmental, and social impacts of industry and business. At James Cook University (JCU) in Australia, sustainability has become a key element in the University's Strategic Intent, and over the past 5 to 10 years, an alignment to an ethos of sustainable practice has occurred across the teaching, research, and facilities management sectors. For example, a new sustainability degree program aligned with agricultural sciences is in its second year of offering, algae-based bio-fuel and bio-mimicry research is a recognised strength for the university, and a recent state of the art centralised cooling-water installation

DOI: 10.4018/978-1-4666-8246-7.ch040

has received National awards in sustainability practice. Parallel with these developments, JCU's School of Engineering and Physical Sciences have been developing and embedding curricula within the undergraduate engineering degree program (particularly chemical engineering) that develops an engineering student's "awareness of sustainability".

Internationally, engineering educators and engineering leaders across the globe have recognised that engineering graduates should be aware of sustainability and should be able to incorporate sustainability into their designs. Over the past 10 years or more, sustainability and sustainable design has been an emerging feature of engineering and particularly chemical engineering higher education degrees. Key accreditation bodies such as Engineers Australia (EA), in consultation with industry, have strengthened their emphasis on sustainability, ethics, health and safety, interdisciplinary knowledge, innovation, systems approaches, contextual understanding, and emotional intelligence. These are all characteristics which are commonly aligned with the broad principles of sustainability. Even more so, the Institution of Chemical Engineers (IChemE) have provided a number of vision statements outlining their commitment to sustainability, health and safety, innovation, reduced resource consumption, and minimised waste production. For example, in their recent review of the "Roadmap for the 21st century" are the Vice President's (Ed Daniels) opening remarks:

The future is challenging and uncertain. The puzzle is complex, but chemical engineering remains central to the delivery of sustainable energy, water, food, and wellbeing in all parts of the world. (IChemE, 2013)

Furthermore, the IChemE's traditional design prize has been reformed into a sustainability design prize. The specific objectives of which are to encourage students to think of sustainable development as a key element of their design projects and also to influence chemical engineering departments to position sustainable development at the heart of the curriculum.

In Australia, James Cook University, Royal Melbourne Institute of Technology, and Monash University, are examples of Universities where progress in embedding sustainability across the chemical engineering degree program has been most comprehensive. Murphy et al. (2009) and Allenby et al. (2009) both provide details on the progress in embedding sustainability into both research and teaching areas in higher education in the United States of America. Allenby et al. (2009) in particular, provides an interesting summary of the philosophical challenges and motivations in embedding sustainability. Although many institutions are shifting toward the incorporation of sustainability content into their degree programs, in the USA the University of Texas and Rowan University (Slater et al., 2007) provide exemplars of best practice in this area. In Europe, the progress made at Delft University to embed sustainability within engineering degree programs also provides a good case study (see for example: Mulder, (2006) and Segalàs et al. (2009)).

Apart from some exemplars of best practice and despite professional accreditation bodies such as Engineers Australia (EA) and The Institute of Chemical Engineers (IChemE) expecting that university graduates demonstrate an "awareness of sustainability" (in the EA's case, from 2014), there has actually been relatively minor progress made to update and modernise engineering training. As noted in Steiner's (2010) description of the state of Australian engineering education: "*There is little evidence of sustainability being embedded at the heart of the engineering curriculum*". Chemical engineering academics such as Azapagic et al., (2007), Davidson et al. (2005) and Byrne and Fitzpatrick (2009), have concluded in the past that most chemical engineering programmes have made limited progress in increasing student's exposure to sustainability issues, let alone embedding sustainability as a contextual basis for engineering design and decision making. One reason for the lack of progress is because embedding sustainability is a challenging task for engineering educators. The challenge relates to the need for leadership, and personal commitment, as well as to more practical challenges associated with pedagogy and curriculum development. For example, "*some engineering lecturers are not receptive to including sustainability in their engineering subjects sometimes because it is thought 'nebulous and partly ideological' and does not appear to have immediate practical application*" (Hopkinson & James, 2010). Others feel it is "beyond their comfort zone" Bryce et al. (2004). To modernise context and embed sustainability requires staff support and effective leadership that places importance on sustainability and provides opportunities for staff personal and professional development. A personal connection to sustainability coupled to an understanding and appreciation of sustainable engineering applications is also essential to embedding sustainability throughout the curricula so that sustainability becomes a theme which is woven throughout traditional discipline practice and theory.

The broad requirements or general approach to developing students understanding and awareness of sustainability are well-described in the literature. Furthermore, national and international case studies in this area have generally followed a similar process of curriculum renewal, with common characteristics. An example is the model proposed by Desha and Hargroves (2011) which they called Rapid Curriculum Renewal for Sustainability. Their model was categorised into:

- Awareness raising & developing a common understanding amongst staff.
- Identifying graduate attributes.
- Auditing and mapping each program against graduate attributes.
- Embark on strategic content development & renewal.
- Bridging & outreach with industry & education.
- Integrating curriculum with campus & community opportunities.

The third and fourth elements in the rapid curriculum renewal model, involving development and mapping of strategic content or curricula, are the most significant challenges in this process. Currently there is a lack of detail and clarity regarding the content type, program location, or the methodology required to develop curricula to best achieve these aims. For example, in a survey of 1368 USA engineering departments, curriculum development in sustainability was found to require more structure and organisation (Davidson et al., 2007). It is hoped that the work we present in this chapter addresses some of these deficiencies.

When it comes to teaching an awareness of sustainability there is a common understanding that sustainability should be integrated into a degree and not necessarily taught as a separate subject. However, the task of embedding sustainability is not straightforward and would be benefit if content were able to be sourced within traditional teaching resources, such as core discipline textbooks. Unfortunately, taking chemical engineering as an example, there are only a handful of textbooks that are dedicated to engineering sustainability, but to this authors knowledge no examples of core discipline textbooks that have embedded sustainability within the traditional content. Furthermore, many if not all academics will not have been exposed to this content as part of their own formative engineering training. As such, the most common examples of teaching sustainability in undergraduate engineering programs are either at a base level: by introducing definitions of sustainability into general engineering courses (for example); or the development of entire stand-alone subjects that might deal only with typical sustainability tools and techniques, such as life cycle analysis. Other approaches include the creation of new postgraduate courses in "sustainable engineering" that lead to Masters level qualifications. Whilst laudable, these approaches also run the risk of students (and academic staff) perceiving sustainability as an "add on" feature to extend traditional engineering approaches, instead of considering it as an intrinsic feature, integral to good engineering design and practice.

In this submission I will describe the efforts being undertaken within James Cook University's chemical engineering program to source and develop curricula that embeds sustainability. Five key sustainability attributes which provide a framework for understanding and staging whole-program curriculum reform will be described. The scaffolded nature of the attributes will be emphasised as a students' progressive development of the attribute capabilities was helpful in undertaking broad-scale program sequencing and also finer-scale curriculum design and development. A fine-scale curriculum design methodology which utilises a modified form of Bloom's taxonomy (Nightingale et al., 2007) will be described. A sequence of first, second, third and final year core chemical engineering subjects are used to illustrate use of the methodology to design curricula. Brief curricula examples are described to emphasise subject connectivity and also to introduce the use of non-traditional teaching methods in embedding sustainability.

ORGANISATIONAL BACKGROUND

In order to provide clarity to the discussion that follows, a number of terminology definitions are provided. The term "program" refers to the entire sequence of 32 individual "subjects" that are usually delivered over a four year period and lead a student graduating with a named engineering degree, such as chemical engineering. Each subject within a degree program runs over a 13 week semester and broadly speaking, will typically involve students being exposed to lectures, practicals and tutorials relating to the subject content. The specific materials that are delivered by the lecturer or provided to students for review (i.e. lecture materials, multi-media, tutorial/assignment question sheets, practical and field trip information details) are referred to individually as curriculum and collectively as curricula. The demonstration of a students' mastery of the subject curricula is determined by submission of aligned assessments.

James Cook University's School of Engineering and Physical Sciences is a small and highly integrated School with 25 person staff offering a four-year Bachelor of Engineering degree program comprising 32 subjects (15 discipline specific, 17 multi-disciplinary), with four discipline-major program options (chemical, mechanical, civil and electrical engineering). New engineering minor program options set to begin in 2015 include among others, sustainability, automatic control, water and waste water, and asset management. The School's total student number comprises approximately 600 - 700 students at any one time, of which there are approximately 20-30 chemical engineering students per year level. Engineering students undertake a common first year before choosing a major in their second year of study. The key capstone subjects in chemical engineering are full year subjects in the student's final year of study and include Engineering Research Thesis Project and Chemical Engineering Design. All students are also required to undertake at least 10 weeks of vacation work practice prior to graduation.

SETTING THE STAGE

Initial subject and curriculum development to embed sustainability began in an ad hoc manner in 2007 via the introduction of sustainability definitions and environmental ethics into a second year chemical engineering subject taught by the Author. In 2009 a systematic, research-led process to embed sustainability began via a funded (Australian Department of Education, Employment and

Workplace Relations, 2009) collaboration between James Cook University engineering academics and involving a sustainability think tank - The Natural Edge Project. An additional funded fellowship scheme in 2012 was used to continue the curriculum design and embedding process and to fund professional development in sustainability for involved staff. Over the course of the project more than 12 of the School's academic staff members have undertaken the design and implementation of new sustainability aligned curriculum in first, second, third and fourth year engineering subjects across all major disciplines. More than 15 separate subject offerings now include sustainability aligned curriculum with 7 of these subjects being specific to chemical engineering students. The School is currently in the process of designing a new sustainability subject to offer to students from other parts of the university. The Engineering School was reviewed for EA Accreditation in 2012 and was commended both for its broad focus on sustainability as well as specific components of the curriculum involving interdisciplinary project work. In a recent external review of the engineering school's progress in embedding sustainability (Skamp, 2012), it was noted that in the Australian context, the progress that has been made to embed sustainability is "*well advanced compared to many engineering disciplines in other universities* ".

CASE DESCRIPTION

In the literature there are many different tools and techniques that are invoked as a recipe for defining and teaching sustainability to engineering students. Even the term sustainability is fraught with ambiguity and many alternatives definitions abound. The term green engineering design and the Principles of Green Engineering have been used in the past (Anastas & Zimmerman, 2003 and Slater et al., 2007). Readers are also referred to a review of a selection of techniques and sustainability definitions by Garcia-Serna et al. (2007). Key elements of a engineering student's understanding of sustainability that are common themes in the literature include definitions of sustainability, exposure to examples of sustainable design and practice, a deep understanding of the systems approach, knowledge of the interactions between engineered and other (social and ecological) systems, usage of life cycle thinking, and quantification of impacts using techniques such as sustainability metrics or the triple bottom line approach. Additional elements that may also be aligned to sustainability have included health, safety and risk analysis, innovation and creativity, as well as students who are exposed to inter- and multidisciplinary teams and who develop cross-cultural understanding and awareness. Unfortunately the criteria and objectives in sustainability evolve rapidly and news tools and techniques multiply as our familiarity and understanding of sustainability increases. For example, aspects of risk assessment and social sustainability quantification are anticipated to become critical to sustainability assessment, yet examples of their application and development are rare, and their adoption within engineering higher education is still in its infancy. As such there needs to be an acceptance that there is flexibility in how sustainability curriculum is developed and taught to engineers.

It has been suggested in an Australian Learning and Teaching Council report (King, 2007) that engineering curriculum development would benefit from a top-down, systematic approach founded in consideration of specific objectives and graduate attributes. In this work, we emphasise the determination of the required generic capabilities that lead to a students' development of the generic attribute: *awareness of sustainability*. The literature is unfortunately sparse when it comes to the development of engineering competencies and attributes in relation to sustainability. Segalàs et al. (2009) provides an example comparing sustainability attributes at three European universities and classified them under three descriptors:

knowledge and understanding, skills and abilities, and attitudes. Brennan (2009) provides a more practical overview by introducing the type of content required, similar to the green engineering principles. However he also categorises learning areas, provides examples of supporting project-based activities, and suggests an approach that scaffolds curriculum. For example, Brennan (2009) suggests introducing concepts and knowledge early in the degree.

In the following sections, the case study project to embed sustainability across the JCU engineering degree program is described, with emphasis on chemical engineering. The description begins with the determination of interdisciplinary program-wide generic sustainability attributes that provide the framework for the development work that followed. The use of the attribute capabilities in broadly mapping content/topic areas and the planning of scaffolded learning pathways is then presented. The curriculum design tools that were used to both review and then to design specific sustainability curricula are described, before finally providing examples of ways to integrate sustainability applications into engineering subjects.

Generic Sustainability Attributes

At JCU a series of preliminary activities were undertaken prior to embarking on whole-scale curriculum design and program mapping. These activities included collaborative staff and local industry forums and whole-teaching-staff attribute design workshops. This would be an appropriate time to raise the general awareness of sustainability amongst staff through professional development opportunities such as guest seminars and targeted conference attendance. The attribute design workshops involved all engineering disciplines and were used to develop, in alignment with the teaching staff's understanding of sustainability, five capabilities that defined a JCU engineering student's "awareness of sustainability". The capabilities were initially discipline-based, but were later simplified through a review process into common interdisciplinary attributes which were deliberately more general in terminology and better suited to the recognised characteristics of sustainability. The five generic capabilities are shown in Table 1, and broadly match what has been typically proposed across the literature. One of the key advantages of this development process is that the staff felt a sense of ownership of the attributes and could more easily interpret them to fit their own expectations and experience. The common set of attributes also formed a solid framework to use to begin progress toward whole-scale program mapping and curricula design. In particular the simplicity of the attribute capabilities made them adaptable and flexible across disciplines. The scaffolded nature of the capabilities (i.e. knowledge generally precedes conceptualising systems and quantifying impacts, which precedes optimising a system) helped to facilitate the later stages of curriculum design and reform.

Table 1. Generic graduate attributes in sustainability (Reproduced from Sheehan et al., Proceedings of Chemeca 2012, Wellington, New Zealand

Graduate Attribute Description	Capability Keyword
Knowledge of sustainability including definitions, discipline context, relevance, and importance.	Knowledge
Discipline specific exposure to sustainability applications including examples of sustainable practice and design.	Applications
Ability to conceptualise complex systems and their interaction across ecological, social, and environmental dimensions.	Systems
Ability to use tools to quantify sustainability of products, processes, and designs.	Quantify
Ability to optimise engineering designs to trade off across the three dimensions of sustainability (environment, equity, economy)	*Optimise*

Broad Scale Mapping

The typical approach to introducing sustainability into chemical engineering programs has been to introduce new curriculum in the first year of a degree program that broadly aligns with the *knowledge* attribute. This might involve an introduction to definitions of sustainability (most often the Brundtland definition) and introduction to methods that enable the definition of the characteristics of sustainability (such as the triple bottom line approach: economy, ecology, society). More sophisticated curriculum might introduce students to the wicked problems faced by industry and society. This can include an introduction to nutrient and element cycles, including carbon, nitrogen and water, and discussion that begins to address key environmental issues such as climate change, air and water borne pollution, and energy constraints in engineered systems. These latter issues can also be classified as the required knowledge that enables student's further understanding of the environmental impacts that would be described and quantified in life cycle and sustainability assessment methodologies, such as the IChemE's sustainability metrics (IChemE, 2013). Knowledge of social and equity issues is certainly considered to be important but is not commonly within the realm or experience of engineering academics and as such the location and details of this content is less clear. At JCU, social issues are addressed through the introduction of ethics at both first and second year levels and then extended in third year via project management examples. This is certainly a challenging area to identify and design curriculum.

More advanced curricula is required to address the latter capabilities and to develop students understanding of interactions between systems and also to expose them to methodologies for quantifying impacts. Chemical engineering students are well-placed to take on board this curriculum because of their extensive exposure to and reliance on systems skills and methodologies. In fact, systems analysis courses such as those that deal with the application of mass and energy balances on engineered systems are very well-suited to including introductions to Life Cycle Assessment (LCA) and extending student's systems thinking to include interacting systems (be they social or environmental). Life cycle systems thinking and examples of LCA's are valuable in the curricula because they can be extended or modified to cover other LC concepts such carbon and ecological footprints, embedded energy, and also provide context for the use of thermodynamic properties such as exergy.

Whilst the introduction of LCA into the curriculum addresses the systems capability, it also provides a convenient framework with which to begin to address the quantify capability. Many of the previous examples make use of environmental impact categories such as water use and Global Warming Potential (GWP), the later being typically expressed as an aggregated impact (i.e. kg CO_2 equivalents). Thus there is a requirement to include quantification of different impacts and also to outline techniques such as data aggregation. A range of LC approaches and environmental impact categories and aggregation techniques can be spaced throughout a degree program in relevant subjects. For example, embedded energy would be a good LC concept to introduce in the materials science course, whereas eutrophication potential and PO_4^{3-} equivalents would be suited for introduction in a wastewater treatment subject.

There are some excellent examples of LCA that can and have been incorporated into chemical engineering education. Issues of recyclability and impact on energy consumption can be discussed by referring to systems diagrams that describe the cradle to grave aluminium life cycle. Other examples include an LCA comparison of air dried and paper towel dried hand washing (Evans et al., 2008), and an LCA-based assessment of the use of fly ash in cement manufacturing (O'Brien et al., 2009). Recent LCA examples of alternative by-product technologies in sugar production can also be interesting and topical providing insights into alternative fuels such as bagasse fibre (Renouf et al., 2011 and 2012). Simpler examples that introduce LCA thinking to students might include an examination of life cycle carbon emissions comparison between six different products (beer, washing powder, car, shoes, milk, jacket) (Ball, 2008). The sustainable design textbook by Azapagic and Perdan (2011) contains a lengthy discussion of sustainability indicators and impacts, and offers excellent overview of sustainability as it relates to the process industries. Brennan (2013) also describes LCA methodology and provides a number of case studies relevant to the process industries. However, whilst there are good LCA and sustainability examples spread throughout various dedicated journal and conference articles, there is a distinct lack of integration of sustainability examples within fundamental chemical engineering textbooks. This integration would make embedding of sustainability into traditional subjects easier.

The final capability is highly scaffolded and relates to a student's ability to use learned knowledge, as well as systems and quantification skills in order to optimise designs across the dimensions of sustainability. Like the wicked or complex problems that engineers will face in the workplace, this is a very difficult capability to reach within a four year degree program. It is suggested that this capability be most effectively addressed in a Masters degree program or in a five year engineering degree. Here at JCU we make minor inroads into capability via curricula in the two full-year capstone subjects: Engineering Research Thesis Project and Chemical Engineering Design.

Table 2 illustrates a program mapping tool for the chemical engineering discipline that has been updated and modified over time as our understanding and development of the new curricula evolves. The map aligns curricula descriptions with each of the five capabilities associated with the generic sustainability attribute. In the beginning of the curriculum reform process, the map was used to brainstorm appropriate subjects and also brainstorm possible embedded curricula (using broad terms such as those deemed locally or disciplinarily important: water and energy). The scaffolded nature of the capabilities was important in this stage. In the early phase of mapping, there was limited detail on actual curricula and more emphasis on mapping an appropriate progression of the attribute. In essence, the map was a convenient tool to "visualise" the progression of the attribute. In this way the map could be used, where necessary, to identify and target professional development opportunities for teaching staff. To illustrate the inherent progression, a subject in first year might be identified as an appropriate location for the embedding curricula aligned with the *knowledge* capability, a third year subject might be identified as an appropriate location for the embedding curricula aligned with the *quantify* capability and a fourth year subject might be identified as an appropriate location for the embedding curricula aligned with the *optimise* capability. In this case study, professional development funds were provided as an incentive for the relevant teaching staff to learn about techniques to enable the quantification of sustainability (in the third year subject for example).

Over the course of three years of progressive but somewhat ad hoc curriculum development at JCU, the program map has been updated to reflect increased awareness of the attribute progression and increased specificity in the developed curricula. To date, more than 15 subjects across the entire engineering degree program have embedded sustainability curricula. At JCU we have chosen to concentrate attribute development and convey the majority of sustainability curricula within a handful of key subjects. This is particularly the case in developing the capabilities of *systems, quantify,* and *optimise*. The attainment of the *knowledge* capability is more widely distributed. The key subjects for delivering this curriculum are a second year subject on process systems (energy balance, sustainability, LCA, design and

Table 2. Generic sustainability graduate attribute program map illustrating the progression of attribute capabilities (Adapted from Sheehan et al., Proceedings of Chemeca 2012, Wellington, New Zealand)

Attribute capability	Introduction to engineering	Material balances & fundamentals of chemistry	Energy balances, LCA & process design	Engineering materials	Fluid mechanics	Thermodynamics of fluids
knowledge	Sustainability definitions, LCA categories, ethics	Carbon cycle, Nutrient cycles, climate change, pollution prevention	Definitions & ethics, data aggregation, LCA: scope, impact category			
application	Carbon footprint product comparisons	Process examples	Energy efficiency: MED, cooling tower, scale effects...etc	Material selection, sustainable materials, thermal efficiency	Energy efficiency, pumping systems	Energy efficiency, heat recovery systems
systems		LCA: diagrams, systems representation	LCA: boundary, con- ceptalisation	LCA: Embedded energy and recyclability		
quantify			CO_2eq, GWP, sustainability metrics	Energy Rate of return, efficiency		
optimise						
	First Year		Second Year			

Attribute capability	Chem Eng'g reactor design	Chem Eng'g thermodynamics	Engineering project management	Process safety & water treatment	Chem Eng'g design project
knowledge	Green chemistry		Triple bottom line, environmental impacts, social impacts		
application	Catalysts, water efficiency	Energy efficiency, pinch technology	cultural understanding, indigenous experience	Wet land treatment systems, air pollution control	
systems	LCA: Nutrient recovery			Safety systems & methodologies	LCA, client/community interactions
quantify		Exergy analysis	Social sustainability metrics	Metrics: air and water impacts, risk assessment	Enviro impact/risk assessment, sustainability metrics analysis
optimise					Technology selection
	3rd Year			4th Year	

process dynamics), third year engineering project management (social impacts), fourth year process safety (advanced LCA, water pollution, risk assessment) and a fourth year chemical process design subject (sustainable technology selection, process sustainability indicators/metrics).

Up until this point, the *applications* capability has not been described in relation to specific subjects and curriculum. This is because based on our experience in curriculum development and also our own interpretation of this attributes practical impact on teaching, it is a mechanism for using "more sustainable" engineering designs and applications as examples for reinforcing and presenting existing (i.e. traditional or foundation) content. It can be seen as a measure by which an academic recognises how sustainability can impact on their own teaching domain. The effective integration of this capability within a subject might require an academic to have a pre-existing focus or understanding about the impact of sustainability on their subject. Alternatively, professional development such as targeted conferences might facilitate the development of new examples to illustrate more sustainable designs to students. It is anticipated that after a period of program reform and staff development, all subjects in a degree program would present material and examples that include sustainability as the context for problem solving, technology selection, design, and engineering analysis.

Fine Scale Curriculum Design

After using the broad scale program mapping process to identify potential subjects and topic areas, a finer-scale curriculum design tool was necessary. A design tool was utilised in order to both review and to design new curricula, including identifying assessments and student learning outcomes. A matrix-based methodology based on a modified form of Blooms taxonomy was utilised (adapted from Nightingale et al., 2007). A key starting point in this methodology was to describe for an existing subject, in as much detail as possible, the specific subject learning outcomes (SLO's) that were aligned with the sustainability attribute. The process of defining the sustainability-related SLO's is worthwhile as it encourages teaching staff to formalise and clearly define student learning. Three different subject SLO's are provided below, as examples of this development process. In a first year subject covering material balances & fundamentals of chemistry (course code: EG1010) are the following four sustainability aligned subject learning outcomes, with attribute keywords underlined. For clarity in latter discussion, the course code is included as an identifier for each subject learning outcome:

EG1010 SLO1: To demonstrate a *knowledge* of common element cycles (C, N, P).

EG1010 SLO2: To use *systems* diagrams to represent the Carbon cycle.

EG1010 SLO3: To demonstrate a *knowledge* of the impacts of CO_2 within the context of climate change.

EG1010 SLO4: To demonstrate a *knowledge* of the environmental interactions between common engineered systems and the environment.

In the follow-on second year subject on energy balances, LCA & process design (course code: CL2501) are the following five sustainability aligned subject learning outcomes, with attribute keywords underlined:

CL2501 SLO1: To develop *knowledge* of the definitions of sustainability, sustainable design and the roles and responsibilities of engineers in sustainable development.

CL2501 SLO2: To develop a broader *knowledge* of the environmental impacts and environmental sustainability performance measures of chemical processes.

CL2501 SLO3: To develop *knowledge* of the life cycle assessment approach to product and process design.

CL2501 SLO4: To propose life cycle *systems* diagrams for products and chemical processes

CL2501 SLO5: To be able to *quantify* the impact of chemical processes in terms of aggregated $CO_{2\,eq}$ emissions.

In a parallel second year subject on materials engineering (course code: EG2010) are the following three proposed sustainability aligned subject learning outcomes, with attribute keywords underlined:

Table 3. Constructive alignment of sustainability learning objectives and subject assessment tasks in a first year subject (EG1010) on material balances and fundamentals of chemistry (A: assignments, E: exams, T: tutorials, P: practicals).

Knowledge Domain ↓ Type of Learning	Cognitive Process Domain → Depth of Learning				
	Remember	**Understand**	**Apply**	**Evaluate**	**Create**
Factual Knowledge	SLO1 (A,E) SLO3 (A) SLO4 (A, E)				
Conceptual Knowledge	SLO2 (T, A)	SLO2 (A)			
Procedural Knowledge					
Meta-Cognitive Knowledge					

Table 4. Constructive alignment of sustainability learning objectives and subject assessment tasks in a second year subject (CL2501) on energy balances, LCA and process design (A: assignments, E: exams, T: tutorials, F: field trip/site visit). (Adapted from Sheehan et al., Proceedings of Chemeca 2012, Wellington, New Zealand)

Knowledge domain ↓ Type of Learning	Cognitive Process Domain → Depth of Learning				
	Remember	**Understand**	**Apply**	**Evaluate**	**Create**
Factual Knowledge	SLO1 (T,E) SLO2 (T,E,F) SLO5 (T, A, E)	SLO1 (T,F,E) SLO5 (T)	SLO5 (T,A)		
Conceptual Knowledge	SLO3 (T, E)	SLO4 (T) SLO3 (T)	SLO4 (T)		
Procedural Knowledge	SLO3 (E)				
Meta-Cognitive Knowledge					

EG2010 SLO1: To develop knowledge of the definitions of sustainability metrics relevant to materials selection (embedded energy, carbon footprint).

EG2010 SLO2: To understand and describe a materials life cycle impacts using systems diagrams.

EG2010 SLO3: To be abl To quantify the life cycle impacts of a material using embedded energy/carbon footprint.

Subject Curriculum Review

For each subject the specific subject learning outcomes (SLO's) described above can be mapped in two dimensions. The first dimension is the type of learning, which includes the progressive development of factual, conceptual, procedural, and meta-cognitive learning. The second dimension includes the depth of learning and is identified by progressive descriptions such as a student being able to recall and then understand knowledge, all the way to being able to apply, evaluate, and eventually, create new knowledge. The terminology used in the learning matrix was also considered to blend well with the desire to embed a gradual progression in students exposure to the curricula associated with sustainability (i.e. to scaffold learning across the degree program). In the example matrices that follow (Tables 3 and 4), the types of assessments where each subject learning outcome is evidenced are also indicated. A learning matrix for the first year subject (EG1010) is shown in Table 3. This subject provided one of the first instances where students were exposed to sustainability curricula, so it seems reasonable that all of the noted subject learning outcomes are grouped into the top left hand corner of the matrix (i.e. remembering and understanding factual knowledge).

Table 4 illustrates the mapping of the second year subjects SLO's (CL2501) to the learning matrix. Particular emphasis is placed on this subject (CL2501) because it is the first subject in the degree program that cuts across both the *quantify* and *systems* attributes. This subject introduces a basic level of procedural knowledge in systems analysis (i.e. LCA methodology) and this procedural knowledge is targeted for scaffolding and development (i.e. extending the depth of learning) in later courses (such as third year and fourth year subjects).

A few specific comments are provided below on the curricula that we have developed to teach the SLO's and also curricula (assessments) that have been developed to demonstrate a student's attainment of the SLO's. In EG1010, content is primarily lecture driven and is mostly assessed via typical exam questions. In lectures, the students are introduced to systems diagrams describing the carbon, nitrogen and phosphorous cycles. As well as a range of other products and processes, aluminium production is used as a case study to illustrate the use of a systems approach to quantify the impact of aluminium recycling (on life cycle energy use). A relevant assignment question involves students assessing the following carbon cycle issues: the quality and relevance of literature sourced CO_2-temperature correlations; describing the importance of ocean storage and CO_2 solubility; deriving a simplified process model of the planet in order to predict the effects on temperature of increasing industrial emissions of CO_2; reflecting on the reliability of their conclusions.

In the second year subject on energy balances, LCA and process design (CL2501), the sustainability curricula is more extensively developed and both the type and the depth of learning are increased. An important component of the learning approach used in this subject is group-based tutorial work. The sustainability curricula involves a series of tutorial worksheets that groups of up to four students work on over a period of two weeks. The tutorials were interspersed with the associated lecture content (30% time allocated to lectures) and involved ethical role play requiring alternative points of view, development of data aggregation techniques, technology investigation and qualitative sustainability assessment, systems diagram development and LCA based comparative assessment of different fuels (coal, natural gas and bagasse fibre) in terms of GWP. Teacher observations of these sessions indicated that students were highly engaged with the content and found the tutorial workshops to be challenging and engrossing. Another aspect of the assessment was a field trip to an exemplary (in terms of sustainable design) industrial site. This trip met the traditional course requirements of exposure to discipline practice and learning to develop process flow diagrams, whilst also reinforcing the relevance of sustainability to their discipline. This type of activity also meets the broader objectives identified in curriculum renewal models that recommend bridging and outreach to local industry and community.

Subject Curriculum Design

In the early years of curriculum reform there were no obvious sustainability aligned curricula embedded into the third and fourth years of the degree program. The required curricula needed to be planned and designed before implementation. Whilst the broad-scale map shown in Table 2 provides a rough idea of the topic area, more specific learning outcomes were required to direct the development of this curriculum. The tool illustrated in Table 3 and particularly Table 4 was used to facilitate the design of new curriculum in a selection of latter year subjects. The appropriate latter year subject and its associated attribute capabilities were identified using the program map in Table 2. Specifically, this was achieved by using existing SLO's and their location in the learning matrix as a starting point for defining the new SLO's. Two techniques were used to develop the new SLO's. The first was incorporate minor and predictable modifications in the terminology used to describe existing SLO's. The second approach was to take an existing SLO from a subject early in the degree program and to use its location within the learning matrix as a basis for deriving new SLO's that extend learning. In this way the SLO terminology remained the same, but the depth and/or type of learning was extended.

Two examples that utilise SLO terminology changes are described. The SLO's from the second year subject (CL2501 SLO2 and CL2501 SLO5), shown again below, were modified and extended to design curricula for a third year subject (EG3000: Engineering project management) and a fourth year subject (CL4040: Process safety & water treatment) respectively. In the third year subject the broad program map in Table 2 is used to identify that the *quantify* and *knowledge* capabilities aligned with *social* sustainability are required. Using capability aligned SLO's from the second year subject (CL2501) as a starting point, the terminology in the knowledge-based learning outcome was modified to include the term "social" instead of "environmental" and in the quantify-based learning outcome the term "social" was used instead of "aggregated CO_{2eq} emissions". These modifications are shown below and two new SLO's were derived for the third year subject:

CL2501 SLO2: To develop a broader *knowledge* of the *environmental* impacts and *environmental* sustainability performance measures of chemical processes.

CL2501 SLO5: To be able to *quantify* the impact of chemical processes in terms of *aggregated $CO_{2\,eq}$ emissions.*

EG3000 SLO1 (new): To develop a broader *knowledge* of the *social* impacts and *social* sustainability performance measures of chemical processes.

EG3000 SLO2 (new): To be able to quantify the impact of chemical processes in terms of *social* measures.

To facilitate curriculum design to meet these new SLO's, they were assumed to be able to be progressed to the same extent in the constructive alignment matrix (i.e. the same depth and type of learning) as the basis SLO's from the second year subject (Table 5). This gives a very specific description of the aims of the new curriculum and helps to facilitate a highly targeted curriculum design process. Similar methods of assessment and pedagogy from the second year subject were considered suitable for SLO development in the third year subject as well. These SLO's formed a

Table 5. Constructive alignment of sustainability learning objectives and subject assessment tasks in a third year subject (EG3000) on engineering project management (A: assignments, E: exams, T: tutorials). Note the identical locations of the basis subject learning outcomes (SLO2 and SLO5) in Table 4

Knowledge Domain ↓ Type of Learning	**Cognitive Process Domain → Depth of Learning**				
	Remember	**Understand**	**Apply**	**Evaluate**	**Create**
Factual Knowledge	SLO1 (T,E) SLO2 (T, A, E)	SLO2 (T)	SLO2 (T,A)		
Conceptual Knowledge					
Procedural Knowledge					
Meta-Cognitive Knowledge					

starting point for sourcing content and lecture materials, designing new assessments, and facilitating professional development. New curricula resources included case studies from Azapagic and Perdan (2011) as well as online documentary videos on the impacts of fly-in/fly-out workforces on social cohesion and videos describing indigenous perspectives surrounding mining proposals and developments. Group based tutorial work was also used to demonstrate students' capabilities.

Another example of the modification of SLO terminology to design new curricula is described. CL2501 SLO5 from the second year subject was targeted for modification and then inclusion in a fourth year subject on process safety & water treatment (CL4040). This was achieved by replacing terms associated with GWP impacts (i.e. $CO_{2\ eq}$) with those associated with other environmental impacts. The choice of aggregated impact category is related to the how relevant the existing content delivered in that subject is to that particular impact category. The IChemE (2013) Sustainability Metrics provide an excellent compilation of impact categories that could be used to develop SLO's of this type. For example, in the process safety & water treatment subject the appropriate impact category might be eutrophication ($PO_4^{3-}{}_{eq}$) and aquatic toxicity (Cu_{eq}).

CL2501 SLO5: To be able to quantify the impact of chemical processes in terms of *aggregated* $CO_{2\ eq}$ *emissions*

CL4040 SLO1 (new): To be able to quantify the impact of chemical processes in terms of aggregated [*eutrophication/toxicity/ozone depletion/resource consumption/.... etc*] emissions

Examples of the use of the constructive alignment matrix to identify new SLO's that extend prior procedural knowledge deeper into the cognitive process domain (i.e. increasing the depth of learning) are now described. Consider for example the SLO's in the second year subject that were aligned with the development of students understanding of systems and LCA (CL2501 SLO3 and CL2501 SLO4 in Table 4). These SLO's can essentially be repeated again (i.e. using the same terminology) in fourth year subjects which are (identified in the overall program map as) important to extending and further developing students understanding and ability to apply systems/LCA techniques. Referring to Table 6, CL2501 SLO3 (To develop knowledge of the life cycle assessment approach to product and process design) could retain the same language but be extended in a latter subject (CL4040 SLO1) from the *remember* and *understand* cognitive domains into the *apply*

Table 6. Constructive alignment matrix illustrating the extension of the depth and type of learning of a second year subjects sustainability learning outcomes (CL2501 SLO3 and SLO4 in italics) into proposed fourth year subject learning outcomes (CL4040 SLO1 and CL4071 SLO1, respectively)

Knowledge domain ↓ Type of Learning	Cognitive process domain → Depth of Learning				
	Remember	Understand	Apply	Evaluate	Create
Factual Knowledge					
Conceptual knowledge	*CL2501 SLO3*	*CL2501 SLO3* *CL2501 SLO4*	*CL2501 SLO4* CL4040 SLO1	CL4040 SLO1 CL4071 SLO1	CL4071 SLO1
Procedural knowledge	*CL2501 SLO3*	CL4040 SLO1			
Meta-cognitive knowledge					

and *evaluate* cognitive domains. Assessment of this SLO occurs via a literature review of available product LCA's and an analysis of various sensitivities (boundary, scope, data quality) on the LCA conclusions. Additionally, CL2501 SLO4 (To propose life cycle systems diagrams for products and chemical processes) can retain the same language but can also be extended into the *evaluate* and *create* cognitive domains. This would occur in the fourth year capstone chemical process design subject (CL4071 SLO1) where new innovative process designs are envisaged and evaluated in terms of their LC impacts.

Developing the Applications Capability

Applications is one of the key sustainability attributes identified in group workshops. In an early set of SLO's, a number of "applications" based SLO's were written. An example of a specific application aligned SLO considered in the second year subject (CL2501 Energy balances, LCA & process design) was:

- To be able to understand and quantify engineering *applications* to enhance energy efficiency in chemical processes.

However, after comparing this application driven SLO's and other subject SLO's with Engineers Australia accreditation competencies (see Sheehan et al., 2012) there was insufficient new or distinctive learning to be able to differentiate the applications SLO above from more traditional Engineers Australia learning objectives such as "a student's ability to describe and quantify energy (*efficiency*)". For example, a student who is able to quantify energy (traditional EA competency) and has knowledge of energy efficiency measures (CL2501 SLO2) would be expected to be able to meet the applications-based SLO introduced above. Hence a definitive statement (i.e. SLO) regarding applications is considered redundant. However, we believe that facilitating deep learning in this area requires a student to be exposed to examples of energy efficient processing. However, providing assessment that proves "exposure" to sustainability examples or applications is difficult. This should not in any way discount the value in exposing students to innovative sustainability applications and examples as part of their degree program. At this point we promote the argument that teaching sustainability requires not only exposure to new tools and techniques but the thorough integration of sustainability as a contextual basis during the teaching of traditional engineering concepts.

A selection of examples of sustainability applications/practice and their link to traditional engineering concepts are outlined. In a first year subject (EG1010) biodegradable fibre-reinforced polymers are introduced during a discussion on molecular mass. In the same subject nutrient recovery from urine and non-renewable resource constraints are discussed during lectures describing the phosphate and nitrogen cycles, and are also used as examples for illustrating concepts of chemical equilibrium. Aluminium recycling (i.e. life cycle) is discussed during traditional lecture content on redox reactions and also during lectures on formulating mass balances with recycle. In a second year subject (CL2501), skill development in chart reading and energy balance formulation are developed through use of psychrometric chart data. In the past, cooling towers have been used as the traditional example through which the students practice their skills. The traditional example is altered by including a life cycle comparison (in terms of energy, water, and chemical use) between traditional cooling tower design and air-cooled condenser design. Through this comparison, students develop an understanding of context and competing requirements for the selection of alternative designs. This is reinforced through a field trip later in the course which visits a cooling tower set-up. Another example in the same subject uses an assignment question that requires students to compare energy usage in order to concentrate sugar juice via either single effect or multiple effect evaporation. This example develops fundamental skills in formulating energy balances, understanding fluid thermodynamics, and retrieval of steam table data. It also leads to consideration of energy efficient alternatives and the economic trade off between capital and running costs. Examples in civil engineering include using concrete formulations (fly ash substitution for example) with low carbon footprint, as case studies in traditional materials characterisation learning areas. In thermo-fluid subjects, solar pumps and solar thermal systems can make good examples to present traditional thermodynamic topics.

Exposure to sustainable applications has commonly been seen as essential to making sustainability the context for engineering decisions. It is believed that innovation and technological advances are necessary to creating more sustainable designs and providing solutions to society's wicked problems. This is an area where professional development and alignment of both research and design projects with sustainability can make great inroads. Examples within the JCU program include the capstone full year design project and also the full year thesis research project. Although not explicitly stated as such, sustainability aligned thesis projects now occur across all disciplines but depend greatly on academic staff interest and experience. Examples include projects on solar thermal and energy systems in electrical and mechanical engineering, life cycle analysis of recycled fibre use in cement formulations in civil engineering, by-product use in sugar milling and reactor design for nutrient recovery in chemical engineering. Other projects initiated as part of the curriculum reform process have included multidisciplinary teams of students modelling life cycle energy, water and materials use in tropical housing (included mechanical, electrical, chemical, civil and environmental students). Final year chemical engineering design projects involve local industry assistance in developing realistic and topical resource recovery projects that are based on their existing processes. Industry support is used to source experts in related technological innovation. Examples have included resource (in this case CO_2, N_2 and H_2) recovery from process flue-gas, mine tailings water recycling as well as ethanol and bio-plastics production from sugar mill by-products.

CURRENT CHALLENGES FACING THE ORGANIZATION

To date at least 15 unique engineering subjects at JCU have been updated in order to embed sustainability within the curriculum. The JCU engineering staff numbers are comparatively small, which has led to a highly integrated and interdisciplinary program structure. This has been a significant advantage in helping to expand interdisciplinary curricula and avoiding silo thinking. However, I certainly believe that the use of broad scale non-disciplinary capability key-words is also very useful in avoiding silo thinking. Whilst there has been strong engagement by most staff in the early attribute development workshops, engagement and participation in the actual development and integration of new curricula has been less universal. The uptake amongst a tighter group of more dedicated teaching staff (approximately 12 academics) has been strong, and the most significant embedding and scaffolding of content has been within the chemical engineering program. Embedding within this discipline has developed to such an extent that a new sustainability minor is set to begin in 2015 (available to all engineering programs) enabling other disciplines to learn the new curriculum. Sustainability is strongly supported by chemical engineering experts in both industry and academia and the emerging global imperative to embed sustainability within chemical engineering education provides weight to the argument that curriculum reform in this area is unavoidable. Furthermore, the response of students to the curriculum reform, across a range of student feedback mechanisms, has been universally positive.

There remain pockets of resistance to curriculum reform, particularly amongst established academics and some senior executives. Our experience suggests that resistance arises from a number of different sources. One source of resistance arises from the complex time demands on current academics and the establishment's emphasis on research performance as the traditional pathway to promotion. Strong and supportive leadership from the executive can reduce this barrier by recognising and encouraging curriculum reform as a legitimate and valued academic activity. We have tried to address this barrier at JCU by providing professional development (PD) funds that facilitate the alignment of an academic's research with sustainability. To ensure focus we included requirements that teaching outcomes (curriculum reform) must result from the PD support. There has been good uptake of PD, particularly from academics that are themselves motivated to undertake sustainability-related research and are eager to incorporate their research into their teaching. There has also been good uptake of PD from academics that hold strong personal commitments to sustainability. These academics see great value in the curriculum reform and are motivated by enhancing student learning and improving graduate quality.

Another source of resistance arises out of teaching staff observations that there is limited room for new curriculum in engineering degrees, and that there is a reluctance in letting other curriculum go. However, this constraint is a constant challenge for academics maintaining modern engineering degree programs and avoiding stagnation in curriculum. It is necessary to convince academics that programs change and the needs of industry (i.e. graduate attributes) also change. Engaging industry in curriculum reform is a good way to reinforce the acceptability and desirability of new curriculum. It is widely acknowledged that industry are looking for future engineers who have more developed social/ecological/economic skills and are also more experienced in inter-disciplinary teamwork and projects. Industry is probably more willing to reduce traditional technical curricula to enhance these graduate qualities. The trade-offs involved in developing new curriculum are still being explored at JCU. Closely related to staff reluctance to move away from traditional degree programs (for fear of losing important existing curricula) is the perception of sustainability as a soft science or even a life-style (ethical) choice for which the university has no responsibility. The latter group may have an inherent mistrust of the "environmental activist" associations with sustainability or may simply be less aware of the rigorous and complex methodologies associated with integrating sustainability into engineering design. Strong leadership and professional development such as targeted seminars are important to changing these perceptions. Staff members need to recognise that the drive to embed sustainability is important to both the Institution and also of benefit to the students and their prospective employers. Another common comment by an academic resistant to curriculum reform is to state that "I already include sustainability in my teaching" and thus do not need to change anything. Whether this is driven by the time demands placed on academics or a lack of understanding of the relevance of sustainability within their teaching domain is unclear. Professional development aligned with sustainability and peer example and encouragement are some of the most important drivers for long lasting change to occur. Providing adequate funding for curriculum design is particularly important because traditional teaching resources in sustainability are often unavailable and obtaining suitable learning resources can be more difficult.

CONCLUSION

This chapter provides an overview of the progress in embedding sustainability into engineering and particularly chemical engineering undergraduate programs at James Cook University. Emphasis in the review is placed on identifying the characteristics associated with developing a students' awareness of sustainability. A set of capabilities associated with the awareness of sustainability generic attribute are described because they facilitate curriculum mapping and design and offer increased flexibility in the teaching curricula. A broad-scale map is described which is a helpful template for staging curriculum across the entire program. A finer-scale learning matrix which is populated with specific subject learning outcomes aligned to sustainability capabilities is also described. The learning matrix and subject learning outcomes are shown to be very useful for designing new curriculum which progressively develops a students' awareness of sustainability. A number of curriculum examples are described to help other teachers to embed sustainability within their subjects.

REFERENCES

Allenby, B., Murphy, C. F., Allen, D., & Davidson, C. (2009). Sustainable engineering education in the United States. *Sustainability Science*, *4*(1), 7–15. doi:10.1007/s11625-009-0065-5

Anastas, P. T., & Zimmerman, J. B. (2003). Through the 12 principles - Green engineering. *Environmental Science & Technology*, *37*(5), 95A–101A. doi:10.1021/es032373g PMID:12666905

Australian Dept. Education, Employment and Workplace Relations. (2009-2011). *Diversity & structural adjustment fund, JCU curriculum refresh project.* Australia's University of the Tropics.

Azapagic, A., & Perdan, S. (2011). *Sustainable development in practice: Case studies for engineers and scientists* (2nd ed.). United Kingdom: Wiley-Blackwell.

Azapagic, A., Perdan, S., & Shallcross, D. (2005). How much do engineering students know about sustainable development? *European Journal of Engineering Education*, *30*(1), 1–19. doi:10.1080/03043790512331313804

Ball, J. (2008, October 6). Six products, six carbon footprints. *The Wall Street Journal*. Retrieved June 20, 2013 from http://online.wsj.com/article/SB122304950601802565.html

Brennan, D. (2009). Education priorities for chemical engineers in green process engineering. In *Proceedings of the 2nd International Congress on Green Process Engineering,* Venice, Italy.

Brennan, D. (2013). *Sustainable process engineering: Concepts, strategies, evaluation and implementation*. Singapore: Pan Stanford Publishing Pte Ltd.

Bryce, P., Johnston, S., & Yasukawa, K. (2004). Implementing a program in sustainability for engineers at University of Technology, Sydney: A story of intersecting agendas. *International Journal of Sustainability in Higher Education*, *5*(3), 267–277. doi:10.1108/14676370410546411

Byrne, E. P., & Fitzpatrick, J. J. (2009). Chemical engineering in an unsustainable world: Obligations and opportunities. *Education for Chemical Engineers*, *4*, 51–67. doi:10.1016/j.ece.2009.09.001

Davidson, C. I. H., Matthews, S., Hendrickson, C. T., Bridges, M. W., Allenby, B. R., & Crittenden, J. C. et al. (2007). Adding sustainability to the engineer's toolbox: A challenge for engineering educators. *Environmental Science & Technology*, *41*(14), 4847–4850. doi:10.1021/es072578f PMID:17711192

Desha, C., & Hargroves, K. (2011). Informing engineering education for sustainable development using a deliberative dynamic model for curriculum renewal. In *Proceedings of the 2011 Research in Engineering Education Symposium,* Madrid, Spain.

Evans, G. M., Galvin, K. P., & Doroodchi, E. (2008). Introducing quantitative life cycle analysis into chemical engineering curriculum. *Education for Chemical Engineers*, *3*(1), 57–65. doi:10.1016/j.ece.2008.01.003

García-Serna, J., Pérez-Barrigón, L., & Cocero, M. J. (2007). New trends for design towards sustainability in chemical engineering: Green engineering. *Chemical Engineering Journal*, *133*, 7–30. doi:10.1016/j.cej.2007.02.028

Hopkinson, P., & James, P. (2010). Practical pedagogy for embedding ESD in science, technology, engineering and mathematics curricula. *International Journal of Sustainability in Higher Education*, *11*(4), 365–379. doi:10.1108/14676371011077586

IChemE. (2008). *Driving in the right direction* (Technical Strategy Roadmap: Progress Report).

Institute of Chemical Engineers. (2013a). *Chemical engineering matters.* Retrieved June 16, 2013 from http://www.icheme.org/~/media/Documents/icheme/Media%20centre/Technical%20strategy/c0001_12%20chemical%20engineering%20matters_FSC_Web.pdf

Institute of Chemical Engineers. (2013b). *IChemE sustainability metrics.* Retrieved June 16, 2013 from http://www.icheme.org/communities/subject_groups/sustainability/~/media/Documents/Subject%20Groups/Sustainability/Newsletters/Sustainability%20Metrics.ashx

King, R. (2008). Addressing the supply and quality of engineering graduates for the new century (Report to the Carrick Institute for Learning and Teaching in Higher Education Ltd.). Sydney, Australia.

Mulder, K. F. (2006). Engineering curricula in sustainable development. An evaluation of changes at Delft University of Technology. *European Journal of Engineering Education*, *31*(2), 133–144. doi:10.1080/03043790600566912

Murphy, C. F., Allen, D., Allenby, B., Crittenden, J., Davidson, C., Hendrickson, C., & Matthews, H. S. (2009). Sustainability in engineering education and research at US universities. *Environmental Science & Technology*, *43*, 5558–5564. doi:10.1021/es900170m PMID:19731645

Nightingale, S., Carew, A., & Fung, J. (2007). Application of constructive alignment principles to engineering education: Have we really changed? In *Proceedings of the 2007 AaeE Conference*, Melbourne, Australia.

O'Brien, K. R., Menache, J., & O'Moore, L. M. (2009). Impact of fly ash content and fly ash transportation distance on embodied greenhouse gas emissions and water consumption in concrete. *International Journal of Life Cycle Assessment*, *14*, 621–629. doi:10.1007/s11367-009-0105-5

Renouf, M. A., Pagan, R. J., & Wegener, M. K. (2011). Life cycle assessment of Australian sugarcane products with a focus on cane processing. *International Journal of Life Cycle Assessment*, *16*, 125–137. doi:10.1007/s11367-010-0233-y

Renouf, M. A., Wegener, M. K., & Pagan, R. J. (2010). Life cycle assessment of Australian sugarcane production with a focus on sugarcane growing. *International Journal of Life Cycle Assessment*, *15*, 927–937. doi:10.1007/s11367-010-0226-x

Segalàs, J., Ferrer-Balas, D., Svanström, M., Lundqvist, U., & Mulder, K. F. (2009). What has to be learnt for sustainability? A comparison of bachelor engineering education competences at three European universities. *Sustainability Science*, *4*(1), 17–27. doi:10.1007/s11625-009-0068-2

Sheehan, M. E., Desha, C., Schneider, P., & Turner, P. (2012). Embedding sustainability into chemical engineering education: Content development and competency mapping. In Proceedings of Chemeca 2012,Wellington, New Zealand.

Skamp, K. (2012). *Investigating the implementation of sustainability education in the School of Education and the Faculty of Science and Engineering* (unpublished external evaluator's report). December 13, 2012

Slater, S. C., Hesketh, R. P., Fichana, D., Henry, J., Flynn, A. M., & Abraham, M. (2007). Expanding the frontiers for chemical engineers in green engineering education. *Int. J Engineering Education*, *23*(2), 309–324.

Steiner, S. (2010). Engineering our world towards a sustainable future. In P. Jones, D. Selby, & S. Sterling (Eds.), *Sustainability education: Perspectives and practice across higher education* (pp. 174–200). London: Earthscan.

This work was previously published in a Handbook of Research on Pedagogical Innovations for Sustainable Development edited by Ken D. Thomas and Helen E. Muga, pages 474-493, copyright year 2014 by Information Science Reference (an imprint of IGI Global).

Chapter 41
Managing and Planning Technology Usage and Integration in Teacher Education Programs in an Emergent Nation

Nwachukwu Prince Ololube
Ignatius Ajuru University of Education, Nigeria

ABSTRACT

This chapter explores the impact of the changing context of Information Technologies (ITs) and Information Systems (ISs) on Teacher Education (TE). ITs and ISs have influenced educational philosophy and classroom practices all over the world. Significant technological innovations over the last three decades have altered the environment in which educators operate and profoundly changed the experience of both formal and informal education. The impact and pervasiveness of ITs and ISs have forced traditional Colleges of Education and University Faculties of Education into a period of transition and transformation. Colleges and Faculties of Education have, for example, become sites of branding and rebranding. The policy makers associated with these programs reflexively look to market-based solutions without first giving serious thought to the challenges preventing the effective integration and use of ITs and ISs in TE, particularly in developing economies. Using a theory-based method of analysis, this chapter gathers and analyzes contemporary views and ideas on education and technology. This chapter finds that the impact of ITs and ISs on TE programs in Nigeria has shortchanged these programs. As a result, education consumers and stakeholders are dissatisfied with the slow integration and use of ITs and ISs in government-owned institutions of higher education in general and in TE programs in particular.

DOI: 10.4018/978-1-4666-8246-7.ch041

INTRODUCTION

The globalization of the education sector and impacts of globalization on the workforce require a different kind of education; one that enhances the ability of learners to access, assess, adopt, and apply knowledge, to think independently, to exercise appropriate judgment, and to collaborate with others to make sense of new circumstances. Much like globalization, emerging technologies have impacted all aspects of national economies and societies. Teacher education has been highly affected by global trends in technology, particularly its economics and business content (Singh & Papa, 2010). Among UNESCO's recent strategic objectives for improving the quality of higher education are the diversification of content and methods, the promotion of experimentation and innovation, and the diffusion and sharing of information, best practices and policy dialogues (UNESCO, 2002, 2003). Many of these objectives relate directly to information technologies (ITs) and information systems (ISs) which have become critical personal and social tools and have had a revolutionary impact on how we see and love in the world (Ololube, Kpolovie, Amaele, Amanchukwu, & Briggs, 2013). In the context of teacher education, ITs and ISs involve the gathering, processing, storing, distributing and use of information in a range of strategy, management and operational activities with the aim of improving the effectiveness and efficiency of teachers.

Information capitalism and globalization have likewise impacted the ways in which teaching and learning are carried out in education programs around the world (Singh & Papa, 2010). Innovations in educational technologies are revolutionizing educational design and methodology (Miniaoui & Kaur, 2014). These trends, however, are not widespread and must be further strengthened if they are to reach a large percentage of the population, especially in the third world. In a complex society like Nigeria, many factors affect the use and integration of technologies in the teaching and learning process. As a result, a proactive, interdisciplinary and integrated approach is required to ensure the successful development of teacher education and, in turn, the successful future development of the national economy (Ololube, 2014).

The global academic landscape includes research, teaching and learning. It includes educational programs and courses, the pedagogy or methodology of teaching, the research process (including dissemination and publication), library information systems and services, and administration and management. The integration of IT and ISs in teacher education programs has been the topic of a great deal of debate throughout this landscape. In Nigeria, the relationship between the development of ITs and ISs for teacher education programs and their diffusion into programs in Colleges of Education and university Faculties of Education is dependent upon governmental policies (Ololube, 2011).

Information technologies and systems are indispensable and have been accepted as part of the contemporary world especially in industrialized societies. In fact, many have already begun considerable adjustments to meet the challenges and opportunities of the knowledge age. The pervasiveness of ITs/ ISs has brought about rapid changes in technology and attendant social, political, and economic transformations (Ololube, 2006a). The field of education has not gone untouched. Without a doubt, ITs and ISs have impacted the quality and quantity of teaching, learning, and research in teacher education programs globally and to some extent in Nigeria. ITs and ISs provides opportunities for student teachers, and academic and non-academic staff to communicate with one another more effectively during formal and informal teaching and learning (Yusuf, 2005). Consequently, student teachers and academic and non-academic staff now require training not just in basic computer literacy, but also in the use of various communication and educational software packages and applications (Ololube, 2006b).

Teachers today must begin to learn at the outset of their teacher training programs about how to effectively integrate ITs/ISs into their classroom activities and school structure. Given that the quality of faculty is known to be a key predictor of student learning (Ololube, 2011), teacher education faculty training in ITs/ISs use is thus critical. Both ITs and ISs can facilitate student teacher training and help student teachers to take full advantage of the potential of technology to enhance quality and student learning in their own future classrooms. ITs/ISs have also introduced a new era in traditional face-to-face (f2f) methods of teaching and learning and in blended learning (BL). It is therefore pertinent that Nigerian education settings open themselves to the benefits that these new trends have offer in terms of building capacity and improving access to information.

The ability to effectively manage and plan for ITS/ISs enhances the proactivity of authorities with respect to information relevant to teaching services, in line with global best practices. When properly approached, ITs/ISs management can provide some of the essential information needed to manage education systems in an efficient and productive manner. This management effort must involve teachers and students as well as administrators and policymakers (Figure 1).

PURPOSE OF THE STUDY

In a complex society like Nigeria, we recognize that a number of prominent factors affect the successful development of teacher education programs. As such, it is quite impossible to consider all such factors at present. The purpose of this study is thus to address, exclusively, ITs and ISs in relation to teacher education and the sustainable development of education in Nigeria. This paper asserts that the effective use of ITs/ISs in teacher education addresses both the problem and solution to technology-based learning. ITs/ISs enable synergistic results that benefit pre-service teachers as they graduate and carry out their duties as teachers. Nonetheless there remains a need to better design teacher education curriculum and programs so that pre-service teachers can better plan for unanticipated and unintended results that confront them in the classroom in terms of ITs/ISs. At the societal level, ITs/ISs help us to better manage complex information flows and to integrate these flows in effective policy formulation and planning towards the maximization of human capital and potential.

It is more important now than ever that teacher education programs recognize these and other positive ramifications of ITs/ISs and ensure their graduates are equipped with effective and integrated tools and training modules to lead the next generation of students in the dynamic and innovative use and further development of these tools. Despite efforts by both the federal and state government, however, to establish effective teacher education programs in Nigeria, an ongoing lack of adequate ITs/ISs infrastructure on university and college campuses has reduced access to ITs/ISs instructional material for both faculty and students. Consequently, most teachers and student teachers rarely, if ever, come into contact with ITs/ISs aided instructional materials (Ololube, Umunadi & Kpolovie, 2014).

The desire to carry out this research arose from the need to examine the effectiveness of teacher education programs in Nigeria in relation to the role and usage of ITs/ISs. Theoretically, this paper aims to ascertain the degree to which ITs/ISs has impacted the development of teacher education. In general, the purpose of this study is to verify the research hypothesis as a basis for encouraging Nigerian institutions of higher education to maintain or improve the quality of their teacher education programs. This paper hopes to provide education administrators, planners and policymakers with the empirical models that will help them to better come to terms with the reality on ground in terms of the effective application of ITs/ISs in teacher education programs.

Figure 1. Image for information systems management. Source: (http://www.leadership-idn.com/definition-of-information-system-management/).

TEACHER EDUCATION PROGRAMS IN NIGERIA

Nigerian Colleges of Education and Faculties of Education in universities are openly committed to excellence in teacher education programs. Excellence in teacher education can be taken to mean effectively providing teaching and learning experiences that prepare student teachers for the challenges of today's multi-faceted, ever varying, and varied workplace (Ololube, 2006). The guiding philosophy of teacher education is to produce student teachers with sharp intellectual minds capable of further critical intellectual inquiry (Ololube, 2011). Colleges and Faculties of Education are among several institutions in Nigeria that offer teacher education services to students who wish to specialize in subjects including agricultural science, arts, environmental sciences, health education, humanities, information and communication, management and social sciences, and the natural and applied sciences.

Colleges of Education offer post-secondary National Certificate in Education (NCE) training programs. The NCE is the qualification required to teach in junior secondary schools and technical colleges. In addition to training junior secondary school teachers, Colleges of Education now also train primary school teachers. The NCE has become the minimum qualification for primary school teaching as of 1998. Some of the Colleges also offer NCE pre-primary courses to produce qualified teaching personnel for the pre-primary level (Moja, 2000). Universities in Nigeria offer Bachelor of Education degree programs to both senior secondary school graduates and senior secondary school teachers who already have NCE qualifications. They also offer Masters and Doctorate degree programs in education.

Introduction to Computer Science is a fundamental course for student teachers in Nigeria either as part of their program or as a part of a previously completed major. Computer science is ideally taught in a general and applied fashion and produces graduates who are scientifically and technically skilled in information processing, data collection and analyses, and communication. All of this should be set in a problem-solving context where students learn about the planning and management processes involved in using computers. Introduction to Computer Science should also involve teaching and learning about the information needs of computers, the design of information management systems, and the principles and practices of system usage.

The successful completion of an introductory course in computer science is a critical accomplishment for undergraduate students who may one day be at the helm of decision making in their workplace and looking to keep pace with the demands of a globalized economy. This course is equally important for students who are planning to further their studies in the future and who, as graduates, will need to make informed professional development decisions using ITs/ISs. Introduction to computer science courses are challenging classes to teach because the technical complexity of the course material is quite high while student interest in this material can, unfortunately, be quite low. In most cases, take home assignments are given to students with basic instructions and sources for materials on the Internet. In some cases, assignments are submitted to faculty members via e-mail and feedback is provided to students days after the submission also via e-mail.

In Nigeria, the need for well qualified teachers cannot be underemphasized. Teacher education is a means of providing teachers with the skills and knowledge needed to carry out their teaching responsibilities (Osunde & Omoruyi, 2004). Teacher education is concerned with the art of acquiring professional competencies and professional growth. It is designed to produce highly motivated, sensitive, conscientious and successful classroom teachers who will handle students effectively and professionally towards better educational achievement (Ololube, 2005a, b). According to Amedeker (2005), inadequate teacher preparation programs results in teachers' inability to demonstrate adequate knowledge and understanding of the structure, function and development of their disciplines. An effective teacher education program is thus a prerequisite for a reliable and resilient education which leads to confidence among both teachers and students as a result of effectively and professionally coordinated learning (Lawal, 2003; Umunadi and Ololube, 2014).

Teacher education programs in Nigeria are under the supervision and control of governmental organizations. The National Commission for Colleges of Education (NCCE) (2013) has responsibility for teacher education in Nigeria delivered by Colleges of Education. At present there are 74 Colleges of Education, of which 22 are controlled and funded by the Federal Government, 47 are controlled and funded by state governments, and 3 are owned by private agencies. The NCCE was established in 1990 to set minimum standards for all teacher education programs and accredit their certificates and other academic awards after obtaining the prior approval of the Minister. The Commission has also been given responsibility for approving guidelines and establishing criteria for accreditation for Colleges of Education in Nigeria. Nigeria's 129 universities, in contrast, are under the direct supervision of the National Universities Commission (NUC) (2013). Polytechnics, of which 9 run Nigeria Certificate in Education (NCE) programs, fall under the National Board for Vocational Colleges and Technical Education (NBTE) (2013) (Table 1).

Table 1. Status and list of institutions that offer teacher education programs in Nigeria

Institutions	Numbers
Federal Colleges of Education (Regular)	11
Federal Colleges of Education (Technical)	10
Federal Colleges of Education (Special)	1
State Colleges of Education	47
Private Colleges of Education	5
Polytechnics with NCE Programs	9
Universities with Teacher Education Programs	89

The National Teachers Institute (NTI) was established to provide refresher and upgrade courses to teaching personnel, to organize workshops, seminars and conferences, and to formulate policies and initiate programs that will lead to improvement in the quality and content of education in the country. In pursuit of this, the Institute has initiated training and retraining programs to help unqualified primary school teachers receive the qualifications now required. Recently, the Institute also embarked on an NCE program through a Distance Learning System (DLS). Lastly, the Institute provides training for the Pivotal Teachers Training Program (PTTP) also by means of a DLS. The PTTP was introduced in 2002 as a means of producing teachers to fill the gap in teacher supply for the Federal Government's newly introduced Universal Basic Education (UNBE) (Osunde & Omoruyi, 2004).

The requirements for admission to teacher training differ depending on the type of institution. Colleges of Education require prospective candidates to have at least three credits in senior school and two other passes. At the university level, prospective candidates must have five senior school credits that include the chosen major teaching subjects. Prospective College of Education and Polytechnic students are required to sit for and pass the Polytechnic/College of Education Matriculation Examination, while prospective university students are required to pass the Joint Admission and Matriculation Board Examination (Moja, 2000).

ITS/ISS AND TEACHER EDUCATION

Many Nigerian teachers have been unable to find effective ways to use technology in their classrooms or any other aspect of their teaching and learning life. In terms of an explanation, teachers often note that cite their use of technology in the classroom has not been encouraged and that they have not been well trained in the use of ITs/ISs as teaching tools and a means for educational sustainability (Ololube, 2006), notwithstanding the specifications in the National Policy of Education (FRN, 2004). Nigeria as a nation has come late and slow to the use of ITs/ISs in all sectors, particularly education. This is a result of chronic limitations brought about by both economic disadvantages and government policies. These factors have a direct impact on the nation's educational development.

In a 2005-2006 study by Global Information Technology (2005), the Networked Readiness Index (NRI) was used to measure the degree of preparation of 115 economies for participating in and benefitting from ITs/ISs development. Nigeria ranked 90th out of the 115 countries surveyed. The United States of America topped the list, followed by Singapore, Denmark, Iceland, Finland, Canada, Taiwan, Sweden, Switzerland and the United Kingdom. In a similar study of 104 countries in 2004 Nigeria ranked 86th (Global Information Technology, 2004). Thus rather than showing improvement, Nigeria's readiness is declining. Slow or limited access to basic ITs/ISs equipment, low Internet connectivity, inadequate computers, and poor use of audiovisual materials and equipment (films, slides, transparencies, projectors, globes, charts, maps, bulletin boards, programmed materials, information retrieval systems, and instructional television) in teacher education programs are very real barriers to the effective and professional development of teachers in Nigeria (Ololube, 2006). Administrators and instructors must thus make educational technology an integral part of teaching and learning so as to provide a clear demonstration of how the use of instructional technology tools can address the personal and general objectives of teaching and learning in Nigeria.

In recent years the integration of ITs/ISs in university teaching, and particularly in teacher training programs, has been the topic of much discussion (Larose et al., 1999) as ITs/ISs has impacted the quality and quantity of teaching, learning, and research in traditional and distance education institutions around the world. In concrete terms, ITs/ISs literacy has enhanced teaching and learning through its dynamic, interactive, and engaging content, and has provided real opportunities for individualized instruction (Newhouse, 2002a). Information and communication technology has the potential to accelerate, enrich, and deepen skills, motivate and engage students in learning, help to relate school experiences to work practices, help to create economic viability for tomorrow's workers, contribute to radical changes in school, strengthen teaching, and provide opportunities for connection between institutions and the world. ITs/ISs can make education more *efficient and productive* by engendering a variety of tools to enhance and facilitate teachers' professional activities (Yusuf, 2005). To Newhouse (2002b), technology is further developed to solve problems, improve living standards and to increase productivity. It is reasonable to expect educational technology to be developed with similar objectives. That is, if a teacher selects the most appropriate educational technology, student learning can be optimized and an increase in the value of the outcome obtained (Ololube, 2014).

Newhouse (2002a) explains educational productivity as a concept most happily found in economics textbooks where the productivity of a worker or economic unit is defined by dividing the output (revenue) by the input (costs). This is generally more difficult to define for the education industry since the output is not easily measured, particularly in monetary terms, to enable its comparison with costs. Nonetheless, Newhouse offered a helpful definition of output as the quality and quantity of learning demonstrated by students, or learning outcomes.

The concept of teacher ITs/ISs literacy is theoretically unclear and changing in that the precision of the definition depends on whether it occurs at the level of operational abilities or at other levels. Most contemporary authors tend to center the definition of ITs/ISs literacy on a few core competencies or abilities, which might then determine whether teachers know or do not know how to use ITs/ISs instructional material. Ideal definitions go beyond this to include the ability to prepare and use a selection of appropriate and operational ITs/ISs materials, and the ability to identify and efficiently affect specific student purposes in order to build knowledge and develop critical and creative thinking. Teachers committed to improving their competence in ITs/ISs are likely to contribute, directly or indirectly to the growth of student's achievement (Ololube, 2014).

Teacher education and training is a means for professional updating, which deals with all developmental functions, directed at the maintenance and enhancement of one's professional competence and literacy. Teacher education and training must support the idea that ITs/ISs is an important factor in teachers' job effectiveness and professional development. Studies concerning staff training and education clearly demonstrate the need to offer teachers better opportunities to develop their ITs/ISs based knowledge in order to support this effectiveness (Kautto-Koivula, 1993, 1996). Teachers need techniques, tools and assistance that will help them to develop ITs/ISs based projects and activities designed to elevate the level of teaching in required subjects and in turn improve student learning and academic achievement (Aduwa-Ogiegbaen & Iyamu, 2005).

Newhouse (2002b) has classified the educational impacts of the use of ITs/ISs along five dimensions. These are:

- Students Attributes [ITs/ISs Capability, Engagement, Achievement of Learning Outcomes].
- Learning Environments Attributes [Learner-centered, Knowledge-centered, Assessment-centered, Community-centered].
- Teacher Professional ITs/ISs Attributes [Vision and Contribution, Integration and Use, Capabilities and Feelings].

- School ITs/ISs Capacity Attributes [Hardware, Connectivity, Software, Technical Support, Digital Resource Materials].
- School Environment Attributes [Leadership and Planning, Curriculum Organization, Curriculum Support, Community Connections, Accountability].

In contrast to many of the studies citing the benefits of ITs/ISs teacher training, Larose et al., (1999) argue that regardless of the quality of ITs/ISs equipment available to teachers and independent of the quantity of courses they have taken in their undergraduate studies, the transfer of acquired competencies and learning into practice is poor. The major impact of education on the educated, in fact, remains at the level of the "private" use of these technologies and not in their integration into daily teaching practices. In their findings, many of the educated, no matter the level of education, are computer literate but do not use technologies in their teaching because of their fear that the rate of obsolescence of the hardware and/or software will make their task more complex and interminable.

Furthermore, a recent research study (Ololube et al., 2013) which focused on the perceived use, ease of understanding, self-efficacy, facilitating conditions, behavioural intentions, and attitudes and anxieties towards computer use among higher education students and faculty in a developing economy, found that IT/IS constitute an important force in efforts to build an information technology society and to join the international community in meeting the Millennium Development Goals. Higher education institutions are enduring entities that must ensure and create the diffusion of knowledge for national development. Society depends on these institutions for its growth and for the production of new knowledge, its transmission through education and training, and its dissemination through information communication technologies.

DISCUSSION

Theoretical and personal observation evidence suggests that teacher training programs provided by Nigerian institutions of higher education are hindered by their ineffective use and provision of ITs/ISs instructional materials. Although, based on observation, teacher preparation programs have slightly impacted the level of performance of Nigerian teachers this has not been to the extent needed to meet UNESCO's (2005) Millennium Development Goals (MDGs) for education. It might be deduced that there is a considerable relationship between ITs/ISs integration and usage and the poor standard of teacher education programs in general which invariably affect the student and in-service teachers' classroom performance. Yusuf's (2005) study, for example, found that most teachers in Nigeria do not have the needed experience and competence in the use of computers for educational or industrial purposes. Most, in fact, lack competence, skills and knowledge in basic computer and software operations. Yusuf found no significant difference between male and female teachers in their experience in using ITs/ISs materials, their levels of proficiency in computer operations, and their use of common software. Furthermore, the introduction of computer education into Nigerian secondary schools in 1988 has largely been unsuccessful as a result of teacher incompetence. Studies (e.g., Yusuf, 2005) have recognized that teachers' ability and willingness to use ITs/ISs materials and integrate these into their teaching is largely dependent on the quality of professional ITs/ISs development received.

Teachers trained in today's teacher education programs are not technologically equipped to meet the challenges of the 21st century and carry out their duties in line with global transformations in science and technologies. Existing curriculum designed for the training of student teachers in Nigeria does not include the practical usage of ITs/ISs materials such as computers, software, slides, and overhead projectors. In situations where computers are provided, training is based only on theoretical models. Student teachers rarely come into contact with ITs/ISs instructional materials, including those in the department of educational technology proper.

The institutions responsible for the provision of teacher education programs provide programs within the confines of the mandate given to them by federal and state governments through various bodies that coordinate their activities. Their ability to be effective is dependent, for the most part, on the policies set by these bodies and the availability of funds for the purchase and maintenance of much-needed ITs/ISs equipment. According to Osunde and Omoruyi (2004), the greatest problem faced by teacher education programs is inadequate funding coupled with a lack of library facilities and inadequate teaching/learning materials. This may account for much of the limited effectiveness of the teacher training programs. It is possible as well that some of the hardship faced by these institution, and their inability to develop an effective and proficient ITs/ISs literate teaching cadre, is as a result of corrupt practices by both federal and state government officials on the one hand, and the regulatory bodies and officials in teacher education institutions on the other.

CONCLUSION AND RECOMENDATIONS

Technological changes over the past three decades have rendered teacher education and training more important than ever. Teacher education programs around the world, however, are struggling to keep up with the new demands placed on them by the 21st century classroom. They are working, albeit slowly, towards providing their graduates with the knowledge and skills needed in evolving marketplaces and sophisticated learning environments, and to prepare teachers for lifelong learning. In order to meet these challenges, many countries have begun to focus concurrently on expanding access, improving internal efficiency, promoting the quality of teacher teaching and learning, and improving system management (Haddad & Jurich, [n.d]).

Quality education is seen as the main instrument for social, political and economic development of a nation. Thus the strength, security and well-being of Nigeria rest squarely on the quality of education provided for its citizens. Education has enabled a steady supply of human resources for national economies, especially in the west where education is seen and accepted as an effective instrument for success. It is thus essential that we recognize that teachers are indispensable for successful learning about ITs/ISs, and learning and teaching through ITs/ISs s to improve the standard of education in Nigeria.

ITs/ISs is an important instrument in the development of quality teaching and learning in educational systems around the world, as well as a means for fundamentally transforming existing school principles and practices to better prepare students to meet innovations in the global arena. Achievements in ITs/ISs penetration and usage in Nigeria teacher education programs are dependent on the recognition, by federal and state governments and educational authorities, of the importance of ITs/ISs application to education for sustainable development. This recognition must manifest as useful policies and the provision of sufficient funds on the one hand and the implementation of policies by coordinating bodies and the institutions themselves on the other. It is clear that secondary school students in Nigeria are already far behind their peers in developed countries and that the digital divide continues to grow (Aduwa-Ogiegbaen & Iyamu 2005). Federal and state governments, through The National Universities Commission (NUC) and the National Commission for Colleges of Education (NCCE), must thus invest heavily in the institutions that offer teacher education programs. Such an effort will create an enabling environment in which teacher education programs can to strive to produce highly qualified and ITs/ISs literate teachers that will help to make the integration and use of ITs/ISs in schools a success.

Teacher education institutions in Nigeria must assume leadership role in revolutionizing education or be left behind in the wake of rapid technological changes. Accordingly, for Nigerian education to reap the full benefits of ITs/ISs in learning, it is essential that student teachers and in-service teachers are able to effectively use ITs/ISs tools for learning. As noted by Newhouse (2002a, 2002b) and UNESCO's (2002) with emerging technologies, the teaching profession is evolving from emphasis on teacher-centered, lecture-centered instruction to student-centered interactive learning environments. Designing and implementing successful ITs/ISs enabled teacher education program is thus the key to fundamental, wide-ranging educational reforms.

Teacher education institutions and programs must provide leadership in new teacher education models, pedagogies and tools for learning through an effective strategic plan. That is, leadership in teacher education programs should be visionary about conceiving a desired future state, which includes the depiction of where and what the teacher education program should be in the future, without being constrained by such factors as funding and resources. It must then work backward to develop an action plan to bridge the gap between the current and desired state (Ololube, 2014).

This chapter sought to provide an understanding of the impact of ITs/ISs on teacher preparation so as to support the nurturing of a new caliber of teachers whose professional abilities are key to the development of a struggling economy. This is so because the purpose of teacher education is no longer simply to convey a body of knowledge, but to teach how to learn, how to problem-solve and how to blend the old with the new. It is therefore imperative to establish innovative programs and curriculum that will address the challenges of teacher education in a globalized world.

This study proposes that Colleges and Faculties of Education undertake a strategic planning analysis to determine their strengths, weaknesses, opportunities and threats (SWOT). As part of this analysis, they should first determine the intellectual capabilities needed to cope with current complexities in teacher education programs. Second, they will need to set priorities for teacher education programs according to the present and future needs and demands of Nigeria's citizenry. Third, they must be on the lookout for opportunities to improve and guarantee the quality of education. Finally, Colleges and Faculties of Education must be creative and prepare themselves for the challenges of the 21st century in line with the MDGs for both education for sustainable development.

REFERENCES

Aduwa-Ogiegbaen, S. E., & Iyamu, E. O. S. (2005). Using Information and Communication Technology in Secondary Schools in Nigeria: Problems and Prospects. *Journal of Educational Technology & Society*, *8*(1), 104–112.

Amedeker, M. K. (2005). Reforming Ghanaian Teacher Education Towards Preparing an Effective Pre-service Teacher. *Journal of Education for Teaching*, *31*(2), 99–110. doi:10.1080/02607470500127194

Beebe, M. A. (2004). Impact of ICT Revolution on the African Academic Landscape. In *Proceedings of CODESRIA Conference on Electronic Publishing and Dissemination*. Retrieved September 20, 2013 from http://www.codesria.org/Links/conferences/el_publ/beebe.pdf

Federal Republic of Nigeria (FRN). (2004). National policy on education (4th Ed.). Lagos: NERDC Press.

Global Information Technology Report. (2004). *The Networked Readiness Index Rankings 2005*. Author.

Global Information Technology Report. (2005). *The Networked Readiness Index Rankings 2005*. Retrieved September 21, 2013 from http://www.weforum.org/pdf/Global_Competitiveness_Reports/Reports/gitr_2006/rankings.pdf

Haddad, W. D., & Jurich, S. (n.d.). *ICT for education: Potential and potency*. Retrieved September 20, 2013 from http://cbdd.wsu.edu/edev/Nigeria_ToT/tr510/documents/ICTforeducation_potential.pdf

JAMB. (2006/2007). *Joint Admissions and Matriculation Board: Polytechnics, and Colleges of Education and the programs / courses offered*. Retrieved September 20, 2013 from http://www.jambng.com/pce_institution1.php

Kautto-Koivula, K. (1993). *Degree-Oriented Professional Adult Education in the Work Environment: A Case Study of the Mian Determinants in the management of a Long-term Technology Education Process*. (Unpublished PhD Dissertation). University of Tampere, Tampere, Finland.

Kautto-Koivula, K. (1996). Degree-Oriented Adult Education in the Work Environment. In Professional Growth and Development: Direction, Delivery and Dilemmas. Career Education Books.

Larose, F., David, R., Dirand, J., Karsenti, T., Vincent Grenon, V., Lafrance, S., & Cantin, J. (1999). Information and Communication Technologies in University Teaching and in Teacher Education: Journey in a Major Québec University's Reality. *Electronic Journal of Sociology*. Retrieved September 20, 2013 from http://www.sociology.org/content/vol004.003/francois.html

Lawal, H. S. (2003). Teacher Education and the Professional Growth of the 21st Century Nigeria Teacher. *The African Symposium, 3*(2).

Mac-Ikemenjima, D. (2005). *e-Education in Nigeria: Challenges and Prospects*. Paper presentation at the 8th UN ICT Task Force Meeting. Dublin, Ireland.

Miniaoui, H., & Kaur, A. (2014). Introducing a Teaching Innovation to Enhance Students' Analytical and Research Skills: A Blended Learning Initiative. In N. Ololube (Ed.), *Advancing Technology and Educational Development through Blended Learning in Emerging Economies* (pp. 21–35). Hershey, PA: Information Science Reference.

Moja, T. (2000). *Nigeria Education Sector Analysis: An Analytical Synthesis of Performance and Main Issues*. World Bank.

National Board for Technical Education (NBTE). (2013). *List of institutions with contact addresses under the purview of NBTE*. Retrieved September 12, 2013 from http://www.nbte.gov.ng/institutions.html

National Commission for Colleges of Education (NCCE). (2013). *Welcome to NCCE*. Retrieved September 12, 2013, from http://ncceonline.org/about-us/

National University Commission (NUC). (2013). *List of Nigerian universities*. Retrieved September 12, 2013, from http://www.nuc.edu.ng/pages/universities.asp

Newhouse, C. P. (2002a). *The Impact of ICT on Learning and Teaching*. Perth, Australia: Special Educational Service.

Newhouse, C. P. (2002b). *A Framework to Articulate the Impact of ICT on Learning in Schools*. Perth, Australia: Special Educational Service.

Ololube, N. P. (2005a). Benchmarking the Motivational Competencies of Academically Qualified Teachers and Professionally Qualified Teachers in Nigerian Secondary Schools. *The African Symposium, 5*(3), 17-37.

Ololube, N. P. (2005b). School Effectiveness and Quality Improvement: Quality Teaching in Nigerian Secondary Schools. *The African Symposium, 5*(4), 17-31.

Ololube, N. P. (2006a). Teachers Instructional Material Utilization Competencies in Secondary Schools in Sub-Saharan Africa: Professional and non-professional teachers' perspective. In *Proceedings of the 6th International Educational Technology Conference EMU*. EMU.

Ololube, N. P. (2006b). Appraising the Relationship Between ICT Usage and Integration and the Standard of Teacher Education Programs in a Developing Economy. *International Journal of Education and Development Using ICT*, *2*(3), 70–85.

Ololube, N. P. (2007). The Relationship between Funding, ICT, Selection Processes, Administration and Planning and the Standard of Science Teacher Education in Nigeria. *Asia-Pacific Forum on Science Learning and Teaching*, *8*(1), 1–29.

Ololube, N. P. (2011). Blended learning in Nigeria: Determining students' readiness and faculty role in advancing technology in a globalized educational development. In A. Kitchenham (Ed.), *Blended learning across disciplines: Models for implementation* (pp. 190–207). Hershey, PA: Information Science Reference. doi:10.4018/978-1-60960-479-0.ch011

Ololube, N. P. (2014). Blended Learning Methods in Introduction to Teaching and Sociology of Education Courses at a University of Education. In N. P. Ololube (Ed.), *Advancing Technology and Educational Development through Blended Learning in Emerging Economies* (pp. 108–127). Hershey, PA: Information Science Reference.

Ololube, N. P., Kpolovie, P. J., Amaele, S., Amanchukwu, R. N., & Briggs, T. (2013). Digital Natives and Digital Immigrants: A study of Information Technology and Information Systems (IT/IS) Usage between Students and Faculty of Nigerian Universities. *International Journal of Information and Communication Technology Education*, *9*(3), 42–64. doi:10.4018/jicte.2013070104

Ololube, N. P., Umunadi, K. E., & Kpolovie, P. J. (2014). Barriers to Blended Teaching and Learning in Sub-Saharan Africa: Challenges for the Next Decade and Beyond. In N. P. Ololube (Ed.), *Advancing Technology and Educational Development through Blended Learning in Emerging Economies* (pp. 232–247). Hershey, PA: Information Science Reference.

Osunde, A. U., & Omoruyi, F. E. O. (2004). An Evaluation of the National Teachers Institute's Manpower Training Program for Teaching Personnel in Mid-western Nigeria. *International Education Journal*, *5*(3), 405–409.

Singh, N., & Papa, R. (2010). *The Impacts of Globalization in Higher Education*. Retrieved September 30, 2013 from http://cnx.org/content/m34497/1.1/

Umunadi, K. E., & Ololube, N. P. (2014). Blended Learning and Technological Development in Teaching and Learning. In N. P. Ololube (Ed.), *Advancing Technology and Educational Development through Blended Learning in Emerging Economies* (pp. 213–231). Hershey, PA: Information Science Reference.

UNESCO. (2002). *Information and Communication Technologies in Teacher education: A Planning Guide*. Paris: UNESCO.

UNESCO. (2003). *Manual for Pilot Testing the Use of Indicators to Assess Impact of ICT Use in Education*. Retrieved September 20, 2013 from http://www.unescobkk.org/education/ict/resource

UNESCO. (2005). *United Nations Decade of education for Sustainable development 2005-2014*. Retrieved September 20, 2013 from http://portal.unesco.org/education/en/ev.php-URL_ID=27234&URL_DO=DO_TOPIC&URL_SECTION=201.html

Yusuf, M. O. (2005). Information and Communication Technologies and Education: Analyzing the Nigerian National Policy for Information Technology. *International Education Journal*, *6*(3), 316–321.

ADDITIONAL READING

Adekola, O. A. (2007). *Language, literacy, and learning in primary schools: Implications for teacher development programs in Nigeria*. Washington, DC: World Bank. doi:10.1596/978-0-8213-7048-3

Aremu, A., & Adediran, E. M. (2011). Teacher Readiness to Integrate Information Technology into Teaching and Learning Processes in Nigerian Secondary Schools: A Case Study. *African Research Review*, *5*(4), 178–190. doi:10.4314/afrrev.v5i4.69275

Dania, P. O., & Enakrire, R. T. (). The Utilization of Information and Communication Technology (ICTs) for effective teaching of social studies in secondary schools in Delta State. *Prime Research on Education, 2*(10), 378-389.

Hlatshwayo, N. F. (2008). The readiness of teachers to integrate information and communication technology for learning in a selected school in the GautengOnline project. Retrieved on 24 April, 2009 from http://ujdigispace.uj.ac.za:8080/dspace/bitstream/10210/901/3/Title.pdf.

Jegede, O. P., & Owolabi, J. A. (2003). Computer education in Nigerian secondary schools: gaps between policy and practice. Meridian, 6(2), Retrieved October 10, 2013 from http://www.ncsu.edu/meridian/sum2003/nigeria/index.html.

Jung, I. (2005). ICT-Pedagogy Integration in Teacher Training: Application Cases Worldwide. *Journal of Educational Technology & Society*, *8*(2), 94–101.

Jung, I. S. (2003). A comparative study on the cost-effectiveness of three approaches to ICT teacher training. *Journal of Korean Association of Educational Information and Broadcasting*, *9*(2), 39–70.

Kenechukwu, S. A., & Oboko, U. (2013). Information and Communication Technology in Teacher Education in Nigeria. *International Journal of Educational Foundations and Management*, *1*(1), 23–31.

Kleiner, B., Thomas, N., & Lewis, L. (2007). *Educational Technology in Teacher Education Programs for Initial Licensure (NCES 2008-040)*. Washington, DC: National Center for Education Statistics, Institute of Education Sciences, US Department of Education.

Kpolovie, P. J., Iderima, C. E., & Ololube, N. P. (2014). Computer Literacy and Candidate Performance on Computer-Based Tests. In N. P. Ololube (Ed.). Advancing Technology and Educational Development through Blended Learning in Emerging Economies (pp. 80-106). Hershey, PA: Information Science Reference. doi: . doi:10.4018/978-1-4666-4574-5.ch005

Oguzor, N. S. (2011). Computer usage as instructional resources for vocational training in Nigeria. *Educational Research Review*, *6*(5), 395–402.

Oguzor, N. S., Adebola, H. E., Opara, J. A., & Eziefula, J. F. (2010). Information and communication technology (ICT), Its role and value in adult education in Nigeria. Proceedings of the 10th International Educational Technology Conference and Exhibition.

Okewale, O., & Adetimirin, A. (2011). Information Use of Software Packages in Nigerian University Libraries. *Journal of Information Technology Impact*, *11*(3), 211–224.

Pukkaew, C. (2013). Assessment of the Effectiveness of Internet-Based Distance Learning through the VClass e-Education Platform. *International Review of Research in Open and Distance Learning*, *14*(4), 254–276.

Su, B. (2009).Effective technology integration: Old topic, new thoughts. *International Journal of Education and Development using Information and Communication Technology, 5*(2), 161-171.

Thakrar, J., Zinn, D., & Wolfenden, F. (2009). Harnessing Open Educational Resources to the Challenges of Teacher Education in Sub-Saharan Africa. *International Review of Research in Open and Distance Learning*, *10*(4), 1–15.

UNECSO. (2008). *Education for all by 2015: Will we make it?* Paris. Retrieved September 24, 2013, from http://www.unesco.org/education/gmr2008.

Weber, E. (2007). Globalisation, glocal development, and teachers' work: A research agenda. *Review of Educational Research*, *77*(3), 279–301. doi:10.3102/003465430303946

Wolfenden, F. (2008). The TESSA OER experience: Building sustainable models of production and user implementation. *Journal of Interactive Media in Education.* Retrieved September 18, 2013, from http://jime.open.ac.uk/2008/03/.

Zhou, G., Brouwer, W., Nocente, N., & Martin, B. (2005). Enhancing conceptual learning through computer-based applets: The effectiveness and implications. *Journal of Interactive Learning Research*, *16*(1), 31–49.

KEY TERMS AND DEFINITIONS

Information Systems (ISs): An integrated set of components that collect, store, and process data for delivering information, knowledge, and digital products. Twenty-first century schools rely on information systems to carry out and manage their teaching and learning processes.

Information Technologies: (**ITs**): The application of computers and telecommunication materials that store, retrieve, transmit and manipulate data in diverse contexts. ITs are commonly referred to as computers and computer networks, which encompass other information distribution technologies such as projectors, the Internet, blended learning tools, televisions, mobile phones, etc.

ITs/ISs Infrastructures: ICT components and resources such as computers, Internet access, power supply, and telecommunication facilities as well as ITs/ISs libraries, personnel, and funds, among others.

ITs/ISs Knowledge: The knowledge, skills, experiences, and abilities needed to stay informed of current technological developments. It is a collective knowledge that is interested in contributing to further ITs/ISs knowledge that will, in turn, lead to individual, national and global development.

Teacher Education: The procedures designed to equip prospective teachers with the skills, attitudes, knowledge and behaviors required to perform tasks effectively in the school setting and community.

Teacher Training: Specialized training organized to promote and produce cutting edge professionals for high quality teaching. It helps teachers to develop subject matter command, skill, and ability combined with exceptional understanding of how to create positive student learning experiences.

This work was previously published in Effects of Information Capitalism and Globalization on Teaching and Learning edited by Blessing F. Adeoye and Lawrence Tomei, pages 96-110, copyright year 2014 by Information Science Reference (an imprint of IGI Global).

Chapter 42
Moving Beyond a Focus on Delivery Modes to Teaching Pedagogy

Judi Simmons Estes
Park University, USA

ABSTRACT

The use of online methodologies to deliver coursework has become institutionalized in higher education. There is an urgent need to move beyond the question of which delivery model is most effective: face-to-face, fully online, or blended, and switch the focus to teaching pedagogy and strategies that effectively engage students in the learning process. This chapter posits that student-learning outcomes are less dependent on delivery mode and instead dependent on a teacher's pedagogical practices; it is the skill of the teacher as facilitator that drives the effective development of the learning community and influences student-learning outcomes. Further, it is suggested that constructivism, as a pedagogy of teaching, be considered, regardless of delivery mode; students construct their own knowledge as the teacher facilitates the process through providing opportunities for active engagement and critical inquiry within a community of learners. Teaching opportunities are adapted in response to the needs of students with technology as a tool to deliver learning outcomes.

INTRODUCTION

There is general agreement that enrollment in online courses, in institutions of higher education, is showing a substantial increase (Means, Toyama, Murphy, Bakia, & Jones, 2009); over 6.1 million students enrolled in at least one online course in the fall of 2010 (Allen & Seaman, 2011). In addition, the availability of online courses has also shown a significant increase in the last eight years (Christensen, Horn, Caldera, & Soares, 2011). The rapid growth of online education has been identified as one of four key trends changing institutions of higher education; increasingly students want to access educational opportunities whenever and wherever they choose (Johnson, Smith, Willis, Levine, & Haywood, 2011). The growth of online delivery of coursework increased 21% in 2009, a substantially higher rate of growth than the 2% growth in overall higher education student

DOI: 10.4018/978-1-4666-8246-7.ch042

enrollment (Allen & Seaman, 2010). Interestingly, 33% of baccalaureate awarding institutions view online courses as critical to their strategic plan (Allen & Seaman, 2008).

BACKGROUND

To be considered an online course 80% or more of the content is delivered via the Internet (Simonson, Smaldino, Abright, & Zvacek, 2009). Students vary in regard to the type of delivery model they prefer; some are drawn to blended (hybrid) courses that meet face-to-face (f-2-f) and have 30-80% of content delivered online (Allen & Seaman, 2007). Blended courses offer institutions, faculty and learners flexibility responsive to the context in which the course is being delivered. The combinations of f-2-f and online delivery of instruction vary and both students and faculty tend to like this combination and enjoying the benefits of each delivery model. When using the blended format, teacher sometimes meet weekly and use the online format to extend time to focus on discussion through online discussion threads. Others teachers may meet predominantly online with some f-2-f contact typically requiring a meeting at the beginning, middle, and end of the course.

According to Freeman (2010), distance learning occurs when time, location, or both separate teacher and the students, and contact can be either synchronous (real-time, teacher-led event in which all students are "in class" at the same time) or asynchronous (interaction between teacher and students occurs intermittently with a time delay). F-2-f, blended and online learning can occur in a variety of models using both synchronous and asynchronous strategies.

Blended learning has been found to offer the best of both online and f-2-f delivery (Vaughan, 2007) and has demonstrated effectiveness in the teaching-learning process (Picciano & Dziuban, 2007). Yet, some researchers have posited that blended learning is not "better" than an online delivery model (Reasons, Valadares & Slavkin, 2005). Rovai and Jordan (2004) concluded that although a blended course allows another means of delivery in education, and one that is rather flexible in nature, it is the skill of the teacher as facilitator that drives the effective development of the learning community and promotes satisfactory learning outcomes for students.

There has been an ongoing debate in the literature as to whether online courses are as effective as traditional courses (Chen & Jones, 2007). However, the results have been inconsistent and lacking empirical data to support any definitive conclusions. Grandzol and Grandzol (2006) posited that in regard to delivering instruction online, it is time to move past researching which mode of delivery is "best," and rather focus on identifying and validating "best practice" for effective instruction regardless of the mode of delivery.

PEDAGOGY OF TEACHING

"Times are changing for higher education….. [From] using technology to expand distance education, to the recognition of the importance of sense of community, we are witnessing a transformation of higher education" (Rovai & Jordan, 2004, p. 1). The practice of offering education online is inviting an examination of the pedagogy of teaching approaches used by institutions of higher education for both face-to-face and online delivery (Giroux, 2001). Pedagogical approaches, how teachers orchestrate classroom learning, do matter, especially today as changes are occurring in traditional methods of teaching in order to meet the needs of students (McKenzie, 2003). If one's teaching pedagogy is clear, then it becomes easier to maintain that integrity as an instructor moves a course from face-to-face model to a blended format or fully online.

Russell (1999) concluded that the amount of learning that occurs in a course is independent of the instructional delivery model or the technology involved and instead depends on the pedagogical practices used by the facilitator; effective teaching can occur in any classroom setting where both students and teachers are invested in the learning process. It is not necessarily the pedagogy of instruction that changes, related to mode of delivery of instruction, but rather the on-going teacher decision-making and reflection that occur while determining the strategies that most effectively deliver instruction while meeting the needs of students. The pedagogy of the teacher is key to the instructional learning process and how instruction is delivered. There is an argument that the most pressing pedagogical issues of the online learning environment include opportunities for interaction, teacher feedback, and course rigor (Compton, Davis, & Correta, 2011).

Teacher as Facilitator

Similar to the f-2-f classroom environment, online instruction is most effective when faculty view themselves as "the guide on the side" of the learning process, rather that the "sage on the stage" (King, 1993). The idea of teacher as facilitator of the learning process is steeped in the theories of Dewey (1859-1952), Vygotsky (1896-1934), Piaget (1896-1980), and Bandura (b. 1925); collectively these theorists laid the foundation for and development of constructivism. Constructivism is a pedagogy of teaching that promotes social interaction and student engagement as well as promoting critical thinking, inquiry, and problem-based learning. A teacher as facilitator plays an integral role in promoting and sustaining critical discourse and constructive social dynamics, managing both learning (e.g., promoting higher level thinking) and the social aspect (e.g., maintaining an appropriate flow of discussion and timely submission of assignments) in an online learning environment. Promoting learning through reflective thought is a role of the facilitator (Land & Zembal-Saul, 2003).

Researchers have stressed the role of teachers in delivering instruction online (Hara & Kling, 1999) as is also true for teaching f-2-f. Teachers must interact with students on a cognitive, emotional, and social level to be most effectives. This is not new information as this is the case for teaching f-2-f. Yet, it may be more important to offer opportunities for social engagement online because the online environment can create a sense of social distance between students. There is a need to overcome those barriers.

Edelstein and Edward (2002) noted that online courses are successful when the students are involved and active participants. Learners must get to know each other and establish relationships based on trust where each member's comments are valued. The sense of shared values and goals gives an online group a sense of community. As the community progresses in development, sharing and reflection should dominate the dialog; when the community matures, teachers as facilitators guide the group into activities involving higher-level thinking. Digenti (1998) mentioned that participation in a learning community involves cognitive skill and social skills. Critical discourse is the primary process by which the learning community members grow, moving from basic knowledge to deeper understanding, restructuring knowledge, an ultimately making the information their own (Ryman, Hardham, Richardson, & Ross, 2009). Shea, Li, and Picket (2006) reported positive relationships between teacher presence and sense of classroom community.

Chickering and Gamson (1987) introduced seven principles for good practice in undergraduate education. Chickering and Ehrman (1996) suggested ways to use technology with each principal to achieve student interaction, collaboration, and active learning as well as teacher use of promoting expectations, feedback, and respect for diversity. The seven practices include 1) encourage contact between students and faculty, 2) develop reciprocity and cooperation among students, 3) encourage active learning, 4) give prompt feedback, 5) emphasize time on task, 6) communicate high expectations, and 7) respect diverse talents and ways of learning. Chickering and Ehrman set the stage for the idea that "new" technology can be used to implement the seven principles for good practice. Given that technology is ever changing and there is no way for educators to predict the technology that may be available in the future, it is likely that there will always be "new" technology to be used. The anchor for good practice is the pedagogy of teaching that underpins the use of technology.

Grant and Thornton (2007) verified the usefulness of the seven practices (Chickering & Gamson, 1987) of undergraduate education, through comparing them with comments on student evaluations; three themes arose that can serve as a bridge between teaching f2f and online: 1) course design, 2) instructional practices, and 3) interactivity/interconnectivity in teaching-student interactions. Whether f-2-f, online, or blended delivery, a common factor in student success is the teacher who views their role as a facilitator of a learning community. Each of these seven principles of good practice is consistent with the tenets of constructivism. Encouraging contact between students and faculty, building cooperation among students, and encouraging active engagement build community and support learning within a social environment. Giving prompt feedback, emphasizing time on task, communicating high expectations, and respecting diverse talents and ways of learning are integral to the role of teacher as facilitator.

Building a Learning Community

There is growing interest in the factors that constitute a learning community online; several online community scales have been developed (Bolliger & Inan, 2012; Lin, 2004; Randolph & Kangas, 2008; Rovai, 2002; Tu, 2002; Young & Bruce, 2011). Rovai's Classroom Community Scale, the first developed, identified two factors of importance in an online community, connectedness and learning. In developing the scale, Rovai challenged the belief that a sense of community is limited to the face-to-face classroom community and proposes that the online classroom can build and maintain a sense of community at comparable levels of those found in face-to-face classrooms. Rovai reviewed literature pertaining to learning communities and applied the literature to the online classroom. Included in Rovai's discussion is elements of design and delivery of an online course supportive to building community among students in an online class environment. While the Rovai Scale is the first developed and the validity of the scale has been challenged (Barnard-Brack & Shiu, 2010), all of the scales that have been developed since 2002 measure combinations of the same two constructs presented by Rovai, connectedness and learning.

Online community has been defined in the literature in many ways, These definitions often identify several common elements and themes, including the ability to build mutual trust; a sense of connection, belonging, support; and an ability to share in the activities of the course as a group (Shea, Swan, & Pickett, 2004). The time together online becomes more than just weekly time together; the learning community in an online course can allow for a collective exploration of ideas and a collaborative approach to academic work. An online community is a cohesive group emerging from shared experiences when students become interdependent and view themselves as a contributing member; an interest in others, as well as self, develops and success of the group becomes a motivating factor for participation (Shaffer & Anundsen, 1993).

Building a learning community is a natural part of a f-2-f classroom environment; building community is just as important in an online or blended course. A community of learners can be experienced when students work together, share experiences, and have a sense of responsibility to one another (Wenger, 1999). Findings in a study conducted by Rovai and Jordan (2004) indicated that the sense of community in a blended course grow as a result of the f-2-f meetings, thus, reducing a sense of isolation that can sometimes occur when a course is being delivered entirely online.

Can the community-building process in online groups be complete without the group meeting face-to-face? Although f-2-f contact at some point in the community-building process can be useful and further facilitate community development, it is not likely to change the group dynamic initially created online. It is possible to build community without f-2-f contact. In a blended class, an initial f-2-f class can be helpful to orient students to the online environment and technology in use. Having periodic f-2-f classes throughout a term in a predominantly online course can be distracting from the online work; what tends to happen is that posting to the discussion will drop off as a face- to- face meeting approaches and then it will take time to build again (Palloff & Pratt, 2007). Formation of online communities without face-to-face contact demands greater attention up front to issues of policy and process. Just as norms would be negotiated in a face-to-face class, the same needs occur online. In fact, in the online environment, collaboratively negotiated norms are more critical.

Building a learning community helps promote skills of collaboration and reflection and support deeper levels of learning (Digenti, 1998; National Research Center for Career and Technical Education, 2010). Creating such a learning community is the result of an intentional effort of the teacher of the f-2-f or online course. Both pedagogical and social factors interplay in an online community (Ryman, Vine, & Richardson, 2009).

The Social Nature of Community

While the social benefits of participating in a community of learners is widely recognized, the research related to online learning communities has only recently been discussed in the literature (Glisan & Trainin, 2006). The term social presence is used in reference to a sense of social connectivity felt by students (Short, Williams, & Christie, 1976); social presence is the degree to which a person is perceived as "real" in communication that is conducted using technology. Social presence has been correlated with learner satisfaction online (Gunawardena & Zittle, 1997), as well as a sense of belonging to a community (Picciano, 2002). Garrison, Anderson, and Archer (2003) posit that in order to form community online, students must have a sense of social connection. Yet, there has been little agreement among researchers on how social connection occurs (Tu & Corry, 2002).

Social presence is something we rarely consider in a face-to-face classroom. When students can see one another within a physical space, we simply assume that presence will occur; students will develop a sense of who their peers are simply by being within physical proximity. However, when instruction is teacher-centered, students can sit in the same classroom and not even learn the names of their peers, much less make a social connection. When active and collaborative learning is part of that face-to-face environment, a sense of social presence is more likely to occur naturally. Simple physical presence may not be enough; the more students feel a part of a group the more they will participate (Picciano, 2002). The more teacher centered the classroom environment, regardless of delivery model, the less opportunity students have to get acquainted with one another.

When a student is taking a course fully online, there may be a greater possibility for a sense of isolation; some students may need more social contact than they are experiencing. Collaborative activities can help alleviate feelings of isolation by purposefully connecting learners with one another through various learning activities and promoting interdependence. Consequently, attention should be paid to the intentional development of social connections. Students in an online class can have a need to feel known by their peers and teacher; both as a learner in the course but also as an individual with a personal life. Teachers experienced in multiple modes of course delivery typically understand that strategies will be adopted in response to the needs of students for the purpose of providing the most effective instruction; the only difference is on-going attention to how technology can best be used as a tool to accomplish learning outcomes.

Wenger (1999) posited that the value of education is in social aspects of learning and that the focus of teaching needs to be on getting to know the individuality of students and supporting each to be a part of the community of learning. Community is a key to creating a sense of belonging for each student; one way to create community and a sense of belonging is through offering collaborative learning opportunities for students.

Collaborative Learning

Although there is a substantial amount of research citing the benefits of collaborative learning in face-to-face learning environments (Johnson & Johnson, 1989, 2004), there is a paucity of research with online environments. Studies have demonstrated that students engaging in collaborative learning are found to have high academic achievement, social connections, and self-efficacy (Johnson, Johnson, & Smith, 1991). The goal of a collaborative learning environment goes beyond knowledge acquisition; students who participate in collaborative learning demonstrate critical thinking (Schultz, 2003). Students often need to experience a sense of connection to other students before being willing to share meaningful responses; contributions can be obligatory when a student does not have a sense of belonging or support for building social connections (Kreijns, Kirschner, & Jochems, 2003).

The most powerful experiences for students are those in which peer interactions and connections occur throughout the group rather than only between student and teacher. It is helpful for students to view a teacher as also being a contributing learner collaborating in the process of critical inquiry. Activities that require students to contribute and interact with one another promote critical thinking within the context of collaboration (Conrad & Donaldson, 2004). In addition, collaboration is a fundamental principal of facilitating the development of an online learning community and in achieving desired learning outcomes for students while promoting both independence and interdependence. Exercising independence in sharing one's point of view contributes to the collaborative process, just as positive group interdependence is an element in both collaboration and community building. Interdependence helps a student develop cooperative skills while profiting from the viewpoints and knowledge of others (Johnson & Johnson, 2005).

It is important to note that students need to be told why collaboration is important and why it is being used in a course (f2f, blended, or online). It is not unusual for students to initially express resistance to participation in collaborative exercises. This resistance is often because of past negative experiences that a student has had; for example, peers did participate in small group collaborations, it was difficult to make contact with peers in the group, or there was general frustration with the process. Teachers can ease resistance by explaining why the collaborative activity is occurring and how it contributes to learning outcomes for the course. There can also be a resistance from students and from faculty to use collaborative learning because it may not seem task-oriented enough to resemble the traditional learning environment associated with a learning environment. The more successful students are at collaborating, the more they seek out opportunities to collaborate (Brookfield & Preskill, 2005).

Student Engagement in Discussions

When students engage in discussions with each other rather than just with the teacher, the possibilities for collaboration increase. Several collaborative strategies are applicable for use in other aspects of student lives; learning to listen respectfully to others, engaging in critical inquiry and analysis, and becoming independent in thinking, are each useful life strategies (Brookfield & Preskill, 2005). It is important for a teacher to facilitate student discussions without suggesting right or wrong answers, allowing for the expression of different viewpoints. Teachers and students can ask higher-level questions that stimulate critical thinking. Next, the responsibility for the facilitation of discussion can be shared between students and teacher. In addition, students should be encouraged to provide constructive feedback to one another on an on-going basis. Initially, this may be a new experience for students. However, if an environment of trust has been established, students quickly learn to welcome input from their peers. Promoting collaborative discussion can assist students in developing an appreciation for other forms of collaborative work. Sharing the responsibility of facilitating discussions is one-way teachers can facilitate discussions keeping them student focused. Rather than being at the center of the discussion, the teacher becomes one member of the discussion, acting only as facilitator. This teaching pedagogy can be new for some teachers and for some students who are use to a teacher-centered environment where the teacher delivers all content with authority. Thus, this constructivist approach can take some adjustment for teachers and students.

The level of interaction of students with one another and the instructor has been shown to be predictor of learning in online and blended courses (Rovai & Barnum, 2003) just as it is in f2f classes. Actively engaging learners in the online learning process and facilitate the meaning-making that is a part of the constructivist approach through which this learning occurs, the content of the course should be embedded in everyday life.

Promoting Critical Inquiry

It is a teacher's responsibility to create a learning environment that guides students to not only work collaboratively but also to engage in critical reflection and inquiry; a process providing a synthesized argument based on evidence to support a position (Alwehaibi, 2012). Critical thinking moves beyond personal opinion. Critical inquiry can be supported within the context of asynchronous and synchronous delivery of instruction. Following are some of the strategies that can be used: a) prompting discussions requiring a higher level of thinking, such as welcoming compare and contrast responses, b) providing a challenge to responses that are opinion-based, asking for sources of information to support the position taken, c) keeping discussion topic focused rather than meandering off on a tangent, and d) offering a counter viewpoint for the purpose of inviting more discussion. Perhaps one of the most effective ways to promote critical inquiry is through questioning.

In an online environment, just as in one that is f2f, the teacher as facilitator asks questions posed to begin discussion that promotes deep exploration of a topic and the development of critical thinking skills. Questions need to be posed so that there is no right or wrong answer; the questions serve only to stimulate thinking and are a means by which to examine a large body of knowledge. As a teacher as provides this type of questioning in an online course, students often begin forming questions that challenge peers to a higher level of thinking. Questions that do promote critical thinking and inquiry are those that provoke high levels of participation and discussion that interject original viewpoints. For example, if a teacher asks questions with a straightforward answer such as, "List three critical factors in using cooperative learning activities as a teaching strategy," the response will be to list three critical factors, typically without discussion or input of personal reflection. On the other hand, if the question is open-ended more original thought is provoked. For example, "Make an argument for or against using cooperative learning activities in exploring a topic with students, defending your answer with research support.

Poor or minimal response to a question indicates that it was not worded in a way that stimulated discussion. A teacher who is closely monitoring a discussion can scaffold the discussion through posing another question when this occurs, continuing to expand upon the original question. It is important to view every question as a beginning point for discussion and monitor, adding prompts as needed to stimulate higher-level thinking.

Collaborative Learning Activities

Another method of promoting collaboration in the online classroom is to offer collaborative learning activities. Hiltz and Turoff (2002) suggest the following ways to provide opportunities for collaborative learning: debates (making an argument for or against), groups projects, case study discussions, role-playing exercises, sharing of solutions for homework problems, and collaborative contributions to essays, stories, research plans, or some content related document (e.g. through use of google docs). The important point is that there are collaborative opportunities to move beyond posts on discussion threads.

Johnson and Johnson (2004) identified five components of effective group collaboration: 1) positive interdependence (group success equals individual success), 2) promotive interaction (providing support for one another), 3) individual accountability (group members identify in advance what they will do for the group), 4) appropriate use of social skills (clear communication and positive conflict resolution), and 5) group processing (reciprocal interactions among group members).

Providing a description about collaboration either within the syllabus, or at the beginning of a course helps to prepare students for group dynamics. For example, a discussion of human tendencies to over function vs. under function or to be more comfortable as a leader or a follower sets the stage for how group members may function. There will also be group members who take charge and want to do the work of others just to get it done. There will be others who always have excuses for non-participation that they explain as life happenings that took them away from the group task.

Prior to forming groups, it is important for a teacher to post guidelines and expectations for the performance and end product. It is also important to encourage the groups to expectations of one another, which can be done within a threaded discussion so that the teacher can monitor. Embedded in guidelines should be expectations that group members evaluate each other's work, participation, and contributions to the collaborative product of the group. A rubric should be made available for the group members to examine prior to group work beginning. Providing members of the group the expectation that they will evaluate themselves and each other, along with a participation evaluation from the teacher, can promote engagement and a successful experience with collaboration. Encouraging students to define tasks to be completed and best ways to be in contact are strategies that can support the collaborative process. It is helpful when a teacher monitors group progress and make individual contact with group members, as needed, to "coach" appropriate behaviors.

Forming small groups can be particularly helpful when there is a large class and breaking into groups provides more of a chance for group member to get to know one another. Whether groups are formed by a teacher or by the students, specific guidelines need to be provided for participation and end product expectations. In a blended course, it is helpful for students to meet f2f toward the beginning of the course. While group formation can be more difficult in the asynchronous online environment (when there is no f2f contact), it is possible and can be an effective way to provide a collaborative opportunity. When students are provided with the invitation to identify ways to connect with one another, they can be creative and identify modes of contact that best meet the needs of the group members.

Shared Structure for Learning

Providing a shared structure for learning is critical to the success of any learning environment, regardless of delivery mode; f2f, online, or a blended format. A shared structure for learning provides clarity of expectations for the learning process. If students are clear about the structure and expectations of a course, experiencing a learning community unfolds rather seamlessly.

Clarity in Expectations

Another important component to building a classroom environment of collaborative learning is the sharing of expectations for the course. A first step is to make expectations clear. This can begin with including expectations for collaboration in the syllabus of the course. If congruence in expectations does not exist, this does not necessarily signify a problem. Instead, it allows the teacher an additional opportunity for explanation. Given learner-focused process is being created and facilitated the teacher must reinforce expectations while responding to the needs of the students. If conflict results from these negotiations, again this is not a problem. The handling and working through of that conflict can move the group closer to congruence in its expectations. The more closely we can achieve congruence in the area of expectations, the more likely it is that a collaborative learning process will be the result. What is being created at this juncture is a contract for learning the process of contracting includes negotiation.

Posting Introductions

Just as it is important in a face-to-face classroom to take time for introductions at the beginning of a course, it is equally important to begin an online or blended course with introductions. To become a true community of learners, community members must take time to form relationships with each other (Ryman, Hardham, Richardson & Ross, 2009). These relationships are especially important when the community members have never held a face-to-face meeting.

Beginning of class warm-up activities can be used in an online class, just as they are in a f2f or blended learning environment; regardless of the delivery mode, ice-breaker activities can be an effective to ease the tension and anxiety that often accompany the start of a class by offering students a social connection. Beginning of course introductions are an example of an activity where the teacher does need to take the lead and respond to the introduction and draw links in experiences between teacher and student as well as students as peers. For example, the teacher can personally connect with a student with whom they have something in common such as serving in the military or living in a particular state. The teacher can connect students with one another in the same way, pointing out commonalities between and among students.

The posting of an introduction is a first step in developing social presence by revealing who one is to the remainder of the group. Because participants feel more comfortable revealing parts of themselves online that they might not reveal elsewhere, it is critical that they feel acknowledged so they can continue to do that safely throughout the duration of the course. This is the first point of connection; the point at which these important relationships begin to develop.

Prompt Feedback

In a meta-analysis of 81 studies that examined teacher immediacy in relation to learning outcomes in traditional, face-to-face classrooms, Witt, Wheeless, and Allen (2004) reported a positive and substantial relationship between overall teacher immediacy and overall student learning; Witt, Wheeless, and Allen posited that the two decades of research on immediacy in face-to-ace classrooms provide a foundation of findings from which to begin investigation of implications in online learning environments.

Chickering and Gamson (1999) identified several strategies for effective instruction as has been previously discussed. It is worth noting that these strategies collectively demonstrate the role of teacher as facilitator. We know that timely and constructive feedback is valued by students who study face-to-face and online (Mancuso-Murphy, 2007). Chickering and Gamson (1987) identified the centrality of feedback to learning and improving performance in face-to-face classroom learning situations. In describing the criterion "gives prompt feedback" (later amended to "incorporates assessment and prompt feedback," Chickering and Gamson (1999) wrote that feedback allows students to assess existing knowledge, reflect on what they have learned and what they still need to learn, and receive suggestions for improvement of future work. Several authors of research studies and best practice have identified the importance of feedback and suggested that feedback be prompt, timely, regular, supportive, constructive, meaningful, non-threatening and help (Grandzol & Grandzol, 2006; Mancuso-Murphy, 2007).

Life Connections

It is important to encourage students to share their talents and ways of learning through incorporating life experiences, interests, and viewpoints into the contributions made through answers and comments. This process of active engagement facilitates the process that students go through while making-meaning of content; this meaning-making process is central to a constructivist approach to teaching. Making-meaning of content involves a process of metacognition, thinking about one's thinking. The more participants can relate life experiences and prior knowledge to the context of the online classroom, the better grasp they will have of course material and the more they will see themselves as community contributors who possess meaningful knowledge; there is a cognitive and social benefit to these types of contributions. A teacher can facilitate this process in many ways including discussion of real-life vignettes, small group exercises to solve a problem, and preparation of a small group project. It is important for a teacher to monitor these discussions and only interject as needed to reinforce the idea that there are no right or wrong answers and that the purpose of the exercise is to bring depth and breadth to the topic discussion.

The more students relate their life experience, viewpoints, prior knowledge and interests to the context of the online classroom, the deeper their understanding will be of what they learn. The process of connecting the learning gained from everyday life to the learning of the course not only creates a deeper sense of meaning for students but it validates who they are as students and learners who possess knowledge and who can apply prior experiences in varied contexts. Encouraging students to share their talents, ways of learning, interests, viewpoints within the discussions of course content is a powerful way to move beyond a focus on the delivery of content and create a learning community sensitive to student needs as recommended by Mandernach (2009).

FUTURE RESEARCH DIRECTIONS

1. There is a paucity of research on the teacher's role in collaborative learning; this is an area for future research.

2. While there is evidence that social connections enhance the experience of the student taking online coursework, there is additional research needed on how these social connections can occur in asynchronous delivery of instruction.
3. Research is needed to determine if receiving professional development training in application of teaching pedagogy, regardless of delivery mode, influences the intentionality of the instruction that is delivered.

CONCLUSION

Institutions of higher education will continue to use technology as a tool for delivering instruction online and in a blended format, in addition to the traditional f2f delivery. This chapter proposes moving beyond which method of instructional delivery is most effective and instead shifting focus to the important role of teaching pedagogy. Research demonstrates that each mode of instructional delivery has successes and that the teacher has a direct influence. In addition, there is some agreement that including a social element in online delivery is important to student engagement and knowledge acquisition. The teaching pedagogy of constructivism offers a model that addresses the social needs of students as well as providing opportunities for critical inquiry; this pedagogy views the teacher as decision-maker in the selection of strategies that best meet the needs of students. It is suggested that the focus of future research relate to the pedagogy of teaching and strategies for engaging students in social interactions in support of critical inquiry and subsequent knowledge acquisition.

REFERENCES

Allen, J. E., & Seaman, J. (2008). *Staying the course: Online education in the United States*. The Sloan Consortium. Retrieved January 21, 2014 from http://sloanconconsortium.org/sites/default/files/staying_the_course-2.pdf

Allen, L., & Seaman, J. (2011). *Going the distance: Online education in the USA*. Wellesley, MA: Babson Survey Research Group.

Allen, L. E., & Seaman, J. (2007). *Online nation: Five years of growth in online learning*. Needham, MA: Sloan Consortium. Retrieved January 25, 204 http://sloanconsortium.org/publications/survey/pdf/online_nation.pdf

Allen, L. E., & Seaman, J. (2010). *Class differences: Online education in the United States, 2010*. Sloan Foundation Publication. Retrieved January 25, 2013 http://sloanconsortium.org/publications/survey/pdf/class_differences.pdf

Alwehaibi, H. (2012). Novel program to promote critical thinking among higher education students: Empirical Study from Saudi Arabia. *Asian Social Science*, *8*(11), 193–204.

Barnard-Brack, L., & Shiu, W. (2010). Classroom Community Scale in the blended learning environment: A psychometric review. *International Journal on E-Learning*, *9*(3), 303–311.

Bolliger, D. U., & Inan, F. A. (2012). Development and validation of the Online student Connectedness Survey (OSCS). *International Review of Research in Open and Distance Learning*, *13*(3), 41–65.

Brookfield, S. D., & Preskill, S. (2005). *Discussion as a way of teaching*. San Francisco, CA: Jossey-Bass.

Chen, C. C., & Jones, K. T. (2007). Blended learning vs. traditional classroom settings: Assessing effectiveness and student perceptions in an MBA accounting course. *The Journal of Educators Online*, *4*(1), 1–15.

Chickering, A., & Ehrman, S. C. (1996). Implementing the seven principles: Technology as lever. *American Association of Higher Education Bulletin*, *49*(2), 3–6.

Chickering, A., & Gamson, Z. (1987). Seven principles for good practice in undergraduate education. *American Association for Higher Education Bulletin*, *39*(7), 3–7.

Chickering, A., & Gamson, Z. (1999). Development and adaptation of the seven principles for good practice in undergraduate education. *New Directions for Teaching and Learning*, *1999*(80), 75–81. doi:10.1002/tl.8006

Christensen, C. M., Horn, M. B., Caldera, L., & Soares, L. (2011). *Disrupting college: How disruptive innovation can deliver quality and affordability to postsecondary education*. The Center for American Progress. Retrieved January 31, 2014 from http://www.americanprogress.org/issues/2011/02/disrupting_college.html

Compton, L., Davis, N., & Correta, A. (2010). Pre-service teachers' preconceptions, misconceptions, and concerns about virtual schooling. *Distance Education*, *31*(1), 37–54. doi:10.1080/01587911003725006

Conrad, R. M., & Donaldson, A. (2004). *Engaging the online learner: Activities and resources for creative instruction*. San Francisco, CA: Jossey-Bass.

Digenti, D. (1998). Toward an understanding of the learning community. *Organization Development Journal*, *16*(2), 91–96.

Edelstein, S., & Edwards, J. (2002*). If you build it, they will come: Building learning communities through threaded discussions.* Retrieved January 25, 2014 from http://www.westga.edu/-distance/ojdla/spring51.html

Freeman, V. S. (2010). Focus: Online education and technology introduction. *Clinical laboratory science: journal of the American Society for Medical Technology*, *23*(3), 3–51. PMID:20803835

Garrison, D. R., Anderson, T., & Archer, W. (2003). A theory of critical inquiry in online distance education. In M. G. Moore & W. G. Anderson (Eds.), *Handbook of Distance Education* (pp. 113–127). Mahwah, NJ: Erlbaum.

Giroux, H. (2001). Pedagogy of the depressed: Beyond the new politics of cynicism. *College Literature*, *28*(3), 1–33.

Glisen, E., & Trainin, G. (2006). *Online community and connectedness: A pilot study.* Retrieved from November, 17, 2013 from http://digitalcommons.unl.edu/cehsgpirw/7

Grandzol, J., & Grandzol, C. (2006). Best practices for online business education. *International Review of Research in Open and Distance Learning*, *7*(1), 1–18.

Grant, M. R. & Thornton, H. R. 92007). Best practices in undergraduate adult-centered online learning: mechanisms for course design and delivery. *Journal of Online Learning and Teaching,* *3*(4), 346-356.

Gunawardena, C., & Zittle, F. (1997). Social presence as a predictor of satisfaction within a computer-mediated conferencing environment. *American Journal of Distance Education*, *11*(3), 8–26. doi:10.1080/08923649709526970

Hara, N., & Kling, R. (1999). Students' frustrations with a web-based distance education course. *First Monday: Peer Reviewed Journal on the Internet, 4* (12). Retrieved January 25, 2014 http://firstmonday.org/htbin/cgiwrap/bin/ojs/index/php/fm/article/viewArticle/710

Hiltz, S. R., & Turoff, M. (2002). What makes learning networks effective? *Communications of the Association of Computer Machinery*, *45*(4), 56–59. doi:10.1145/505248.505273

Johnson, D., & Johnson, R. (1989). *Cooperation and competition: Theory and research*. Edina, MN: Interaction Book Company.

Johnson, D., & Johnson, R. (2004). Cooperation and the use of technology. In D. H. Johanssen (Ed.), Handbook of research on educational communications and technology (pp. 785-811). Mahwah, NJ: Lawrence Erlbaum Associates.

Johnson, D., & Johnson, R. (2005). *Joining together: Group therapy and group skills* (9th ed.). New York, NY: Allyn and Bacon.

Johnson, D., Johnson, R., & Smith, K. (1991). *Active learning: Cooperation in the college classroom*. Edina, MN: Interaction Book Company.

Johnson, L., Smith, R., Willis, H., Levine, A., & Haywood, K. (2011). *The 2011 Horizon Report*. Austin, TX: The New Media Consortium.

King, A. (1993). From sage on the stage to guide on the side. *College Teaching*, *41*(1), 30–35. doi:10.1080/87567555.1993.9926781

Kreijns, K., Kirschner, P. A., & Jochems, W. (2003). Identifying the pitfalls for social interactions in computer-supported collaborative learning environments: A review of the research. *Computers in Human Behavior*, *19*(3), 335–612. doi:10.1016/S0747-5632(02)00057-2

Land, S., & Zembal-Saul, C. (2003). Scaffolding reflection and articulation of scientific explanations in a data—rich project-based learning environment: An investigation of progress portfolio. *Educational Technology Research and Development*, *51*(4), 65–84. doi:10.1007/BF02504544

Lin, G. Y. (2004). *Social Presence Questionnaire of Online Collaborative Learning: Development and validity*. Retrieved on December 15, 2013 from ERIC database. (ED 0484999).

Mancuso-Murphy, J. (2007). Distance education in nursing: An integrated review of online nursing students' experience with technology-delivered education. *The Journal of Nursing Education*, *46*(6), 252–260. PMID:17580737

Manderbach, J. (2009). Three ways to improve student engagement in the online classroom. *Online Classroom*, 1-2.

McKenzie, J. (2003). Pedagogy does matter: *The Educational Technology Journal, 13* (1).

Means, B., Toyama, Y., Murphy, R., Bakia, M., & Jones, K. (2009*). Evaluation of evidence-based practices in online learning: A meta-analysis and review of online learning studies*. Washington, DC: Office of Planning, Evaluation, and Poicy Development, U.S. Department of Education. Retrieved January 25, 2014 http://www2.ed.gov/rschstat/eval/tech/evidence-based-practices/finalreport.pdf

National Research Center for Career and Technical Education. (2010). *Professional development for secondary career and technical education: Implication for change*. Louisville, KY: University of Louisville, College of Education and Human Development.

Palloff, R. M., & Pratt, K. (2007). *Building online learning communities*. San Franciso, CA: Jossey-Bass.

Picciano, A. (2002). Beyond student perceptions: Issues of interaction, presence, and performance in an online course. *Journal of Asynchronous Learning Networks*, *6*(1), 21–40.

Randolph, J. J., & Kangas, M. (2008). A scale for measuring sense of community in online courses: Preliminary psychometric results, predictors of course satisfaction, and predicators of sense of community. In J. Viteli & S. Kaupinmaki (Eds.), *Tuovi 6: Interakitiivinen tekniikka koulutuksessa 2008-kferenssin tutkijapaamisen artikkelit* [Proceedings of the Scholars' Meeting at the Interactive Technology in Education Conference 2008], (pp. 94-118). Tampere, Finland: Tampere University Press. Retrieved December 16. 2013 from http://urn.fi/urn:isbn:978-951-44-7463-7

Reasons, S., Valadares, K., & Slavkin, M. (2005). Questioning the hybrid model: Student outcomes in different course formats. *Journal of Asynchronous Learning Networks*, *9*(1), 83–94.

Rovai, A. P., & Barnum, K. T. (2003). On-line course effectiveness: An analysis of student interactions and perceptions of learning. *Journal of Distance Education*, *18*(1), 57–73.

Rovai, A. P., & Jordan, H. (2004). Blended learning and sense of community: A comparative analysis with traditional and fully online graduate courses. *International Review of Research in Open and Distance Learning*, *2*(5). Retrieved from http://www.irrodl.org/index.php/irrodl/article/viewArticle/192/274

Rovaii, A. P. (2002). Building sense of community at a distance. *International Review of Research in Open and Distance Learning, 3*(1). Retrieved December 10, 2013 from http://www.irrodl.org/index.php/irrodl/article/view/79

Russell, T. L. (1999). *The no significant difference phenomenon*. Chapel Hill, NC: Office of Instructional Telecommunications University of North Carolina.

Ryman, S., Burrell, L., Hardham, G., Richardson, B., & Ross, J. (2010, March). Creating and sustaining online learning communities: Designed for transformative learning. *International*. doi:10.5172/ijpl.5.3.32

Ryman, S., Burrell, L., & Richardson, B. (2010). Creating and sustaining online learning communities: Designing environments for transformative learning. *International Journal of Pedagogies and Learning*, *5*(3), 46–58. doi:10.5172/ijpl.5.3.46

Schultz, B. (2003). Collaborative learning in an online environment: Will it work for teacher training? In *Proceedings of the 14th annual Society for Information Technology and Teacher Education International Conference* (pp. 503-504). Charlottesville, VA: Association for the Advancement of Computers in Education.

Shaffer, C., & Anundsen, K. (1993). *Creating community anywhere*. Los Angles, CA: Tarcher/Perigee Books.

Shea, P., Swan, K., & Pickett, A. (2004). *Teaching presence and establishment of community in online learning environments*. Sloan Consortium Summer Workshops. Retrieved from http://www.sloanconsortium.org/summerworkshop2004/draft-papers/shea_090104.doc

Short, J., Williams, E., & Christie, B. (1976). *The social psychology of communication*. New York: Wiley.

Simonson, M., Smaldino, S., Albright, M., & Zvacek, S. (2009). *Teaching and learning at a distance: Foundations of distance education* (4th ed.). Boston, MA: Allyn & Bacon.

Stein, D., & Wanstreet, C. E. (2003). Role of social presence, choice of online or face-to-face group format, and satisfaction with perceived knowledge gained in a distance learning environment. In *Proceedings of 2003 Midwest Research to Practice Conference in Adult, Continuing, and Community Education*. Retrieved from http://www.alumni-osu.org/midwest/midwest%20papers/Stein%20&20Wanstreet-Done.pdf

Tu, C. (2002). The measurement of social presence in an online learning environment. *International Journal on E-Learning*, *1*(2), 34–45.

Tu, C., & Corry, M. (2002). *Research in online learning community*. Retrieved from http://www.usq.edu.au/electpub/e-jist/docs/html2002/pdf/chtu.pdf

Vaughan, N. (2007). Perspectives on blended learning in higher education. *International Journal on E-Learning*, *6*(1), 81–84.

Wenger, E. (1999). *Communities of practice: Learning, meaning, and identity*. Cambridge, UK: Cambridge University Press.

Witt, P. L., Wheeless, L. R., & Allen, M. (2004). A meta-analytical review of the relationship between teacher immediacy and student learning. *Communication Monographs*, *71*(2), 184–207. doi:10.1080/036452042000228054

Young, S., & Bruce, M. A. (2011). Classroom community and student engagement in online courses. *Journal of Online Learning and Teaching*, *7*(2).

ADDITIONAL READING

Bonk, C. J., & Graham, C. R. (2005). *The handbook of blended learning. Global perspectives, local designs*. New York, NY: Pfeiffer.

Boyer, N., Maher, P., & Kirkman, S. (2006). Transformative learning in online settings: The use of self-direction, metacognition, and collaborative learning. *The Journal of Transformative Education*, *4*(4), 335–361. doi:10.1177/1541344606295318

Doran, C. (2001). The effective use of learning groups in online education. *New Horizon in Adult Education, 15*(2).

Du, J., Havard, B., & Li, H. (2005). Dynamic online discussion: Task-oriented interaction for deep learning. *Educational Media International*, *42*(3), 207–218. doi:10.1080/09523980500161221

Garrison, D. R., Anderson, T., & Archer, W. (1999). Critical inquiry in a text-based environment: Computer conferencing in higher education. *The Internet and Higher Education*, *2*(2-3), 87–105. doi:10.1016/S1096-7516(00)00016-6

Jegede, O. J. (2002). Facilitating and sustaining interest through an on-line distance peer-tutoring system in a cooperative learning environment. *Virtual University Gazette,* 35-45.

Kaleta, R., Skibba, K., & Joosten, T. (2007). Discovering, designing, and delivering hybrid courses. In A. G. Picciano & C. D. Dziuban (Eds.), *Blended learning: Research perspectives* (pp. 111–144). Needham, MA: Sloan Consortium.

Kim, K., & Bonk, C. (2006). The future of online teaching and learning in higher education: The survey says. *EDUCAUSE Quarterly*, *29*(4), 1–15.

Vignare, K. (2007). Review of the literature on blended learning. In A. G. Picciano & C. D. Dziuban (Eds.), *Blended learning: Research perspectives* (pp. 37–64). Needham, MA: Sloan Consortium.

Wantstreet, C. E. (2006). Interactions in online learning environments. *The Quarterly Review of Distance Education*, *7*(4), 399–411.

KEY TERMS AND DEFINITIONS

Asynchronous: A method of instructional delivery that is time shifted; teacher and students can participate at differing times from the same or different locations; think of email or voice mail and how it is accessed after being sent.

Collaborative Learning: Collaborative learning (or cooperative learning) is an instructional strategy that arranges small groups of students to work together to complete an academic assignment and through sharing and learning from one another accomplish a learning goal.

Community of Learners: When students who are enrolled in a course of study, join with the teacher, to cognitively and socially connect in a common exploration of the course content.

Constructivism: A belief that knowledge is a constructed element resulting from the learning process and that knowledge is unique to the individual who constructs it; also includes a view of teacher as facilitator of instruction promoting student engagement and critical inquiry.

Delivery Mode: Instruction can be delivered in many different delivery modes, including online, blended (hybrid), and face-to-face; the method by which instruction is delivered to students.

F2F: Face-to-face coursework is a delivery model of instruction where the teacher and students meet together in person, typically in a "bricks and mortar" classroom.

Hybrid: Another name for blended delivery of instruction; courses that meet face-to-face with between some portion of content delivered online.

Pedagogy: The actual function of teaching; what teachers do when implementing course content to assist their student's learning.

Synchronous: A method of instructional delivery that occurs at the same time while typically not in the same place.

Teacher as Facilitator: A process by which a teacher facilitates the learning process through promoting community building, cooperative learning, and critical inquiry with students sharing their synthesis and application of course content to add depth and breadth of meaning to knowledge acquisition of the community of learners.

This work was previously published in Promoting Global Literacy Skills through Technology-Infused Teaching and Learning edited by Jared Keengwe, Justus G. Mbae, and Simon K. Ngigi, pages 86-101, copyright year 2015 by Information Science Reference (an imprint of IGI Global).

Chapter 43
Prioritization of Design Requirements for Quality Engineering Education

K. Venkatasubbaiah
Andhra University, India

N. Chandra Shekhar
Government Polytechnic, India

Narayana Rao Kandukuri
G.M.R Polytechnic, India

ABSTRACT

The educational institutions must strive to impart quality education and have to create greater satisfaction in their customer group. Quality Function Deployment (QFD) which is a customer driven tool in implementing Total Quality Management (TQM) helps to accomplish this task. One of the phases in QFD methodology is known as House of Quality (HoQ), which is concerned with translating the voice of customer into design requirements by stakeholders. Design requirements will determine how the customer needs are to be fulfilled. This paper presents an integrated methodology (HoQ-ANP) to translate Voices of Customer (VoC) or customer needs (CNs) into design requirements (DRs) and to determine the importance weights of DRs by considering the complex dependency relationships between and within Customer needs and DRs for total quality in engineering education. In order to deal with the vagueness, uncertainty and diversity in dependency relationships fuzzy set theory and group decision-making technique are used to determine the priority structure of CNs, inner dependence among Customer Needs (CNs), Inner dependence among DRs and inter-relationship between CNs & DRs. Prioritization of design requirements for quality engineering education is determined through a case study by employing HoQ-ANP methodology.

DOI: 10.4018/978-1-4666-8246-7.ch043

1. INTRODUCTION

Engineering education is a process of developing techno human resources, which are to be used later as input to industry which in turn produces goods and services for the societal use. Liberalization, Privatization and Globalization led to increase in the number of ill - equipped engineering educational institutions in India. Therefore, there is a greater need to instill quality in engineering education to produce technically skilled and creative man-power in India.

Education is not only a rigorous study process of obtaining necessary professional qualifications, but it is also the intellectual development of an individual, which will have an enduring impact on one's life. Therefore, quality engineering education means not only adding value to students, but also to the society as a whole. Quality engineering education is the development of intellectual skills and knowledge that will equip graduates to contribute to society through productive and satisfying engineering careers as innovators, decision – makers and leaders in the global economy of the 21st century (Natarajan, 2002).

The education sector that produces the human resource has a pivotal role in the quality movement that demands total quality approach in the education system to live up to the requirements of the industry(Mariappan, 2002).

Quality Engineering Education demands a process of continuous improvement of and dramatic innovation in student, employer and societal satisfaction by systematically and collectively evaluating and refining the system, practices and culture of engineering education institutions (Natarajan, 2000).

The QFD application in higher education is classified into three broad categories, namely, teaching effectiveness, curriculum design, and instructional resources. Benjamin et. al, (1993) designed engineering education and curricula using TQM and QFD principles. Jaraiedi and Ritz (1994) applied QFD to improve advising and teaching processes at West Virginia University. Ermer (1995) showed the design requirements to satisfy each customer by considering faculty, students, and industry as clients.

Hwarng et. al, (2001) applied QFD to translate customers' voices into operations requirements at the National University of Singapore. Clayton (2003) used QFD to provide productive quality learning. The analytic network process (ANP) approach has been used in QFD in product planning to prioritize ECs in order to overcome some shortcomings of the traditional QFD models (Karsak, Sozer, & Alptekin, 2003; Partovi & Corredoira, 2002; Buyukozkan, Ertay, Kahraman, & Ruan, 2004).

Quality Function Deployment (QFD) is one of the quantitative tools and techniques of Total Quality Management that could be used to translate customer requirements and specifications into appropriate technical or service requirements (Baba et al., 2009). QFD process is initiated with capturing the voice of customer and it can be used to measure customer satisfaction (Durga Prasad et al., 2008).

QFD is a planning process that includes four matrices namely; product planning matrix, part planning matrix (part deployment matrix), process planning matrix and production planning matrix respectively, and the first of them is also referred to as House of Quality (HoQ) (Liu, 2009).

The customer portion of HoQ is established by capturing the voice of customer (customer needs) and preparing the priority ratings of the customer needs. The priority ratings reflect the preferences of the customers. A few approaches are also available for the determination of priority ratings of customer needs (Sharma et al., 2007).

The HoQ translates the customer needs obtained from the customer's perception into appropriate design requirements using the designer's perception. The HoQ maps the prioritized list of customer needs to appropriate design requirements and it also gives the priority ratings of the design requirements. Designers have an in-depth knowledge of the functions of the product, and they usually express their information in technical and clear terms (Kazemzadeh et al., 2009). Chandra Shekhar et al (2013), determined weights of the factors that enhance the quality in engineering education institutions (EEIs) using AHP.

More number of engineering educations institutions are established in private sector due to the policy of the government. Unfortunately, higher percentage of student failures in the university examinations, fewer amounts of placement opportunities is the major defects in the engineering educational institutions. To ensure quality in engineering education, the major processes involved in the education system such as curriculum development, teaching, learning and evaluation need to be completely overhauled.

This paper presents a HoQ -ANP methodology to prioritize the design requirements for quality engineering education model. The methodology takes care of vagueness and diversity in decision making by using fuzzy set theory and group decision making technique to enhance the effectiveness and efficiency.

1.1. Research Questions

The goal of the present study is to establish the priority of design requirements for quality engineering education.

The sub-research questions are formulated as follows:

- Identify the inner dependence among Customer Needs (CNs);
- Identify the Inner dependence among DRs;
- Identify the inter-relationship between CNs & DRs.

2. ANALYTIC NETWORK PROCESS (ANP)

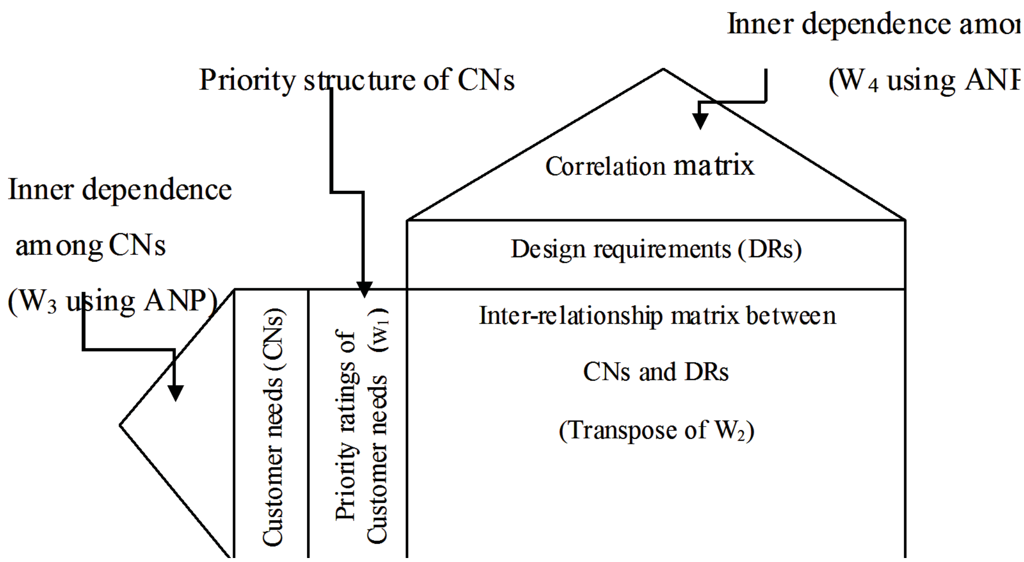
The Analytic Network Process (ANP) is a multi-criteria decision making (MCDM) technique which considers the interdependence among criteria and alternatives and it may transform qualitative judgments into quantitative values. The ANP generalizes the AHP by replacing hierarchies with networks. ANP uses the same fundamental comparison scale (Saaty, 1999) that is used in the AHP. This comparison scale enables the decision-maker to incorporate experience and knowledge intuitively and indicate how many times an element dominates another with respect to the criterion. ANP consists of two stages, namely, construction of the network and calculation of the priorities of the elements (Karsak et al., 2002). ANP enables interrelationships not only among the clusters but also between the elements of a cluster (Andreas et al., 2009).

The degree of relative importance of the design requirements (DRs) with respect to each customer need (CN) is presented in the form of a matrix W_2. The transpose of the matrix W_2 forms the interrelationship matrix of HoQ. The set of priority ratings of customer needs (W_1) are obtained through trapezoidal fuzzy numbers which take care of the vagueness present in the decision maker's judgment. The matrix W_3 represents the inner dependencies of the CNs with respect to each CN. The inner dependence matrix of the DRs with respect to each DR $\left(W_4\right)$ gives the correlation matrix (roof) of HoQ. The HoQ-ANP methodology employed for systematic is shown in Figure 1.

2. DETERMINATION OF WEIGHTS IN FUZZY ENVIRONMENT

Multi-criteria decision making (MCDM) problem deals with the evaluation of a set of alternatives in terms of a set of decision criteria. Abbas

Figure 1. Mapping of CNs and DRs



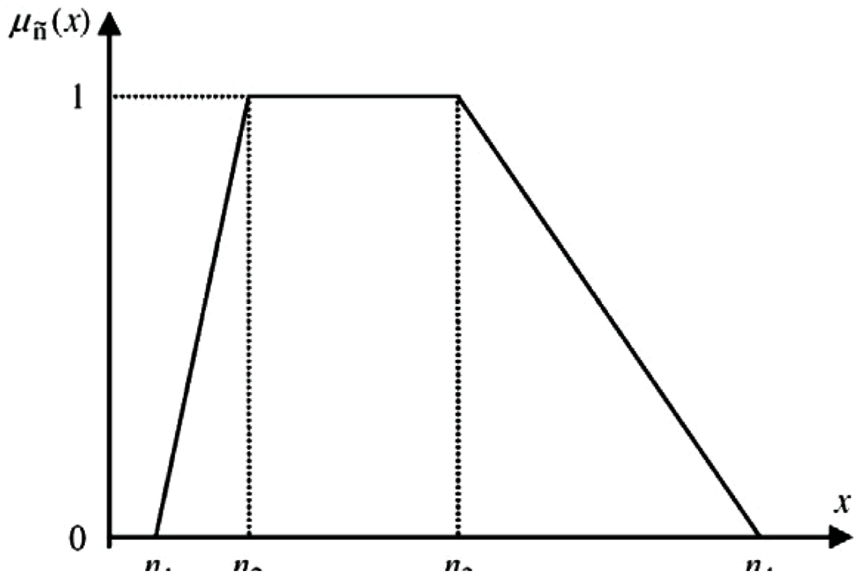
Toloie-Eshlaghy and Mahdi Homayonfar (2011) made a comprehensive survey of methods for eliciting data for MCDM problems and also for processing such data. These methods have attracted much attention from academics and practitioners. Chandra Shekhar et al (2011) adopted Cross Efficiency Approach in Data Envelopment Analysis (DEA) for ranking of Engineering Education Institutions.

In MCDM methods, the ratings and the weights of the criteria are known precisely. However, crisp data are inadequate to model real-life situations, since human judgments including preferences are often vague and one's preference cannot be estimated with an exact numerical value. A more realistic approach may be to use linguistic variables like high, very high, etc. instead of numerical values. A natural way to cope up with such uncertain judgments is to express the comparison ratios as fuzzy sets or fuzzy numbers which incorporate the vagueness of human thinking. When comparing any linguistic variables, the uncertain comparison judgment can be represented by membership functions or the fuzzy number. Here, linguistic values expressed as trapezoidal fuzzy numbers are used to assess the priority of the factors. Venkatasubbaiah et al (2005), evaluated design requirements for quality engineering education using fuzzy outranking technique. Chandra Shekhar et al., (2013), established the overall service quality of engineering education institutions using fuzzy logic approach. In this study, relative weights of the factors influencing the overall service quality of an EEI are determined.

2.1. Trapezoidal Membership Function

Theoretical ranges of the variables are often very wide. The trapezoidal fuzzy numbers are robust characterizations that include minimum and maximum observed values between the wide theoretical ranges. Trapezoidal Membership function membership $\mu_{\tilde{n}}(x)$. A positive trapezoidal number $\tilde{n}$ can be defined as (n1, n2, n3, n4) as shown in Figure 2.

Figure 2. Trapezoidal membership function



The trapezoidal membership function $\mu_{\tilde{n}}(x)$ is expressed as follows:

$$\mu_{x_m}(x) = \begin{cases} 0 & ; \quad x < n_1 \\ \dfrac{x - n_1}{n_2 - n_1} & ; n_1 \leq x \leq n_2 \\ 1 & ; \quad n_2 \leq x \leq n_3 \\ \dfrac{x - n_2}{n_3 - n_4} & ; n_3 \leq x \leq n_4 \\ 0 & ; \quad x \geq n_4 \end{cases}$$

MCDM methods in fuzzy environment like Fuzzy Analytic Hierarchy Process (FAHP) and Fuzzy Outranking Technique (FOT) have the ability to take care of vagueness without aggregating the decision-makers judgments about the importance of the criteria. In this paper, linguistic values expressed as trapezoidal fuzzy numbers by multiple decision-makers are used to assess the weights of the factors. Further, similar to the TOPSIS approach. Fuzzy Positive Ideal Rating (FPIR) and Fuzzy Negative Ideal Rating (FNIR) are used to compute weights of factors.

2.2. Determination of Aggregated Weights

A decision group has K decision makers as k = 1, 2, . . ., K and considers a set of m criteria as c = 1, 2, . . ., m for a selection problem. Then the aggregated fuzzy weights of each criterion W_c can be calculated as: (Chen et al., 2006)

$(W_c) = (w_{c1}, w_{c2}, w_{c3}, w_{c4})$

where:

$$w_{c1} = \min_k \{w_{ck1}\}$$

$$w_{c2} = \frac{1}{K}\sum_{1}^{K} w_{ck2}$$

$$w_{c3} = \frac{1}{K}\sum_{1}^{K} w_{ck3}$$

$$w_{c4} = \max_k \{w_{ck4}\}$$

Table 1. Customer needs

Sl.No.	Customer Needs
1.	Professionalism (P)
2.	Integrated Education (IE)
3.	Educational Facilities (EF)
4.	Responsiveness (R)
5.	Empathy (E)

2.3. Calculation of Closeness Coefficient

The distance between aggregated fuzzy weights (W_c) of each criterion and ideal ratings can be calculated by applying vertex method as given in Box 1, where $\tilde{m} = (m_1, m_2, m_3, m_4)$; and $\tilde{n} = (n_1, n_2, n_3, n_4)$.

The closeness coefficient is determined to calculate the weights of each factor from the following relation:

$$CC_c = \frac{d_c^-}{d_c^* + d_c^-}$$

where d_j^- distance to FNIR is d_j^* is distance to FPIR.

2.4. Determination of Final Weights of the Criteria

By applying normalization to closeness coefficients, final weights of each factor are determined using the following relation:

$$W_c = \frac{CC_c}{\Sigma_{c=1}^{m} CC_c}$$

3. METHODOLOGY

The HoQ maps the customer needs to appropriate design requirements. Fuzzy Positive Ideal Rating (FPIR) and Fuzzy Negative Ideal Rating (FNIR) are used to compute weights of these requirements using survey questionnaire designed to assess the importance of the design requirements to improve the quality of engineering education. The detailed procedure of HoQ-ANP is explained by the following steps:

Step 1. Identification of Customer Needs (CN): Engineering graduate passing out from the college has to fulfill modern and high standard requirements that are needed by industry. All the customer needs are gathered and from the literature and those needs are consolidated into respective categories;

Step 2. Formulation of Design Requirements (DR): This customer needs are to be translated into necessary design requirements. The design requirements may be considered from the literature;

Step 3. Prioritization of Customer Needs (W_1): Assuming that there are no dependence relationships among the CNs, pair-wise comparison matrix within the CNs is constructed with respect to the design goal and the importance weighting vector of CNs is calculated. Priority of customer needs is determined from Fuzzy Positive Ideal Rating (FPIR) and Fuzzy Negative Ideal Rating (FNIR);

Step 4. Determination of inter- relationship matrix (W_2): Inter-relationship matrix is established by assuming that there are no

Box 1.

$$d_v = (\tilde{m}, \tilde{n}) = \sqrt{\frac{1}{4}[(m_1 - n_1)^2 + (m_2 - n_2)^2 + (m_3 - n_3)^2 + (m_4 - n_4)^2]}$$

dependence relationships within DRs. The pair-wise comparison matrix within them is constructed with respect to the inter-dependency relationships between CNs and DRs. These inter-dependency relationships are obtained from Fuzzy Positive Ideal Rating (FPIR) and Fuzzy Negative Ideal Rating (FNIR);

Step 5. Establish the Inner Dependence Matrix of the CNs (W_3): Inner dependence matrix of the CNs is established by constructing the pair-wise comparison matrix within the CNs with respect to the inner- dependency relationships within them. The matrix is obtained from Fuzzy Positive Ideal Rating (FPIR) and Fuzzy Negative Ideal Rating (FNIR);

Step 6. Establish the Inner Dependence Matrix of the DRs (W_4): Inner dependence matrix of the DRs is established by constructing the pair-wise comparison matrix within the DRs with respect to the inner-dependency relationships within them. The inner dependence matrix is determined from Fuzzy Positive Ideal Rating (FPIR) and Fuzzy Negative Ideal Rating (FNIR);

Step 7. Establish the Inter Dependent Priority Matrix of the CNs (W_c): The inter- dependent priority matrix of the CNs is obtained by the following relation:

$$W_c = W_3 * W_1$$

Step 8. Establish the Inter Dependent Priority Matrix of the DRs (Wa): The inter-dependent priority matrix of the DRs is obtained by the following relation:

$$Wa = W_4 * W_2$$

Step 9. Determination of the Overall Priorities of DRs: The overall priorities of the DRs, reflecting the interrelationships within the HOQ are obtained by the following relation:

$$W^{ANP} = W_a * W_c$$

4. CASE STUDY

In order to prioritize the design requirements to improve the quality of engineering education, a case study of Andhra Pradesh state in India is considered. The survey questionnaire is designed to assess the importance of the design requirements for quality engineering education. Sample size of 250 out of 700 engineering education institutions in the state are selected. The distributions of the engineering institutions in Andhra Pradesh are as follows; One hundred institutions in Telangana region, one hundred institutions in Andhra region and fifty institutions in Rayalaseema region. The sample size and the specific institution are chosen considering institute profile, the year of establishment, type of organization, region, and performance. The composition of the persons who have participated in the response of the questionnaire includes: Management, principals, faculty, experts from industry and experts in the field of education. The questionnaires were distributed to the stake holders of engineering education institutions considered in the case study and data is collected.

4.1. Survey Questionnaire

The questionnaire is developed in order to gain vital information that maps the list of customer needs to appropriate design requirements. In general the objectives of conducting the survey is to determine whether performance improvement and measurement is practiced in the education institutions and to assess' attitudes and tendency towards performance improvement. The questionnaire is categorized into four questions.

Question 1 is concerned with finding out importance of the customer needs with respect to the satisfaction of the stakeholders in respect of the goal of achieving Quality engineering Education.

Question 2 is concerned with the impact of the Design Requirements on the Customer Needs.

Question 3 is concerned with knowing of the inner dependence among the customer needs.

Question 4 is concerned with knowing the inner dependence among the design requirements.

The questionnaire is given in the Appendix.

4.2. Data Analysis and Interpretation

The questionnaires were distributed to 600 stake holders out of which 472 were collected which imply 78% were completed by the respondents. The demographic data of the respondents are represented in Figure 3.

Five service quality factors proposed by Shekhar et al., (2010) are considered as customer needs in the study. The authors determined the quality gap of educational services based on differences between students' perceptions and expectations on thirty two items of service quality. Factor Analysis (FA) was carried out to identify the underlying dimensions in the service quality items. Further, the authors validated that these factors significantly influencing the overall service quality of an EEI using ANOVA.

4.3. Customer Needs (CN)

The customer needs are identified from the above study are shown in Table 1

4.4. Design Requirements (DRs)

The customer needs are to be translated into necessary design requirements. Durga Prasad et al. (2007) considered Modern Communication Facilities, Motivated Faculty, Library Modernization, Visual Teaching Aids, Industry-institution Interaction, Better Course Plan and Curriculum, Well Discipline, Opportunity for Knowledge up gradation and capability to attract Companies for Campus interviews as design requirements and prioritized through a case study.

Mahapatra and M.S.Khan (2007) implemented Quality Function Deployment (QFD) method to prioritize design requirements need to be implemented. The design requirements in the priority order are Opportunity for Knowledge up gradation, continuous evaluation system, Technology driven teaching Aids, Industry-institution Interface and management responsibility. In this study, the set of design requirements were generated through literature and the brain storming session held with the eminent faculty, principals, academic deans and placement officers of local engineering colleges. The design requirements are shown in Table 2.

The data collected on customer needs and design requirements by means of questionnaires are analyzed to prepare the fuzzy pair wise comparison matrices using triangular fuzzy numbers. These fuzzy pair wise comparison matrices are useful

Figure 3. Demographic data

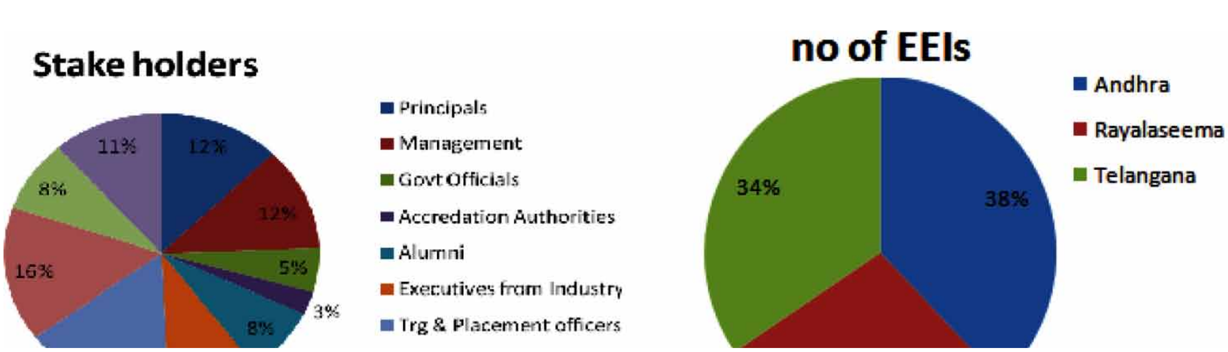


Table 2. Design requirements (DRs)

Sl.No	Design Requirements
1.	Flexible Curriculum Design (FCD)
2.	Teaching Learning Practices(TLP)
3.	Promotion of research and consultancy (PRC)
4.	IT Competency (ITC)
5.	Employability skill Development(ESD)
6	Infrastructure Adequacy (IA)

for analyzing the inner dependency relationships between customer needs, design requirements and the inter dependency between customer needs & design requirements.

5. RESULTS AND DISCUSSION

The HoQ-ANP methodology is employed to determine the overall priority of the design requirements for design of quality engineering education by systematic mapping of CNs and DRs.

5.1. Prioritization of Customer Needs (W_1)

The proposed methodology is illustrated in the following steps. The quality of services provided by the Engineering Education Institutions need to be assessed from the different stakeholder's point of view. Hence in this paper, students, alumni, recruiters and faculty are considered as stakeholders. Five service quality factors viz., professionalism, integrated education, facilities, responsiveness and empathy proposed by Chandra Shekhar et al. (2010) are considered as customer needs in the study.

5.1.1. Specification of Linguistic variables

The following linguistic values of fuzzy variables specified by trapezoidal fuzzy number are considered:

- **Nill:** NL (0,0,0,0);
- **Very Low:** VL (0.0,0.0,0.1,0.2);
- **Low:** L (0.1,0.2,0.3,0.4);
- **Medium Low:** ML (0.3,0.4,0.4,0.5);
- **Medium:** M (0.4,0.5,0.6,0.7);
- **Medium High:** MH(0.6,0.7,0.7,0.8);
- **High:** H (0.7,0.8,0.8,0.9);
- **Very High:** VH (0.8, 0.9, 1.0, 1.0);
- **Full:** F (1,1,1,1).

Relative importance of the factors for quality engineering education is determined by administering the questionnaire shown in the Appendix to the stake holders. The stake holders indicated their response with a Linguistic variable basing on importance of the five factors in respect of Quality engineering Education. The responses are aggregated and shown in Table 3.

The procedure for calculation of aggregate weight is explained by taking professionalism as an example. From Table 3, relative importance of professionalism specified in terms of linguistic values by the stake holders are:

Table 3. Relative importance of factors

Customer Need	Stake Holders			
	Students	Faculty	Alumni	Recruiters
Professionalism	VH	H	VH	H
Integrated Education	MH	VH	H	VH
Facilities	VH	MH	VH	MH
Responsiveness	H	L	L	L
Empathy	H	VL	VL	VL

VH(0.8,0.9,1.0,1.0)

H(0.7,0.8,0.8,0.9)

VH(0.8,0.9,1.0,1.0)

H(0.7,0.8,0.8,0.9)

5.1.2. Aggregate Weights

Below are the aggregate weights:

$\tilde{w}$ = (wc1, wc2, wc3, wc4)

where:

$$w_{c1} = \min_{k}\{w_{ck1}\} = 0.7$$

$$w_{c2} = \frac{1}{K}\sum_{1}^{K} w_{ck2} = 0.85$$

$$w_{c3} = \frac{1}{K}\sum_{1}^{K} w_{ck3} = 0.90$$

$$w_{c4} = \max_{k}\{w_{ck4}\} = 1.0$$

c = 1, 2, 3, 4; k = 1, 2, 3, 4; K = 4

Similarly, aggregate fuzzy weights of each customer needs are calculated and shown in Table 4.

5.1.3. Final Weights

A closeness coefficient is determined to calculate the weights of each factor. Final weights of each factor are obtained by applying the normalization to closeness coefficients. The procedure for calculation is explained by taking facilities factor as an example:

d_c^- → Distance from FNIR (very low)

d_c^+ → Distance from FPIR (very high)

Values of linguistic variables 'Very low' and 'Very high' are taken from Figure 2 and are shown below:

NL (0, 0, 0, 0); F (1, 1, 1, 1)

then we arrive at the equations shown in Box 2.

Closeness coefficient:

Box 2.

$$d_c^+ = \sqrt{(0.7-1)^2 + (0.85-1)^2 + (0.9-1)^2 + (1.0-1)^2} = 0.35$$
$$d_c^- = \sqrt{(0.7-0)^2 + (0.85-0)^2 + (0.9-0)^2 + (1-0)^2} = 1.7385$$

Table 4. Aggregate weights of customer needs

Professionalism	Integrated Education	Facilities	Responsiveness	Empathy
(0.7,0.85 0.90, 1)	(0.6,0.825, 0.875, 1)	(0.6,0.825, 0.85, 1.0)	(0.1,0.35, 0.9, 0.4)	(0,0.20,0.275, 0.90)

Box 3.

$$W_j = \frac{CC_c}{\Sigma_{c=1}^{m} CC_c} = \frac{0.8324}{0.8324 + 0.7867 + 0.7826 + 0.4534 + 0.3924} = 0.2561$$

Table 5. Final weights

Factors	d_c^-	d_c^*	Closeness Coefficient	Final Weight
Professionalism	1.7385	0.3500	0.8324	0.2561
Integrated education	1.6752	0.4541	0.7867	0.2421
Facilities	1.6623	0.4617	0.7826	0.2408
Responsiveness	1.0500	1.2659	0.4534	0.1395
Empathy	0.9621	1.4750	0.3948	0.1215

$$CC_j = \frac{d_c^-}{d_c^* + d_c^-} = \frac{1.7385}{0.35 + 1.7385} = 0.8324$$

Similarly the closeness coefficients of the other customer needs are determined to find the final weight.

Final weight of professionalism is shown in Box 3.

The distances, closeness coefficients and final weights of the customer needs are shown in Table 5.

The final weights represent the priority of customer needs and are shown in the matrix W_1:

$$W_1 = \begin{pmatrix} \mathrm{P} \\ IE \\ EF \\ R \\ E \end{pmatrix} = \begin{pmatrix} 0.2561 \\ 0.2421 \\ 0.2408 \\ 0.1395 \\ 0.1215 \end{pmatrix}$$

Highest weight (0.2561) is obtained with professionalism. The professionalism factor includes skill development along with guidance and counseling, good evaluation system, expert lectures and industrial training during study.

The integrated education factor with a weight of 0.2421 is associated with acquisition of multitasking skills, ability to work in any field, entrepreneurial ability, orientation towards design and development of innovative engineering products and ability to solve challenging engineering problems.

Facilities factor has obtained a weight of 0.2408. Facilities include the items related to modern equipment in labs, instructional aids, learning materials. Adequate facilities enhance the overall service quality. The other factors namely, responsiveness and empathy obtained weights of 0.1395 and 0.1215 respectively. Prompt service, personal attention by all teaching and other staff, orderliness, cleanliness, etc. improve responsiveness and empathy. The importance weights of customer needs are graphically shown in Figure 4.

5.2. Inter-Dependency Matrix (W_2)

Inter-dependency relationships between CNs and DRs are also obtained by administering the questionnaire (see Appendix) to the stake holders. The stake holders indicated their response with a Linguistic variable basing on importance of

Figure 4. The importance weights of customer needs

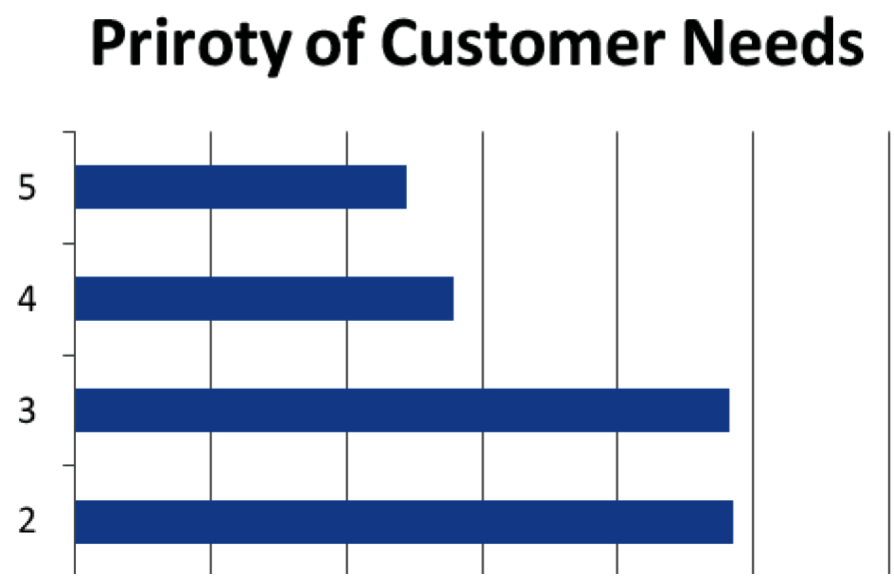


Table 6. Inter-dependency relationships between CNs and DRs

W_2	P	IE	EF	R	E
FCD	0.1128	0.1455	0.1883	0.058	0.0612
TLP	0.1641	0.1659	0.1304	0.1278	0.1851
PRC	0.162	0.1424	0.0678	0.1734	0.1753
ITC	0.2009	0.2296	0.1969	0.2093	0.1883
ESD	0.1998	0.1783	0.207	0.2097	0.2215
IA	0.1807	0.1618	0.2583	0.2355	0.1796

the five factors in respect of Quality engineering Education. The responses are aggregated and shown in Table 11 of the Appendix.

Inter-dependency of DRs and CNs is determined from Fuzzy Positive Ideal Rating (FPIR) and Fuzzy Negative Ideal Rating (FNIR) as discussed in section 4. The Inter-dependency relationships between CNs and DRs are shown in Table 6.

Relative importance of design requirements denotes the impact of the CNs on each of the design requirements. IT capability has an importance degree of 0.2009 on professionalism indicates that Engineering educational institution requires the modern facilities in the field of communication, such as LAN, access to internet, connection of regional libraries by WAN, language labs, E-mail and Fax facilities. These facilities help the students and faculty for solving complex mathematical models and for obtaining latest information on advanced technology.

Flexible curriculum design has an importance degree of 0.3092 on professionalism indicates that there should be interesting modules (content/books), Educational material of high quality, efficient structure of modules, Availability of information on the curriculum structure, variety in elective modules/modules on specialization areas, Laboratories in latest areas should be taken into consideration while designing the curriculum.

Table 7. The inner dependence matrix of the customer needs (W_3)

W_3	PR	IE	EF	R	E
PR	0.2804	0.2686	0.2582	0.2119	0.2052
IE	0.1802	0.3226	0.2072	0.077	0.1677
EF	0.1989	0.177	0.3101	0.188	0.1429
R	0.1898	0.1326	0.0845	0.3298	0.1723
E	0.1507	0.0992	0.14	0.1934	0.312

Teaching learning practices, Employee skill development and Continuous evaluation show little importance on professionalism.

Flexible curriculum design and teaching learning practices with importance weights of 0.3311 and 0.2817 respectively show high importance on integrated education. Continuous evaluation show moderate importance on integrated education. In addition to above factors, Employee skill development, IT capability and infrastructure adequacy influences the acquisition of multitasking skills, ability to work in any field, entrepreneurial ability, orientation towards design and development of innovative engineering products and ability to solve challenging engineering problems.

Facilities include the items related to modern equipment in labs, instructional aids, learning materials and the modern facilities in the field of communication, such as LAN, access to internet, connection of regional libraries by WAN, language labs, E-mail and Fax facilities. These facilities help the students and faculty for solving complex mathematical models and for obtaining latest information on advanced technology. Adequacy of these facilities is important to meet the customer need in respect of education facilities.

Infrastructure adequacy and IT capability with importance weights of 0.5007 and 0.3420 respectively indicate that these requirements ensures improved responsiveness towards student community, Improved access to accurate and timely information. A track of the student's progress is also possible through continuous evaluation which enhances responsiveness.

Importance weights obtained for promotion of research & consultancy, Employee skill development and teaching learning practices indicate their relative importance to ensure empathy.

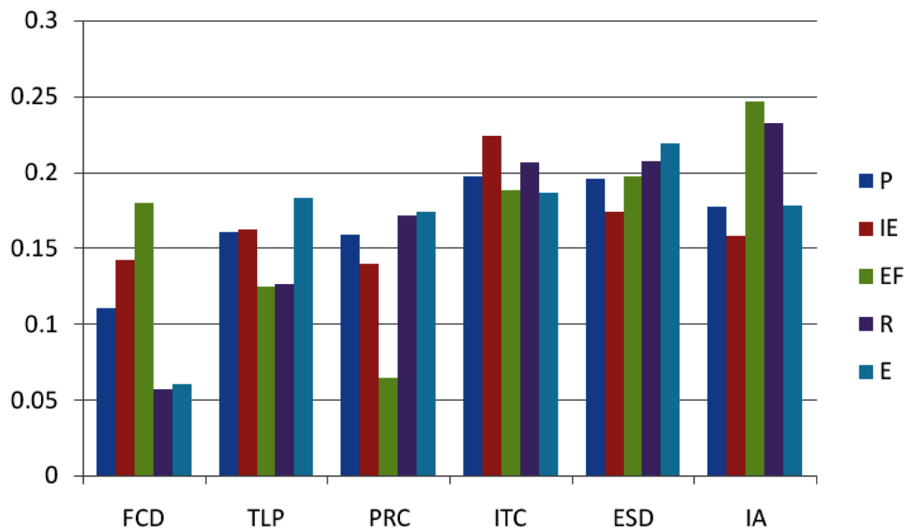
Regular industry institute interaction has importance degree of 0.7656 on industry institute interaction module that improve the employability and exposure of a job seeking candidate of that institution. Hence, it accelerates the conversion rate of prospective aspiring students into successful employees. Inter-dependency of CNs and DRs is graphically shown in Figure 5.

5.3. Inner Dependence Matrix of the CNs (W_3)

Inner-dependency relationships of CNs are also obtained by administering the questionnaire (see Appendix) to the stake holders. The stake holders indicated their response with a Linguistic variable basing on inner dependency among the customer needs in respect of Quality engineering Education. The responses are aggregated and shown in Table 12 of the Appendix.

Inner-dependency among CNs is determined from Fuzzy Positive Ideal Rating (FPIR) and Fuzzy Negative Ideal Rating (FNIR) as discussed in section 4. The Inner-dependency relationships among CNs are shown in Table 7. The values in the table indicate the extent of impact of each customer need on other customer need.

Figure 5. Inter-dependency of CNs and DRs



Normalized values of inner dependency of each customer need on other customer needs are shown graphically in Figure 6.

It is observed that each of the customer needs namely, professionalism, integrated education, Education facilities, responsiveness and empathy depend on the rest of the needs by 71.96%, 67.74%, 68.99%, 67.02% and 68.8% respectively.

It is observed that each of the design requirement namely, flexible curriculum design, teaching learning practices, internal quality assurance, IT capability, employee skill development and infrastructure adequacy depend on the rest of the design requirements by 66.92%, 78.02%, 73.31%, 77.18%,77.3% and 72.65% respectively.

5.4. Inner Dependence Matrix of the DRs (W_4)

Inner-dependency relationships of DRs are obtained by administering the questionnaire (see Appendix) to the stake holders. The stake holders indicated their response with a Linguistic variable basing on inner dependency among the Design requirements in respect of Quality engineering Education. The responses are aggregated and shown in Table 13 of the Appendix. Inner-dependency among CNs is determined from Fuzzy Positive Ideal Rating (FPIR) and Fuzzy Negative Ideal Rating (FNIR) as discussed in section 4. The Inner-dependency relationships among DRs are shown in Table 8 and Figure 7. The values in the table indicate the extent of impact of each design requirement on other requirement.

5.5. Inter-Dependent Priority Matrix of the CNs (W_c)

Using the following relation, the inter-dependent priority matrix of the CNs is obtained and shown in the matrix. The interdependent priority of CNs are shown graphically in Figure 8:

$W_c = W_3 * W_1$

$$w_c = w_3 * w_1 = \begin{pmatrix} P \\ IE \\ EF \\ R \\ E \end{pmatrix} = \begin{pmatrix} 0.2535 \\ 0.2052 \\ 0.2121 \\ 0.168 \\ 0.1612 \end{pmatrix}$$

Figure 6. Inner dependence matrix of the CNs

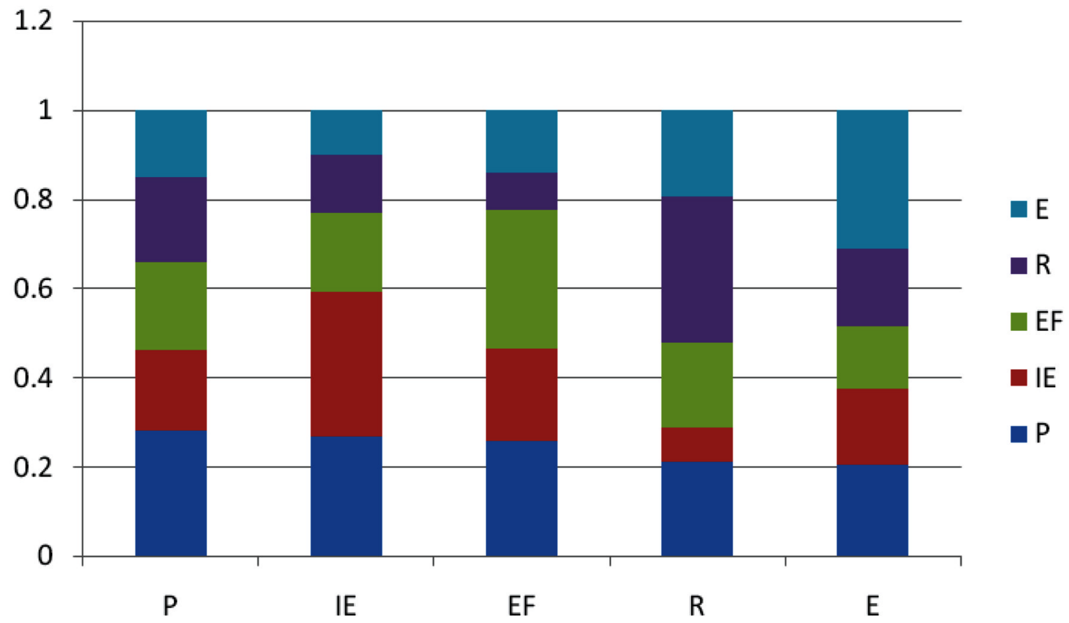


Figure 7. Inner dependence matrix of the DRs

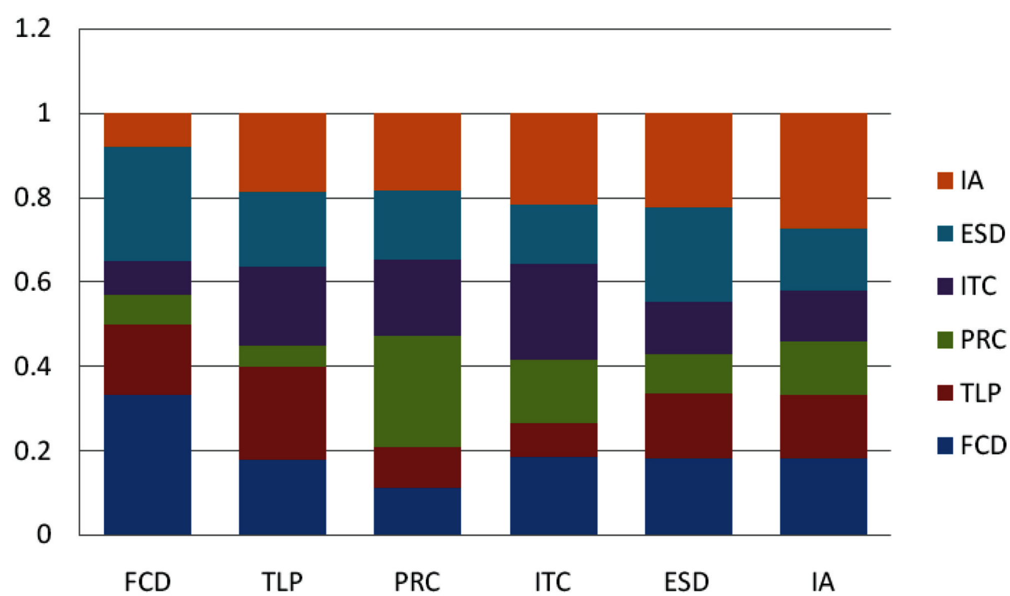
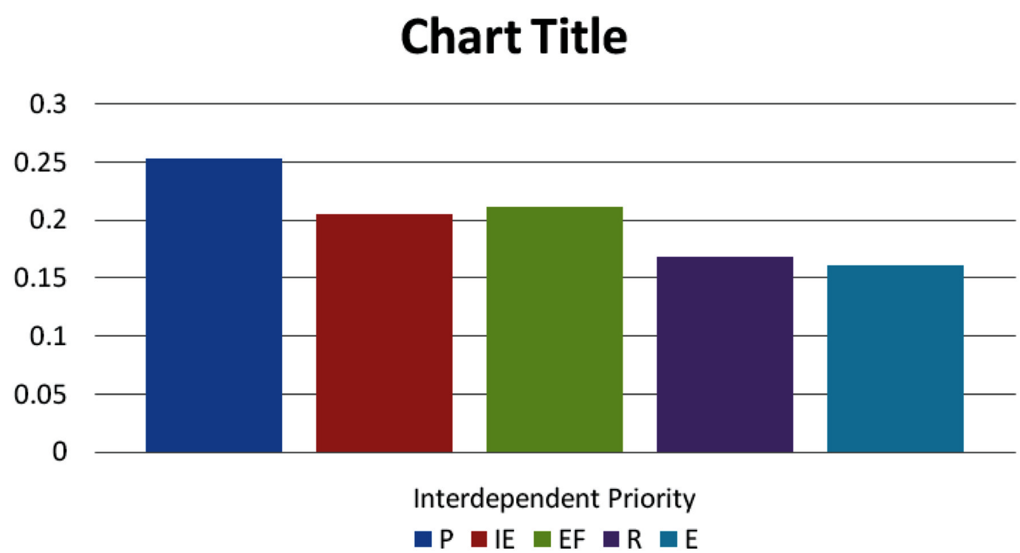


Table 8. The inner dependency matrix of the DRs

W_4	FCD	TLP	PRC	ITC	ESD	IA
FCD	0.3402	0.1838	0.1134	0.1924	0.1881	0.191
TLP	0.1715	0.2276	0.0966	0.0844	0.1614	0.1592
PRC	0.0742	0.0541	0.2726	0.1543	0.0981	0.1343
ITC	0.081	0.1905	0.1818	0.2382	0.129	0.1261
ESD	0.2783	0.1862	0.1678	0.1466	0.2329	0.156
IA	0.0831	0.1933	0.1892	0.228	0.2347	0.2886

Figure 8. Inter dependent priority matrix of the CNs



The inter dependent values shown in matrix w_c illustrates how individual customer needs always effectively aligned or directed toward a common goal of achieving total quality engineering education and adoption of best practices. From the values shown in the matrix, it is observed that professionalism, integrated education, education facilities, responsiveness and empathy by 25.35%, 20.52%, 21.21%, 16.8% and 16.12% respectively by considering the correlation among the customer needs.

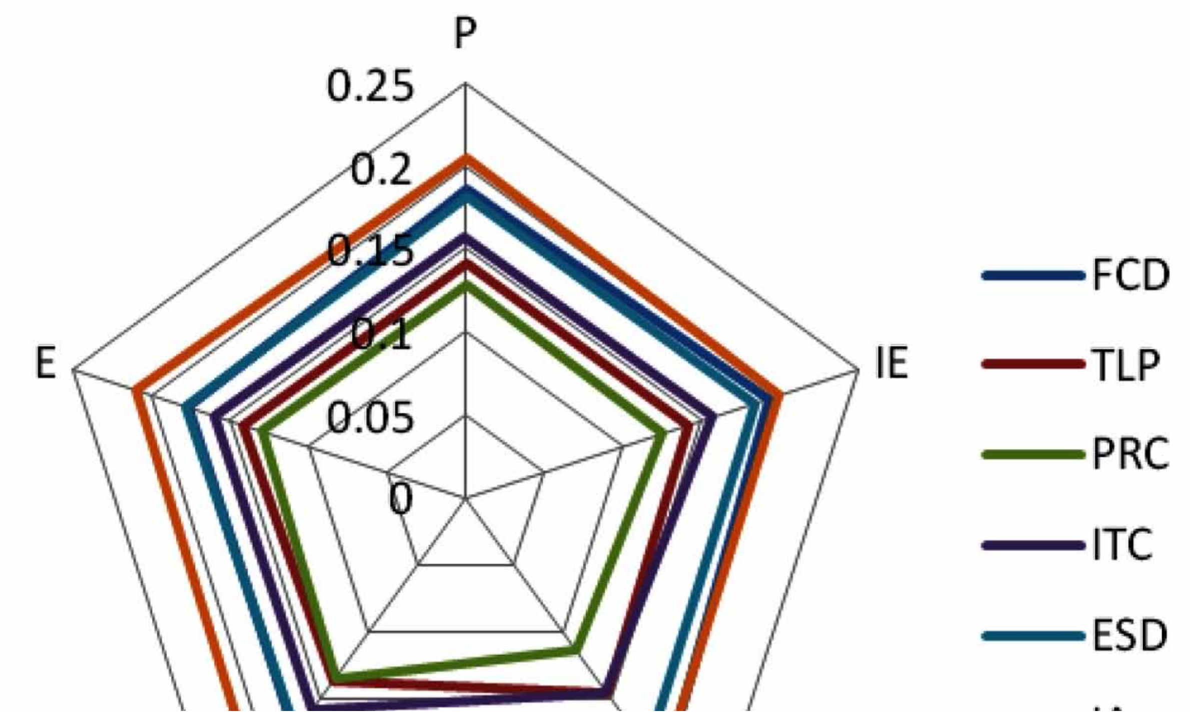
5.6. Inter-Dependent Priority Matrix of the DRs (W_A)

The inter-dependent priority matrix of the DRs is obtained by the following relation and shown in Table 9:

$$W_A = W_4 * W_2$$

The inter dependent values shown in matrix w_A illustrates how the individual design requirements always effectively aligned or directed toward

Figure 9. Inter-dependent priority matrix of the DRs



a common goal by considering the correlation among the design requirements. Inter dependent priority of design requirements and customer needs are graphically shown in Figure 9.

5.7. Overall Priorities of DRs

The overall priorities of the DRs reflecting the interrelationships within the HoQ are obtained by the following relation:

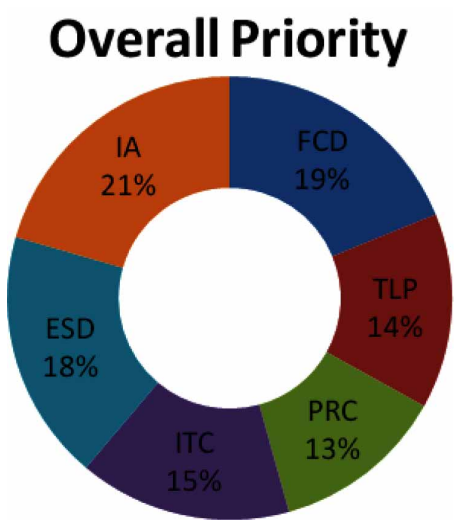
$$W_{ANP} = W_a * W_c$$

$$W^{ANP} = \begin{pmatrix} FCD \\ TLP \\ PRC \\ ITC \\ ESD \\ IA \end{pmatrix} = \begin{pmatrix} 0.2008 \\ 0.1513 \\ 0.1345 \\ 0.1653 \\ 0.1942 \\ 0.2192 \end{pmatrix}$$

Table 9. The inter-dependent priority matrix of the DRs

	P	IE	EF	R	E
FCD	0.1977	0.2048	0.2219	0.1876	0.1869
TLP	0.1503	0.1504	0.1597	0.1448	0.1498
PRC	0.1363	0.1333	0.1249	0.143	0.1372
ITC	0.1663	0.1674	0.1586	0.1671	0.1681
ESD	0.1933	0.1957	0.2054	0.1853	0.1881
IA	0.2166	0.212	0.2217	0.2272	0.2208

Figure 10. Overall priorities of DRs



Normalized values of overall priority of design requirements are shown graphically in Figure 10. The ranking of design requirements basing on the overall priority is shown in Table 10.

In this study, the overall priority of DRs is calculated through QFD-ANP approach. Each of these design requirements has a set of functions either wholly independent or partially dependent on other design requirements. These functions are discussed in brief as follows.

Highest overall priority (0.2192) is obtained with Infrastructure adequacy. Interdependency of IA and CNs is observed during the study. Inner dependency of IA with FCD, TLP, PRC, ITC and are 0.191, 0.1592, 0.1343, 0.1261 and 0.156 respectively. From these values it is observed that the impact of IA on other requirements is considerable. Infrastructure adequacy includes sufficient number of classrooms, laboratories, accommodation, Sports facilities, Medical facilities and availability of infrastructure to host social and cultural events. In case of library services, there should be automating and delivering the entire range of Library functions. Also, availability of textbooks and journals, Easy borrowing process, Friendliness, E-library should be ensured.

Overall priority of 0.2008 is obtained with Flexible curriculum design. Interdependency of FCD and CNs is observed during the study. Inner dependency of FCD with TLP, PRC, ITC, ESD and IA are 0.1715, 0.0742, 0.081, 0.2783 and 0.0831 respectively. From these values it is observed that the there is considerable impact of FCD on TLP and ESD. The curriculum design should create extensive interaction between faculty and students and also among peers. Communication tools in the form of chat, discussion boards shall be provided. Scheduling of the instruction, teacher feedback are also essential to the curriculum planning module. Further, Interesting module content/books, Educational material of high quality, efficient structure of modules, Availability of information on the curriculum structure, Variety in elective modules/ modules on specialization areas, Laboratories in latest areas should be taken into consideration while designing the curriculum.

Employee Skill Development is ranked as third among the design requirements with an overall priority of 0.1942. Interdependency of ESD and CNs is observed during the study. Inner dependency of ESD with FCD, TLP, PRC, ITC and IA are 0.1881, 0.1614, 0.0981, 0.129 and 0.2347 respectively. From these values it is observed that the there is high impact of FCD on IA, moderate impact on FCD, TLP and ITC and less impact on PRC.

Table 10. Ranking of design requirements

DRs	ESD	TLP	IA	PRC	FCD	ITC
Ranking	III	V	I	VI	II	IV

This design requirement should assist in student recruitment and simplifies the same. It should help to improve the employability and exposure of a job candidate from that institution. Hence, it accelerates the conversion rate of prospective aspiring students into successful employees.

In the study, IT capability is emerged as one of the important design requirement with an overall priority of 0.1653. Interdependency of ITC and CNs is observed during the study. Inner dependency of ITC with FCD, TLP, PRC, ESD and IA are 0.1924, 0.0844, 0.1543, 0.1466 and 0.228 respectively. From these values it is observed that the there is high impact of ITC on IA, and moderate impact on FCD, TLP, PRC and ESD.

This design requirement ensures improved responsiveness and empathy towards student community, improved access to accurate and timely information; Enhances workflow, increases efficiency, and reduces reliance on paper; tightens controls and automates e-mail alerts; Provides user-friendly Web-based interfaces; streamlines processes and eases adoption of best teaching learning practices.

Overall priority of 0.1513 is obtained with teaching learning practices in this study. Interdependency of TLP and CNs is observed during the study. Inner dependency of TLP with FCD, PRC, ITC, ESD and IA are 0.1838, 0.0541, 0.1905, 0.1862 and 0.1933 respectively. From these values it is observed that the there is high impact of TLC on IA, ESD, ITC and FCD. There is moderate impact on PRC is observed in the study.

Effective teaching and learning practices include sufficient qualified local teaching staff members are hired for teaching the courses, detailed course materials, sufficient teaching staff with extensive industry experiences, providing students with adequate electronic access to its library, posting of course materials effectively on the institution's webpage. Further, there should be effective staff and student relationships. Students have to receive prompt, individualized attention from the faculty. Faculty has to motivate the students to excel. There should be honest communication among all Staffs and Students.

In the study, PRC is also emerged as one of the important design requirement with an overall priority of 0.1653. Interdependency of PRC and CNs is also observed during the study. Inner dependency of PRC with FCD, TLP, ITC, ESD and IA are 0.1134, 0.0966, 0.1818, 0.1678 and 0.1892 respectively. From these values it is observed that the there is high impact of ITC on IA, ITC, ESD. There is moderate impact on FCD and ESD.

In this study, HoQ-ANP methodology is implemented to prioritize the design requirements of quality engineering education. The design requirements in the priority order are: Infrastructure Adequacy (IA), Flexible Curriculum Design (FCD), Employability skill Development (ESD), IT Competency (ITC), Teaching Learning Practices (TLP) and Promotion of research and consultancy (PRC). These findings are in tune with the earlier studies in the literature (Durga Prasad et al., 2007; Mahapatra & M. S. Khan, 2007).

The ranking of the design requirements obtained through the HoQ-ANP indicates the order in which the institution has to enrich its requirements by setting up and monitoring the above activities to meet the customer expectations. To accomplish the task of establishing total quality engineering education, unconditional commitment and continuous effort by each and every participant of the education system is the primary requirement.

6. CONCLUSION

In this paper, ANP approach is integrated into HoQ to prioritize DRs for total quality engineering education. In addition, the fuzzy theory in determining inner dependence and inter dependence matrices of CNs and DRs are determined from Fuzzy Positive Ideal Rating (FPIR) and Fuzzy Negative Ideal Rating (FNIR). From the study it is observed that the most important design requirement is infrastructure adequacy (IA). The design requirement would help to decide about the design of teaching methodology, students' evaluation methods, students grading pattern and identify the resources needed for teaching learning process. Flexible curriculum design (FCD) is emerged as second important DR closely followed by IA. The curriculum will be designed by considering the inputs such as industry requirements and technological developments. Employee skill development (ESD) is identified as third important design requirement in the study. The design requirement should create perspectives for professional career, opportunities for continuing education and exchange programs with other universities/institutes. IT capability is also necessary to design an integrated architecture framework to incorporate information systems dedicated to the academic environment. Teaching learning practices includes continuous evaluation by regularly updating the students' performance in both scholastic and co-scholastic areas are also necessary to develop quality engineering education model. The educational institutions have to set to up a system to monitor the processes like teaching, learning, curriculum planning etc. to promote research and consultancy.

Ranking of the design requirements obtained in this paper will be the input data to establish performance dimensions and performance enablers of engineering education institutions. These design requirements are subsequently transformed into performance dimensions in turn into performance enablers. Once the network relationship between the design requirements, performance dimensions and enablers is established the analysis and ranking of education institutions may be carried.

The HoQ-ANP methodology furnished the priority ratings of the design requirements in respect of developing quality engineering education is in tune with the stakeholder views. The methodology enables government and managements to make appropriate decisions in selecting design requirements to deploy the customer needs towards quality engineering education.

When the number of engineering characteristics to be compared is not very large, the ANP approach is a more effective approach than other approaches. The future work will focus on the development of priority of design requirements basing on competitiveness and implementation difficulty.

REFERENCES

Andreas, A., Andreas, C. G., Katerina, G., & Konstantina, K. (2009). The application of quality function deployment in service quality management. *The TQM Journal*, *21*(4), 319–333. doi:10.1108/17542730910965047

Benjamin, C. O., & Pattanapanchai, S. (1993). A QFD framework for developing engineering laboratories. *International Journal of Applied Engineering Education*, *9*(5), 422–429.

Buyukozkan, G., Ertay, T., Kahraman, C., & Ruan, D. (2004). Determining the importance weights for the design requirements in the house of quality using the fuzzy analytic network approach. *International Journal of Intelligent Systems*, *19*(5), 443–460. doi:10.1002/int.20006

Chandra Shekhar, N., Venkata Subbaiah, K., & Narayana Rao, K. (2010). Enhancing the quality of engineering education institutions (EEIs) through gap analysis. *International Journal for Quality research, 4*(4), 241-248.

Chandra Shekhar, N., Venkatasubbaiah, K., & Narayana Rao, K. (2011). Cross efficiency approach for ranking of engineering education institutions (EEIs)- A case study. In *Proceedings of the International Congress on Productivity, Quality, Reliability, Optimization and Modeling*, New Delhi, India (pp. 885-897).

Chandra Shekhar, N., Venkatasubbaiah, K., & Narayana Rao, K. (2013). Establishing the overall service quality of engineering education – fuzzy logic approach. *European Journal of Engineering Education*, *37*(6), 575–591. doi:10.1080/03043797.2012.725712

Chandra Shekhar, N., Venkatasubbaiah, K., & Narayana Rao, K. (2013). Factor analysis – AHP approach to enhance the quality in engineering education institutions (EEIs) – A case study. *International Journal of Management in Education*, *7*(3), 237–253. doi:10.1504/IJMIE.2013.054728

Clayton, M. (1993). Treading the quality path: A progress report from Aston University. In D. W. Pipe (Ed.), *Quality management in universities* (pp. 450–453). Australian Government Publishing Service.

Deros, B. M., Rahman, N., Rahman, M. N. A., Ismail, A. R., & Said, A. H. (2009). Application of quality function deployment to study critical service quality characteristics and performance measures. *European Journal of Scientific Research*, *33*(3), 398–410.

Durga Prasad, K. G., Narayana Rao, K., Padmavathi, G., & Venkata Subbaiah, K. (2008). Development of total quality engineering education model using QFD. *The Journal of Engineering Education*, *21*(4), 1–6.

Ermer, D. S. (1995). *Using QFD becomes an educational experience for students and faculty* (pp. 131–136). Quality Progress.

Hwarng, H. B., & Cynthia, T. (2001). Translating customers' voices into operations requirements. A QFD application in higher education. *International Journal of Quality & Reliability Management*, *18*(2), 195–225. doi:10.1108/02656710110379075

Jaraiedi, M., & Ritz, D. (1994). Total quality management applied to engineering education. *Quality Assurance in Education*, *2*(1), 32–40. doi:10.1108/09684889410054563

Karsak, E. E., Sozer, S., & Alptekin, S. E. (2003). Product planning in quality function deployment using a combined analytic network process and goal programming approach. *Computers & Industrial Engineering*, *44*(1), 171–190. doi:10.1016/S0360-8352(02)00191-2

Kazemzadeh, R. B., Majid, B., Aghdasi, M., & Amir, A. (2009). Integration of marketing research techniques into house of quality and product family design. *International Journal of Advanced Manufacturing Technology*, *41*(9-10), 1019–1033. doi:10.1007/s00170-008-1533-2

Licaros, V. A. (2000), Enhancing engineering education through total quality management. In *Proceedings of the Sixth AEESEAP Triennial Conference*, Indonesia.

Liu, C. H. (2009). A group decision-making method with fuzzy set theory and genetic algorithms in quality function deployment. *Quality & Quantity*, *44*(6), 1175–1189. doi:10.1007/s11135-009-9304-1

Mariappan, V. (2002). Total quality education: A model for India. *Productivity*, *42*(4), 597–604.

Natarajan, R. (2002). Emerging trends in engineering education- Indian perspective. In *Proceedings of the Sixteenth Australian International Conference*, Hobart.

Natarajan. (2000). The role of accreditation in promoting quality assurance of technical education. *International Journal of Engineering Education, 16*(2), 85-96.

Partovi, F., & Corredoira, R. (2002). Quality function deployment for the good of soccer. *European Journal of Operational Research*, *137*(3), 642–656. doi:10.1016/S0377-2217(01)00072-8

Saaty, T. L. (1999). Fundamentals of the analytic network processes. In *Proceedings of ISAHP,* Kobe, Japan (pp. 12-14).

Sharma, J. R., Pimplapure, S. R., & Rawani, A. M. (2007). Prioritizing customer requirements in QFD by integrating their interrelationship with the raw weights. Institute of Engineers, India, 88(9), 7-11.

Toloie-Eshlaghy, A., & Homayonfar, M. (2011). MCDM methodologies and applications: A literature review from 1999 to 2009. *Research Journal of International Studies*, *21*, 86–137.

Venkatasubbaiah, K., Narayana Rao, K., & Durga Prasad, K. G. (2005). Evaluation of design requirements for quality engineering education using fuzzy outranking technique – A case study. In *Proceedings of 10th Annual International Conference on Industrial Engineering Theory, Applications and Practice*, Clear Water, FL (pp. 710-717).

This work was previously published in the International Journal of Applied Management Sciences and Engineering (IJAMSE), 1(1); edited by Carolina Machado and J. Paulo Davim, pages 17-40, copyright year 2014 by IGI Publishing (an imprint of IGI Global).

APPENDIX

Name of the Stake holder:
Student/Faculty/Industry/Management
Mail Id:
Address:
Linguistic Variables:
NL-NIL
VL-VERY LOW
LOW-L
ML-MEDIUM LOW
M-MEDIUM
MH-MEDIUM HIGH
H-HIGH
VH-VERY HIGH
F-FULL

Table 11. Indicate the relative importance of the following factors (customer needs) with a view to improve the quality of engineering education

Factors	Professionalism	Integrated Education	Educational Facilities	Responsiveness	Empathy
Degree of relative importance					

Table 12. Indicate the degree of relative impact of design requirements on the customer needs

Q. No	Items (Design Requirements)	C1	C2	C3	C4	C5
D1	Flexible Curriculum Design					
D2	Teaching Learning Practices					
D3	Promotion of Research and Consultancy					
D4	IT Capability					
D5	Employability skill Development					
D6	Infrastructure Adequacy					
Customer Needs : C1- Professionalism; C2- Integrated Education; C3- Educational Facilities; C4- Responsiveness; C5- Empathy						

Table 13. Indicate the degree of relative inner dependency of the following factors (customer needs) with a linguistic variable

Q. No	Customer Needs	C1	C2	C3	C4	C5
C1	Professionalism					
C2	Integrated Education					
C3	Educational Facilities					
C4	Responsiveness					
C5	Empathy					
Customer Needs : C1- Professionalism; C2- Integrated Education; C3- Educational Facilities; C4- Responsiveness; C5- Empathy						

Table 14. Indicate the degree of relative impact of design requirements on the customer needs with a linguistic variable

Q. No	Items (Design Requirements)	D1	D2	D3	D4	D5	D6
D1	Flexible Curriculum Design						
D2	Teaching Learning Practices						
D3	Promotion of Research and Consultancy						
D4	IT Capability						
D5	Employability skill Development						
D6	Infrastructure Adequacy						
Design Requirements: D1- Flexible Curriculum Design ; D2- Teaching Learning Practices ; D3- Promotion of Research and Consultancy ; D4- IT Capability ; D5- Employability skill Development ; D6- Infrastructure Adequacy							

Section 4
Cases and Applications

This section discusses a variety of applications and opportunities available that can be considered by practitioners in developing viable and effective Curriculum Design and Classroom Management programs and processes. This section includes 20 chapters that discuss Curriculum Design and Classroom Management in a variety of settings. Contributions included in this section provide excellent coverage of today's IT community and how research into Curriculum Design and Classroom Management is impacting the social fabric of our present-day global village.

Chapter 44
How Do They Fare?
Learning Achievement and Satisfaction with Blended Learning for Traditional-Age Undergraduates at Moderately Selective Colleges

Janet Kuser Komarnicki
Fisher College, USA

Yufeng Qian
Northeastern University, USA

ABSTRACT

Blended learning is proliferating rapidly in higher education across the United States. However, this learning environment may pose new challenges to learners at moderately selective colleges who are normally found to be low in autonomy. A quasi-experimental study was conducted to examine the learning achievement and course satisfaction of this group of learners in two sections of a course, with one being blended and the other a face-to-face. The results, shown in this chapter, reveal that instructional mode does not have a significant effect on learning achievement and course satisfaction; however, a further examination into the course structure, dialogue, and learner autonomy suggests that low structure and high dialogue can help reduce transactional distance and a synchronous format for the online component in a blended course is highly recommended. In addition, coaching and scaffolding learner autonomy is indispensible for learners at moderately selective colleges and should be considered in the design and implementation of online learning.

INTRODUCTION

Blended learning is proliferating rapidly in higher education across the United States due to its prominent benefits, including flexibility, accessibility, and integration of traditional pedagogical benefits of face-to-face learning and potentially transformative learning enabled by emerging technologies (Kaleta, Skibba, & Joosten, 2007; Vasileiou, 2009). The most recent 2012 Pew

DOI: 10.4018/978-1-4666-8246-7.ch044

Survey on the future of higher education with over 1000 academic experts and stakeholders suggests that 60% are expecting a transition to hybrid classes by 2020 (Quitney, Boyles, & Rainie, 2012). Blended learning, incorporating the best of both worlds, is expected to transform teaching and learning in higher education and is predicted to become the predominant model in course delivery in the near future.

The blended learning environment, with different rhythms and forms of interaction between students and instructor, as well as between students, between students and learning materials, may pose new challenges to traditional-age undergraduate students with moderate academic performance who have been found to be low in academic motivation and self-discipline (Beck, Rorrer-Woody, & Pierce, 1991; Fulk, 2003; Kim & Keller, 2008). In the United States, 800 institutions are considered somewhat selective, accepting between 50% and 75% of their applicants, with an additional 400 less selective institutions that accept over 75% of their applicants (College Board, 2013). Given this backdrop, a large number of students attending colleges in the United States are moderately selective. Is blended learning, which may require relatively higher levels of motivation, engagement and self-directed learning skills (Abulibdeh & Ishtaiwa, 2012; Bliuc, Ellis, Goodyear, & Piggott, 2011; López-Pérez, Pérez-López, & Lázaro, 2011), an appropriate learning environment for this group of learners?

A number of research studies exist on the subject of blended learning in various settings and formats, which reveal mixed results regarding student learning achievement and perceptions of blended learning (Ashby, Sadera, & McNary, 2011; Foulger, Amrein-Beardsley, & Toth, 2011; U.S. Department of Education, 2010). Many existing studies, however, have been conducted at large universities but do not make any reference to level of selectivity of the institution (Hoyt, 2003; Kenney & Newcombe, 2011; López-Pérez, Pérez-López, & Lázaro, 2011; Uzun & Senturk, 2010), others are conducted with graduate students who are dominantly non-traditional adult learners (Falloon, 2011; McLaren, 2010), no specific research has related to blended learning for traditional-age undergraduates at moderately selective institutions. Moore's (2013) theory of transactional distance postulates that the difference in perceptions and understanding between students and instructor (i.e., transactional distance) is a function of three factors: (a) structure (i.e., course design), (b) dialogue (i.e., interaction), and (c) learner autonomy (ability to work independently). In a blended learning environment, where transactional distance may increase due to the quasi-permanent separation of teacher and learners, and between learners in a relatively lower-touch, less relationship-oriented environment, students must possess the ability to function autonomously so as to be successful. As Moore (2013) noted, "a common cause of failure, or at least of courses falling short of expectations, is a failure to design the balance of structure and dialogue that is appropriate for a particular student population and subject field" (p.71).

This chapter is aimed to fill a gap in current distance education research by addressing a prominent subset of the general higher education population. A quasi-experimental study was designed to examine the learning achievement and course satisfaction of undergraduates at a moderately selective college in two sections of the same course, with one implementing a blended learning environment and the other implementing a traditional face-to-face learning environment. Students' course satisfaction in both learning environments will be examined in relation to their perceptions of the course structure and dialogue, and their levels of autonomy, which will be further examined by relating to their satisfaction. The results will help higher education administrators make wise and ethical decisions when adopting blended and online education. Likewise, the results will inform faculty in designing blended courses so as to achieve an optimal balance between course structure, dialogue, and learner autonomy.

BACKGROUND

At one of the moderatly selective institutions, a challenge has been posed by both the potential of blended learning and the concern relative to the ability of the students to succeed in this alternative learning environment. This concern is excerbated by the void in the literature relative to this population of students. The study site is an institution that routinely accepts approximately 85% of undergraduate student applicants and, accordingly, will accept undergraduate students into a bachelor's degree with a GPA as low as 2.1. At this institution, it is not uncommon for students to fail to obtain the required text, routinely fail to complete homework, and have poor attendance despite consistent academic guidelines provided to all students via orientations, standard syllabi elements and faculty policies. The primary concern among faculty and adminstrators alike is that this population of students may not be able to handle the indepenent work required in the online environment, and it could be too risky to implement at a large scale blended or fully online courses and programs in order to aleviate the institution's space constraint issues and students' increasing need for flexibility. What is the effect of a blended learning environment on underachieving students' learning achievment and satisfaction? What would be the optimal balance between course structure and dialogue based upon the autonomy of the individual learner? Exploring these issues from the lens of Moore's (2013) theory of transactional distance, this study was designed to examine the following three research questions:

Question 1: To what extent does learning achievement of traditional-age undergraduates in a moderately selective college differ in a blended learning and a face-to-face mode?

Question 2: To what extent does course satisfaction of traditional-age undergraduates in a moderately selective college differ in a blended learning and a face-to-face mode?

Question 3: To what extent do a course's structure, dialogue, and student autonomy relate to course satisfaction of traditional-age undergraduates in a moderately selective college in a blended learning and in a face-to-face mode?

THEORETICAL FRAMEWORK: TRANSACTIONAL DISTANCE

The theory of transactional distance was first proposed by Moore in 1972 and formally named in 1980 to address distance education (Moore, 2013). Moore was the first to recognize the pedagogical distinctions associated with distance learning and has evolved to support a full range of academic structures relative to the separation of learner and teacher, including the use of current technologies in course delivery, specifically blended and online pedagogy (Moore, 2003; Saba, 1994). The use of the term "transaction" was built from a concept by Dewey and relates to the interplay between teachers and learners in a special learning environment (Moore, 2013). Transactional distance refers to the psychological space and communication gap between student and teacher, and is a pedagogical phenomenon, not geographical, that can occur in any learning environment (Falloon, 2011; Moore, 2003; Saba, 2013; Stirling, 1997).

Course Structure

The first element of the theory of transactional distance can be defined as the "rigidity or flexibility of the course's educational objectives, teaching strategies and evaluation methods" (Moore, 2013 p.70). A course with high structure would have little opportunity for a student to deviate from a prescribed path in the course delivery (Falloon, 2011; Moore, 2013). This theory presumes that online components of the course allow for little deviation and therefore are highly structured, leading to a high level of transactional distance (Moore, 2003). High transactional distance requires a high level of student autonomy. Alternatively, the face-to-face class will be directed by the faculty member and allow for modification and adaptation of the learning activities based on the interaction between the students and teacher.

Dialogue

The second component of transactional distance theory refers to the interpersonal interaction aimed at the communication and construction of knowledge, skills and dispositions between student and teacher (Moore, 2013). The amount of interaction between student and teacher vary across any delivery modality including face-to-face and blended courses. Although Moore limited his concept of dialogue to student-teacher interaction, subsequent theorists have expanded the concept of interaction and dialogue to include student-student interaction as a significant component (Bajt, 2009; Falloon, 2011; Saba, 2013). This construct aligns with Vygotsky's social constructivism that emphasizes the fundamental and critical role of social interaction in learning and development (Vygotsky, 1978), and current online learning theories including the community of inquiry framework which emphasizes social presence, along with teaching and cognitive presences in an online learning environment (Garrison & Vaughan, 2008). The theory of transactional distance presumes that the increase of instructor-student dialogue would decrease transactional distance (Saba & Shearer, 1994).

Autonomy

The third component of the theory of transactional distance refers to the degree of student independence and self-management relative to establishing goals, seeking support when needed, managing time, implementing learning strategies and evaluating outcomes as required for the course (Moore, 2013). The theory proposes that courses will vary in the degree of autonomy required, based on course structure and dialogue. The concept of autonomy is aligned with other theories that relate to student motivation and ability to work independently such as self-determination theory (Deci & Ryan, 2012; Falloon, 2011) and self-directed learning (Garrison, 1997). Various studies have found autonomy to be success factor for blended learning (Abulibdeh & Ishtaiwa, 2012; Hung, Chou, Chen, & Own, 2010; López-Pérez, Pérez-López, & Lázaro, 2011; Owston, York, & Murtha, 2012). In addition, a recent survey of Chief Academic Officers, conducted by The Learning House, reported "the lack of discipline for online students" as the greater barrier to success in online programs (Clinefelter & Magda, 2013, p. 13).

The theory of transactional distance postulates that an inverse relationship exists between structure, dialogue, and autonomy. Transactional distance decreases when instructor-student dialogue increases or when course structure decreases. Transactional distance increases when instructor-student dialogue decreases or when course structure increases (Moore, 2013). The transactional theory provided the foundation for the aforementioned research, as it specifically speaks to the concerns of the faculty and administration at the research site by framing distance education on a continuum and recognizing the need for autonomous learning. What is yet to be known, is whether blended learning, with its unique combination of distance and traditional pedagogies, will demonstrate transactional distance at all and how the course structure, dialogue, and learner's level of autonomy will affect their course satisfaction.

A QUASI-EXPERIMENT AT A MODERATELY SELECTIVE COLLEGE

The research site is a moderately selective private college located in northeastern United States. It has a total undergraduate enrollment of over

2,000 with an acceptance rate of approximately 85%. The study built upon the existing model for blended learning at the research site, which has been utilized over the past five years for non-traditional learners and tested within the past two years with traditional-age undergraduates. The format includes the replacement of one-half of the contact hours with online components and requires weekly discussion forums and the use of various online educational activities. This model was used for the proposed research because of the institutional experience and instructional training available to support this model.

Course Design

The quasi-experiment study was conducted over a traditional 15-week semester using an upper level management class. One instructor taught a section of the course in the traditional face-to-face format and a second section in a blended format. Student participants were all in their junior or senior year of study and self-selected into one of the two sections. There were one experimental group of 18 students (in the blended format) and one comparison group of 19 students (in the face-to-face format). The face-to-face class section met twice per week for 75 minutes each. The blended class section met once per week for 75 minutes and replaced the second 75 minutes of contact hours with instructional activities administered through the learning management system, Blackboard. The course description, learning outcomes, learning materials, and assessment for the two sections were identical, despite the delivery modality. Each week the subject matter was covered, and the learning activities were aligned, but adapted for the specific modality of the class section. The instructor in this quasi-experiment study was highly experienced with teaching in the traditional, online and blended learning environments, with consistently strong student evaluation, as demonstrated by his most recent student rating of 4.71 compared to the overall instructional average at the institution of 4.41.

Data Collection

Data was collected to measure students' learning achievement, and course satisfaction along with the relationship between satisfaction and the constructs of course structure, dialogue, and autonomy. Learning achievement was evaluated using a subject matter test, developed by the faculty member who was an experienced instructor in the course and a subject-matter expert, drawing from test questions provided by the text book publisher. These test bank questions were developed, tested, and peer-evaluated by experts in the field and were sorted and selected by the faculty member to meet the specific learning outcomes of the course. Use of subject matter experts is a common practice for content validity measurement (Gall, Gall, & Borg, 2007). The final exam contained 40 multiple choice, ten short answer questions and one essay question.

The second instrument used was to measure students' satisfaction with the course and their assessment of course structure, dialogue, and self's level of autonomy. The primary foundation for the instrument is the Course Interaction, Structure, and Support (CISS) instrument, developed by Shaik (2002) based on the theory of transactional distance. The CISS was validated for content through a review by experts in the field of education. It was then pilot tested and a factor analysis was completed to ensure construct validity. The instrument was further revised and resulted in a 27 question survey (Shaik, 2002). The Cronbach's alpha reliability test ranged between .76 and .85 for the individual measures. The combined scale had a Cronbach's alpha coefficient of .89, all within the commonly accepted level for internal consistency reliability (Bartkus, Hills, & Naegle, 2009; Muijs, 2011). The instrument was slightly modified to remove three questions relative to an individual construct of departmental support, which was not relevant to the current study. A subscale of the Online Learning Readiness Scale (OLRS) was used to measure learner autonomy

Table 1. Comparison of the face-to-face and blended sections

Class	Enrolled	Withdrew	Completed survey
Group 1: face-to-face	19	0	19
Group 2: blended	22	1	18

(Hung, et al., 2010). This subscale had a composite reliability rating of .871, exceeding the .7 value, which is generally considered acceptable. The final instrument contains four primary sets of variables, each using the same scale within the group. This survey aligned with the researchers' goals of measuring student satisfaction with the course as well as the impact that structure, dialogue and autonomy have on satisfaction.

Quantitative Data Results

The face-to-face class did not experience any attrition and all students completed the survey. The blended section lost one student as a result of withdrawal, and three other students did not complete the survey. Therefore, all analysis related to the three research questions was conducted using n=37 (19 in group 1, 18 in group 2).

The following sections present results of the data analysis for each research question.

Question 1: To what extent does learning achievement of traditional-age undergraduates in a moderately selective college differ in a blended learning and a face-to-face mode?

In this quasi-experiment, students self-selected into the face-to-face or blended section of the course. Given this limitation, a test of normality was required to ensure that each group was similarly aligned and that results would not be impacted by differences that pre-existed within the sample. A review of prior semester cumulative GPA, along with a visual examination of Q-Q plots established a reasonable equivalence of groups. Although the GPA in the blended sections was .22 higher than the face-to-face section (2.99/2.77), the minimum and maximum GPA, along with the range were within .03. In addition, a Shapiro-Wilk test was conducted to ensure normal distribution within each section. The face-to-face section had a p-value of .051, while the blended section had a p-value of .779. In both cases, the benchmark of normality of .05 was satisfied. Once reasonable normality was established an analysis of final exam grades was conducted.

As shown in Table 2, students learning achievement, as measured by final exam grades, was slightly higher for the face-to-face class with a mean of 74.95 compared to the mean score of 73.61 for the blended section. A t-test was conducted with a p-value of .707 indicating that there is no statistically significant difference between these two groups. Despite the lack of statistical significance a Cohen's d measure of effect size was conducted to establish the potential effect that class format had on the variance in final exam grades. This test resulted in a measure of .065, which indicates a minimal practical effect of course format on learning achievement. Of course, a caveat against the no significant difference regarding the learning achievement between the face-to-face and blended groups must be considered, given the relatively small number of sample size (37) involved in this study. A Type 2 error (concluding no significant difference in the sample when one in fact exists in the population) might be possible.

Question 2: To what extent does course satisfaction of traditional-age undergraduates in a moderately selective college differ in a blended learning and a face-to-face mode?

As shown in Table 2, the mean rating of satisfaction in the face-to-face section was slightly higher with a score of 4.68 as compared to the blended section, with a mean score of 4.28. A t-test was conducted to determine statistical significance;

Table 2. Learning achievement and course satisfaction

	Comparison of Means	Sig (2-tailed)	Cohen's d
Learning Achievement	Face-to-face: 74.95 Blended: 73.61	.707	.065
Course Satisfaction	Face-to-face: 4.68 Blended: 4.28	.056	.0625

however, the p-value did not meet the generally accepted threshold of .05 or lower. The actual p-value was .056, which is quite near statistical significance, and therefore presents a cause for consideration. The Cohen's d measure of effect size of .0625 implies a minimal practical effect of course format on overall satisfaction. Similar to the consideration of no significant difference for learning achievement, care must be taken to avoid Type 2 error for course satisfaction, especially when the p value is close to the threshold.

Question 3: To what extent do a course's structure, dialogue, and student autonomy relate to course satisfaction of traditional-age undergraduates in a moderately selective college in a blended learning and in a face-to-face mode?

In order to address question 3, multiple levels of analysis were required. Each construct within the framework of the theory of transactional distance was evaluated in each course format to determine if a blended course delivery demonstrated a higher level of transactional distance than a traditional face-to-face class. By conducting this analysis, not only could the question be answered but the relevance of the theory of transactional distance to blended learning could be assessed. Each construct will be discussed below.

The comparison of mean scores relative to course structure (Table 3), demonstrates a slightly more positive assessment by students in the face-to-face class. The resulting t-test determined that there was not a statistically significant difference in the student assessment of structure by course delivery format. The Cohen's d measure of effect size can be categorized as weak but approaches the benchmark for moderate effect size (.2) which bears some consideration. The Pearson's r coefficient demonstrates a strong correlation between a positive assessment of structure and satisfaction, with the results from the blended section stronger. Based on this analysis, the researchers can support the contention that there is a strong correlation between assessments of course structure and satisfaction for all students regardless of the instructional mode, and there is no statistical significance relative to the variance in assessment of structure for each class section.

The second construct of dialogue was further segmented into an analysis of student/instructor dialogue and student/student dialogue (Table 4). A review of the data provided in the preceding tables demonstrates a recurring observation. In both cases, dialogue was evaluated more positively by the face-to-face class section; however, the p-value indicates no statistical significant difference between the face-to-face and blended

Table 3. Course structure

Structure	Comparison of Means	Sig (2-tailed)	Cohen's d	Pearson's r
Face-to-Face **Blended**	3.58 3.42	.261	.193	.781 .860

Table 4. Dialogue

Student/Instructor	Comparison of Means	T-Test	Cohen's d	Pearson's r
Face-to-Face	3.58	.159	.23	.677
Blended	3.42			.805
Student/Student	Comparison of Means	T-Test	Cohen's d	Pearson's r
Face-to-Face	3.39	.131	.25	.565
Blended	3.17			.812

groups. Yet the Cohen's d measure indicates a moderate effect relative to both components of dialogue and student satisfaction. In addition, there is a very strong correlation between each component of dialogue and satisfaction for the blended section and a moderate correlation with the face-to-face class. Although the students in each section assessed dialogue similarly, there is a modest effect size relative to dialogue and satisfaction and a stronger correlation between dialogue and satisfaction for the blended section.

The third construct of autonomy is a composite variable based on a five-point scale, rather than the four-point scale used in all previous sections. A review of the data above reveals that students in the blended section consider themselves slightly more autonomous than the students in the face-to-face class. This variance however is not statistically significant based on the p-value of .321. The associated Cohen's d measure of effect size, -.165 also indicates a weak effect between the face-to-face and blended groups regarding the student's perception of their autonomy. In addition, the Pearson's r correlation coefficients for each class section are in the moderate range. From this it can be interpreted that student self-assessment of autonomy is not highly correlated with their course satisfaction. However, this analysis is based on student perception of their autonomy and their associated satisfaction. Further analysis is warranted to measure students' actual autonomy and the resulting effect on course satisfaction.

Open Response Results

Each class section was asked one open-ended question that has been summarized for analysis. A simple descriptive coding method was used, which as noted by Saldana (2013), "leads primarily to a categorized inventory, tabular account, summary, or index of the data's contents" (p.89). The small volume of text collected in response to the open ended questions was easily structured and did not warrant any further sub-categorization. A tabular summary of the responses by students in the face-to-face and blended sections to the question regarding their reason for selecting the course format, can be found in the following table:

The overwhelming response to class format selection from the students in the blended class section related to the schedule. However, a reasonable response indicated that students liked the blended format for learning purposes. A follow up

Table 5. Autonomy

Autonomy	Comparison of Means	T-Test	Cohen's d	Pearson's r
Face-to-Face	3.83	.321	.165	.544
Blended	4.0			.688

Table 6. Open-ended question

Face-to-face	Number of References
Tried blended previously	4
Learns better in class **Time management** **Schedule**	9 1 3
Blended	**Number of References**
Less work anticipated	1
Learns better/likes format **Schedule**	8 11

question identified that 14 of the 18 respondents would definitely take a blended class in the future. The following table displays representative comments from students in each class section to provide some insight into the above referenced results.

DISCUSSION

Learning Achievement and Course Satisfaction

In this study, students' academic performance and course satisfaction did not differ significantly in the face-to-face and blended formats. This result supports one common finding from instructional technology research: Delivery mode does not appear to have a significant effect on learning achievement and course satisfaction (Cheng, Lehman, & Armstrong, 1991; Moore et al. 1990; Russell 1999). However, the mean scores do suggest the face-to-face students have performed better in the final exam, despite the fact that students in the blended section began the class with a slightly higher overall GPA. Similarly, student course satisfaction in the face-to-face format was higher than that in the blended format, with its p-value of .056 approaching closely to statistical significance. Regardless of the no-significance conclusion, these results do raise concerns about the blended format for traditional age undergraduates at moderately selective colleges.

As discussed previously, one of the concerns with less achieving students in non-traditional learning environments (i.e., blended, fully-online) is their relatively lower level of autonomy, which has been identified as one of the major factors contributing to withdrawal, or poor performance in an online format. It has been argued that the blended format is more favored over fully online as the former retains the sense of community, and immediacy of feedback and support from the instructor and peers through face-to-face sessions. However, the results from this study reveal that a blended format appears to be inferior to traditional face-to-face classes in assisting and scaffolding less achieving students' learning. This may, of course, be due to the specific design of the blended course, in which

Table 7. Student comments regarding blended class selection

Face-to-face Reasons not to choose blended	Blended Reasons to choose blended
I've tried blended before and it did not work for me I like to have more face-to-face time with my professor I like to go to class and listen to the professor explain things and if I have a question be there to ask them This is the best way to learn I do not think blended courses are the way to get a college education If I were to stay home and have a blended class, where I can manage my own time, I tend to procrastinate	It works with my schedule This allows flexibility to participate online and in person at the next class It is a different commitment and style of coursework, but if you are up for it, it is a good method. Since half the class is on line there is more independent learning but still meets once a week to maintain structure. Fit my schedule great and let me work at my own pace. More freedom and independence. Because I needed to use blackboard for this class, I was always logging in which forced me to keep up with announcements and assignments from other classes.

the online sessions were totally asynchronous, including the delivery of course content, text-based online discussion and group works.

Delayed feedback, a feeling of isolation, and a lack of emotional connection have been perceived as the major challenges to asynchronous online learning (Vonderwell, 2003). The use of synchronous learning in online education in recent years has rapidly increased due to its important advantages over asynchronous learning, such as immediacy, spontaneous feedback, live time interaction and collaboration, and connectedness. A September 2005 eLearning Guild research report indicated that about 90% of respondents had participated in a synchronous e-Learning event (Hyder, Kwinn, Miazga, & Murray, 2007); a 2009 survey of college undergraduate students suggested that almost three-fourths of students prefer online courses that are synchronous with web conferencing capabilities rather than asynchronous online courses (EDUCAUSE, 2009). The use of synchronous e-Learning, if well-designed, holds great potentials for promoting active and deep learning. It may be the case that blended learning is most successful when it is accompanied by the online component in a synchronous format, in which less autonomous students can be fully supported and guided as they are in the face-to-face format.

Structure

Once again, the structure of the course was rated slightly higher by students in the face-to-face class section with a mean of 3.58 compared to a mean of 3.42 for students in the blended section. This however lacked statistical significance and demonstrated a weak effect size; therefore the implication is that students had no significant issues or concerns relative to course structure in either class section. This analysis was furthered with a correlation between assessment of structure and satisfaction to evaluate the relevance of transactional distance. The correlation between satisfaction and structure for the face-to-face section was strong, but was very strong for the blended section. Students in the blended course rated the structure lower, yet it has a stronger relationship for these students for satisfaction. This supports the concept of structure in transactional distance, by demonstrating a difference in assessment of structure and the significance of structure to satisfaction.

Dialogue

The pattern continues as the students in the face-to-face class rated student/instructor dialogue slightly higher with a mean of 3.58 as compared to a mean of 3.42 for the blended section. Although the results lacked statistical significance, there is a modest effect size of .23. To complete the analysis, the correlation was conducted, and established once again that students in face-to-face section demonstrated a strong relationship between student/instructor dialogue and satisfaction, while those in the blended section showed a very strong correlation. This combined with a slightly lower assessment of student/instructor dialogue presents another finding for consideration. For this measure, the interpretation and relevance of transactional distance is complex. On the one hand, the lack of statistical significance raises questions about the applicability of the results to the overall population; however, a modest effect size does imply that students in the blended class section assess student/instructor dialogue slightly less favorably than those in the face-to-face class. In addition, there is a stronger relationship to student assessment of student/instructor dialogue with satisfaction. Therefore, there is a minor finding of reduced student/instructor dialogue, yet this dialogue is more closely correlated to student satisfaction than it is for students in the face-to-face section. These results support the premise that dialogue is reduced in a blended course.

An interesting note regarding student/student dialogue is that it is the item rated lowest by both groups. The face-to-face section had a mean score of 3.39 while the blended class section was 3.17. The effect size was modest and the correlation between student/student dialogue and satisfaction was significantly higher for the students in the blended section with a rating of .812, compared to the correlation of .565 for the face-to-face students. Therefore, students in the blended class had a stronger correlation between student/student dialogue and satisfaction; in other words, the higher they rated student/student dialogue, the higher their rating in satisfaction. They were slightly less satisfied with the dialogue, and it was strongly correlated with their overall satisfaction. For this measure the interpretation and relevance of transactional distance is complex. On the one hand, the lack of statistical significance and effect size imply that blended courses do not suffer from a lower level of student/student dialogue, which supports the premise that transactional distance is not increased in a blended course. However, there is a stronger relationship between assessments of student/student dialogue with satisfaction for students in the blended section. Although the level of dialogue is not statistically validated as being reduced, dialogue is more important to satisfaction for the students in the blended section.

Autonomy

Students who self-selected into the blended course rated themselves slightly higher on a scale of autonomy. This could be interpreted to mean that the students perceived that more autonomy would be required, therefore, selected it because they knew they were capable; or conversely, students who selected into the traditional class, did so in part because of their lack of confidence in their ability to manage the format. This is supported by the open-ended responses from students in the face-to-face section, nine of whom had indicated that they felt they learned better or liked the traditional format better. Some of this is based on experience in a previous section, and some on perception. The variance between means lacks statistical significance and the effect size between the student's assessment of their own perception autonomy and satisfaction is low. For both groups, the correlation between their assessment of autonomy and satisfaction was strong with a coefficient of .544 for face-to-face and .688 for the blended class, slightly stronger for the blended section. In other words, the more autonomous students considered themselves, the more satisfied they were with the course, slightly more so in the blended section. Given these findings the identification of autonomy as a factor in satisfaction for the blended class provides validation that autonomy is more important in a blended class than in a face-to-face setting.

Transactional Distance

According to the theory of transactional distance, distance education is inherently higher in structure; for example, less flexible and adaptable to student needs, and lower in dialogue, which speaks to the interaction between students and student and instructor. For this reason, the theory posits that distance education requires students to be more autonomous learners to be successful (Moore, 2013). The results in this study lend support for the value of the theory of transactional distance for blended learning.

First, each of the constructs that results in transactional distance, structure and dialogue, was perceived less favorably by students in the blended section. Although the results lacked statistical significance, there was a weak to modest effect size in each instance which in conjunction with a slight lower mean supports the notion that students in the blended course were slightly less satisfied with the level of structure and dialogue. This finding is further supported by the stronger correlation between each of these constructs and satisfaction for students in the blended section. This in turn supports the notion that even a blended class increases transactional distance, albeit in a minor way. This development leads to the second major finding or implication.

The second major implication relates to the fact that students in both class sections demonstrated a strong correlation between the constructs and their satisfaction, but the blended section had higher correlation, in some cases very strong. Once again, the constructs were important to all students, but more so for the students in the blended class who simultaneously rated the constructs less favorably. Therefore the construct was more highly correlated with satisfaction and the assessment was lower, demonstrating another finding in support of the existence of transactional distance.

The third key finding concerns autonomy. As mentioned in the theory, a higher level of autonomy is needed when transactional distance is increased. In this study, students in the blended section considered themselves slightly higher in autonomy, yet found the class to be slightly less satisfying and scored slightly lower on the final exam. Although these findings lacked statistical significance they do demonstrate a pattern worthy of consideration. In all cases there is weak to modest effect size that links students' perception of autonomy to their level of satisfaction, and the stronger correlation between autonomy and satisfaction for the blended students further enhances the argument. This is anecdotally supported by the open ended responses of the students in the face-to-face class who indicated they had tried the blended format before and didn't like it; nine students indicated that they "learned better in class," and one specifically mentioned that a lack of time management would not allow them to be successful in blended format.

RECOMMENDATIONS

A fundamental concern relative to the adoption of any new learning environment is to ensure that learning is not compromised and students are not harmed by the implementation. There is a risk with the implementation of any new instructional format, but the risk can be mediated by careful analysis and planning. Based on the findings from this quasi-experimental study, the following section discusses recommendations for introducing and implementing blended learning, particularly at moderately selective institutions.

1. Promote Learner Autonomy in Blended Learning

The results of the study are in line with the decades-long common theme in learning research that learner autonomy is essential to a successful learner regardless of learning environments (Little, 1991), and it is especially seen as indispensable in distance education where transactional distance is presumably high due to the quasi-permanent separation of learner and instructor (Moore, 1993). In addition, recent advances in learning pedagogy suggest that learning in nature is an autonomous, self-directed knowledge construction process, a process that involves both active individual construction of meaning and an individual enculturation into a community (Garrison & Vaughan, 2008). It is, therefore, imperative to support learner autonomy in blended learning environments. Supporting autonomy refers to "an individual in a position of authority (e.g., an instructor), takes the other's (e.g., a student's) perspective, acknowledge the other's feelings, and provides the other with pertinent information and opportunities for choices, while minimizing the use of pressures and demands" (Black & Deci, 2000, p. 742). However, a significant challenge with low achieving learners is that they may feel lost, frustrated or demotivated in a more open learning environment that allows for more choices and autonomy. It is, therefore, important for instructional designers and instructors to design specific instructional strategies to help low achieving students in developing self-directed learning skills, time management skills, and decision-making skills. With sufficient support and scaffolding, these learners can increasingly improve learner autonomy, which will help them assume greater responsibility for their learning.

2. Use a Synchronous Format for the Online Component

Synchronous eLearning can be defined as a real-time, instructor-led online learning event in which all participants are logged on at the same time and communicate directly with each other (Gilbert, 2000). Spontaneous interactions with peers and instructors as well as real time collaborations enabled by the synchronous communication tools are critical elements for enhancing learner experience within online courses. The results of the study support the need for adopting synchronous format for the online part of a blended course. The use of virtual face-to-face real time communication is especially important to less responsible and less autonomous learners who easily tune out and procrastinate in asynchronous online learning. Instructional designers and instructors need to explore how best to take advantage of the abundance and versatility of current synchronous communication tools, such as Blackboard's Collaboration, Google's Hangout, to engage learners and enable "higher order" learning (such as critical thinking, multiple perspectives, socialization, acculturation) that is most likely enabled via purposeful and meaningful social interaction. A caveat to this recommendation however is the impact it would have on increased flexibility provided by the asynchronous format. Offering synchronous meetings decreases the freedom associated with time and place which is a primary advantage of reduced classroom time. A way to mediate this is to offer multiple sessions for the synchronous meetings which increases the flexibility for the student, but is an increased burden on the faculty member (Giesbers, et al., 2014). Given this concern, finding the right balance and usage of this powerful medium is essential.

3. Provide a Low-Structure and High-Dialogue Learning Environment to Reduce Transactional Distance

The results of the study concur with the findings from many other studies in transactional distance. Moore (1993) noted that low structure and high dialogue can reduce transactional distance, which was supported by Wikeley and Muschamp's (2004) study on doctoral students in distance education. While recognizing the critical role of increasing dialogue to online learner success, they further argued "it is better achieved by tightening the structure to allow greater adaptability of content through careful moderation by tutors" (p. 125). It is, therefore, important for instructional designers and instructors at moderately selective colleges to design and develop a highly structured course with clear learning outcomes and expectations, stable routines, and well-structured course materials, learning tasks, and assessment with clear step-by-step instructions. At the same time, instructors need to monitor, assess, and respond to individual learners' challenge and progress by providing customized learning materials and tasks. Just as importantly, instructors need to be highly interactive and responsive during the online sessions in a blended course by providing prompt and explicit feedback and directive step-by-step guidance. In addition to student/instructor dialogue, student/student dialogue also must be addressed. Collaborative learning in both online and blended courses is a proven and significant design element in support of student learning and motivation (Gradel & Edson, 2010; Manning & Emmons, 2010). Specific tactics such as group problem solving and other collaborative activities including peer evaluations have been beneficial to student outcomes in the online learning environment (Jézégou, 2010; Manning & Emmons, 2010). In order to implement these high value practices to reduce the potential transactional distance, faculty training and development in this area are essential.

CONCLUSION

Blended learning will continue to gain prominence at all types of institutions; however, the implications for each unique sub-set of students must continue to be explored. The small size, single location, and single course evaluated in the previously discussed study represent significant limitations. In addition, the lack of statistical significance relative to findings in this study indicates that the results may be coincidental rather than representative of the population of study. Given these conditions, practitioners must use caution in interpreting the findings. However, based on both the theory of transactional distance and the results of this quasi-experiment, several factors should be taken into consideration when developing blended learning programs at moderately selective institutions. The theory of transactional distance can provide insight into best practices to meet the needs of the students. This research provides some validation that the reasonable extension of this format is acceptable.

REFERENCES

Abulibdeh, E. S., & Ishtaiwa, F. F. (2012). The impact of asynchronous e-learning tools on interaction and learning in a blended course. *International Journal of Instructional Media*, *39*(2), 141–159.

Ashby, J., Sadera, W. A., & McNary, S. W. (2011). Comparing student success between developmental math courses offered online, blended, and face-to-face. *Journal of Interactive Online Learning*, *10*(3), 128–140.

Bajt, S. (2009). *Preferred distance learning modalities of millennial community college students*. Urbana, IL: University of Illinois Press.

Bartkus, K. R., Hills, S. B., & Naegle, N. (2009). How important are items on a student evaluation? A study of item salience. *Journal of Education for Business*, *84*(5), 297–303. doi:10.3200/JOEB.84.5.297-303

Beck, H., Rorrer-Woody, D., & Pierce, L. (1991). The relations of learning and grade orientations to academic performance. *Teaching of Psychology*, *18*(1), 35–37. doi:10.1207/s15328023top1801_10

Black, A. E., & Deci, E. L. (2000). The effects of instructors' autonomy support and students' autonomous motivation on learning organic chemistry: A self-determination theory perspective. *Science Education*, *84*(6), 740–756. doi:10.1002/1098-237X(200011)84:6<740::AID-SCE4>3.0.CO;2-3

Bliuc, A., Ellis, R., Goodyear, P., & Piggott, L. (2011). A blended learning approach to teaching foreign policy: Student experiences of learning through face-to-face and online discussion and their relationship to academic performance. *Computers & Education*, *56*(3), 856–864. doi:10.1016/j.compedu.2010.10.027

Cheng, H. C., Lehman, J., & Armstrong, P. (1991). Comparison of performance and attitude in traditional and computer conferencing classes. *American Journal of Distance Education*, *5*(3), 51–64. doi:10.1080/08923649109526763

Clinefelter, D., & Magda, A. (2013). *Onling learning at private colleges and universities: A survey of Chief Academic Officers*. Louisville, KY: The Learning House.

College Board. (2013). *Bigfuture by the College Board*. Available online at https://bigfuture.collegeboard.org/college-search

Deci, E. L., & Ryan, R. M. (2012). Self-determination theory. In P. A. M. Van Lange, A. W. Kruglanski, & E. T. Higgins (Eds.), *Handbook of theories of social psychology* (Vol. 1, pp. 416–436). Thousand Oaks, CA: Sage. doi:10.4135/9781446249215.n21

Educause. (2009). *Key findings: The ECAR study of undergraduate students and information technology, 2009*. Available online at http://net.educause.edu/ir/library/pdf/ekf/ekf0906.pdf

Falloon, G. (2011). Making the connection: Moore's theory of transaction distance and its relevance to the use of a virtual classroom in postgraduate online teacher education. *Journal of Research on Technology in Education*, *43*(3), 187–209. doi:10.1080/15391523.2011.10782569

Foulger, T. S., Amrein-Beardsley, A., & Toth, M. J. (2011). Students' roles in exposing growing pains: Using the "dean's concerns" to refine hybrid instruction. *International Journal of Teaching & Learning in Higher Education*, *23*(2), 150–165.

Fulk, B. M. (2003). Concerns about ninth-grade students' poor academic performance: One school's action plan. *American Secondary Education*, *31*(2), 8.

Gall, M., Gall, J., & Borg, W. (2007). *Educational research: An introduction* (8th ed.). Boston, MA: Pearson Education.

Garrison, D. (1997). Self-directed learning: Toward a comprehensive model. *Adult Education Quarterly*, *48*(1), 18–33. doi:10.1177/074171369704800103

Garrison, D., & Vaughan, N. D. (2008). *Blended learning in higher education: Framework, principles and guidelines*. San Francisco, CA: Jossey-Bass.

Giesbers, B., Rienties, B., Tempelaar, D., & Gijselaers, W. (2014). A dynamic analysis of the interplay between asynchronous and synchronous communication in online learning: The impact of motivation. *Journal of Computer Assisted Learning*, *30*(1), 30–50. doi:10.1111/jcal.12020

Gradel, K., & Edson, A. J. (2010). Cooperative learning: Smart pedagogy and tools for online and hybrid courses. *Journal of Educational Technology Systems*, *39*(2), 193–212. doi:10.2190/ET.39.2.i

Hoyt, J. (2003). The effect of interation levels on student performance: A comparative analysis of web-mediated versus traditional delivery. *Journal of Interactive Learning Research*, *14*(3), 285–289.

Hung, M.-L., Chou, C., Chen, C.-H., & Own, Z.-Y. (2010). Learner readiness for online learning: Scale development and student perceptions. *Computers & Education*, *55*(3), 1080–1090. doi:10.1016/j.compedu.2010.05.004

Hyder, K., Kwinn, A., Miazga, R., & Murray, M. (2007). The eLearning Guild's handbook on synchronous e-learning. Santa Rosa, CA: The eLearning Guild.

Jézégou, A. (2010). Community of inquiry in e-Learning: A critical analysis of the Garrison and Anderson model. *Journal of Distance Education*, *24*(3), 18–27.

Kaleta, R., Skibba, K. A., & Joosten, T. (2007). Discovering, designing, and delivering hybrid courses. In A. Picciano & C. Dziuban (Eds.), *Blended learning: Research perspectives*. Needham, MA: The Sloan Consortium.

Kenney, J., & Newcombe, E. (2011). Adopting a blended learning approach: Challenges encountered and lessons learned in an action research study. *Journal of Asynchronous Learning Networks*, *15*(1), 45–57.

Kim, C., & Keller, J. (2008). Effects of motivational and volitional email messages (MVEM) with personal messages on undergraduate students' motivation, study habits and achievement. *British Journal of Educational Technology*, *39*(1), 36–51.

Little, D. (1991). *Learner Autonomy: Definitions, Issues and Problems*. Dublin: Authentik.

López-Pérez, M. V., Pérez-López, M. C., & Lázaro, R.-A. (2011). Blended learning in higher education: Students' perceptions and their relation to outcomes. *Computers & Education*, *56*(3), 818–826. doi:10.1016/j.compedu.2010.10.023

Manning, K., & Emmons, K. (2010). Best practices in blended courses at a community college. *Visions*, *6*(1), 10–13.

McLaren, A. (2010). *The effects of instructor-learner interactions on learner satisfaction in online masters courses*. Detroit, MI: Wayne State University.

Moore, M. (1973). Towards a theory of idenpendent learning and teaching. *The Journal of Higher Education*, *44*(9), 661–679. doi:10.2307/1980599

Moore, M. (Ed.). (2003). *Handbook of distance education* (3rd ed.). New York: Routledge.

Moore, M. (Ed.). (2013). *Handbook of distance education* (3rd ed.). New York, NY: Routledge.

Moore, M. G., Thompson, M. M., Quigley, A. B., Clark, G. C., & Goff, G. G. (1990). *The effects of distance learning: A summary of the literature. Research Monograph No. 2*. University Park, PA: The Pennsylvania State University, American Center for the Study of Distance Education.

Muijs, D. (2011). *Doing quantitative research in education with SPSS*. London: Sage.

Owston, R., York, D., & Murtha, S. (2012). Student perceptions and achievement in a university blended learning strategic initiative. *The Internet and Higher Education*, *18*, 38–46. doi:10.1016/j.iheduc.2012.12.003

Quitney, J., Boyles, J., & Rainie, L. (2012). *The future impact of the Internet on higher education: Experts expect more efficient collaborative environments*. Washington, DC: Pew Research Center.

Russell, T. L. (1999). *The no significant difference phenomenon*. Chapell Hill, NC: North Carolina State University Press.

Saba, F. (2013). Building the future: A theoretical perspective. In M. Moore (Ed.), *Handbook of Distance Education* (pp. 49–65). New York, NY: Routledge.

Saba, F., & Shearer, R. L. (1994). Verifying key theoretical concepts in a dynamic model of distance education. *American Journal of Distance Education*, *8*(1), 36–59. doi:10.1080/08923649409526844

Saldana, J. (2013). *The coding manual for qualitative researchers*. London: Sage.

Shaik, N. (2002). *Development and validation of a learning environment instrument (CISS)*. Urbana-Champaign, IL: University of Illinois at Urbana-Champaign.

U.S. Department of Education. (2010). *Evaluation of evidence-based practices in online learning: A meta-analysis and review of online learning studies*. Available online at http://www2.ed.gov/rschstat/eval/tech/evidence-based-practices/finalreport.pdf

Vasileiou, I. (2009). Blended learning: The transformation of higher education curriculum. *Open Education: The Journal for Open & Distance Education & Educational Technology*, *5*(1), 77–87.

Vonderwell, S. (2003). An examination of asynchronous communication experiences and perspectives of students in an online course: A case study. *The Internet and Higher Education*, *6*(1), 77–90. doi:10.1016/S1096-7516(02)00164-1

Vygotsky, L. S. (1978). *Mind in society: The development of higher psychological processes*. Cambridge, MA: Harvard University Press.

Wikeley, F., & Muschamp, Y. (2004). Pedagogical implications of working with doctoral students at a distance. *Distance Education*, *25*(1), 125–142. doi:10.1080/0158791042000212495

ADDITIONAL READING

Allen, I., Seaman, J., & Garrett, R. (2007). *Blending in: The extent and promise of blended education in the United States*. Needham, MA: The Sloan Consortium.

Banerjee, G. (2011). Blended environments: Learning effectiveness and student satisfaction at a small college in transition. *Journal of Asynchronous Learning Networks*, *15*(1), 8–19.

Bonk, C., & Graham, C. (Eds.). (2006). *The handbook of blended learning*. San Francisco, CA: John Wiley & Sons.

Clinefelter, D., & Magda, A. (2013). *Onling learning at private colleges and universities: A survey of Chief Academic Officers*. Louisville, KY: The Learning House.

Falloon, G. (2011). Making the connection: Moore's theory of transaction distance and its relevance to the use of a virtual classroom in postgraduate online teacher education. *Journal of Research on Technology in Education*, *43*(3), 187–209. doi:10.1080/15391523.2011.10782569

Garrison, D. (1997). Self-directed learning: Toward a comprehensive model. *Adult Education Quarterly*, *48*(1), 18–33. doi:10.1177/074171369704800103

Garrison, D., & Kanuka, H. (2004). Blended learning: Uncovering its transformative potential in higher education. *The Internet and Higher Education*, *7*(2), 95–105. doi:10.1016/j.iheduc.2004.02.001

Garrison, D., & Vaughan, N. D. (2008). *Blended learning in higher education: Framework, principles and guidelines*. San Francisco, CA: Jossey-Bass.

Gorsky, P., & Caspi, A. (2005). A critical analysis of transactional distance theory. *The Quarterly Review of Distance Education*, *6*(1), 1–11.

Graham, C. (2006). *Blended learning systems: Definition, current trends, and future directions The handbook of blended learning* (pp. 3–21). San Francisco, CA: John Wiley & Sons.

Horzum, M. B. (2011). Developing transactional distance scale and examining transactional distance perception of blended learning students in terms of different variables. *Kuram ve Uygulamada Egitim Bilimleri*, *11*(3), 1582–1587.

Hung, M.-L., Chou, C., Chen, C.-H., & Own, Z.-Y. (2010). Learner readiness for online learning: Scale development and student perceptions. *Computers & Education*, *55*(3), 1080–1090. doi:10.1016/j.compedu.2010.05.004

Jaggars, S. (2013). Online learning in community colleges. In Moore (Ed.), Handbook of distance education (pp. 594-608). New York, NY: Routledge.

Keller, J. (2008). An integrative theory of motivation, volition, and performance. *Technology, Instruction. Cognition & Learning*, *6*(2), 79–104.

López-Pérez, M. V., Pérez-López, M. C., & Lázaro, R.-A. (2011). Blended learning in higher education: Students' perceptions and their relation to outcomes. *Computers & Education*, *56*(3), 818–826. doi:10.1016/j.compedu.2010.10.023

McFarlane, D. A. (2010). Teaching unmotivated and under-motivated college students: Problems, challenges, and considerations. *College Quarterly*, *13*(3), 2–3.

Means, B., Toyama, Y., Murphy, R., Bakia, M., & Jones, K. (2010). *Evolution of edvidence-based practices in online learning: A meta-analysis and review of online learning studies*. Washington, DC: U.S. Department of Education.

Moore, M. (1973). Towards a theory of independent learning and teaching. *The Journal of Higher Education*, *44*(9), 661–679. doi:10.2307/1980599

Moore, M. (Ed.). (2013). *Handbook of distance education* (3rd ed.). New York, NY: Routledge.

Owston, R., York, D., & Murtha, S. (2012). Student perceptions and achievement in a university blended learning strategic initiative. *The Internet and Higher Education*, *18*, 38–46. doi:10.1016/j.iheduc.2012.12.003

Russell, T. L. (1999). *The no significant difference phenomenon*. Chapell Hill, NC: North Carolina State University Press.

Shearer, R. (2013). Theory to practice in instructional design. In Moore (Ed.), Handbook of distance education (pp.251-268). New York, NY: Routledge.

Tsai, C.-C., Chuang, S.-C., Liang, J.-C., & Tsai, M.-J. (2011). Self-efficacy in internet-based learning environments: A literature review. *Journal of Educational Technology & Society*, *14*(4), 222–240.

Uzun, A., & Senturk, A. (2010). Blending makes the difference: Comparison of blended and traditional instruction on students' performance and attitudes in computer literacy. *Contemporary Educational Technology*, *1*(3), 196–207.

Vasileiou, I. (2009). Blended learning: The transformation of higher education curriculum. *Open Education: The Journal for Open & Distance Education & Educational Technology*, *5*(1), 77–87.

Vaughan, N. (2007). Perspectives on blended learning in higher education. *International Journal on E-Learning*, *6*(1), 81–94.

KEY TERMS AND DEFINITIONS

Academic Achievement: Academic performance as measured by course assessments.

Blended Learning: Also referred to as hybrid learning, is a teaching modality that combines traditional face-to-face instructional practices with online instruction. For the purposes of this study, the mix will be approximately 50/50 of each instructional method.

Dialogue: The level of interaction between students, and between students and their instructor within the learning environment.

Learner Autonomy: Independence and self-management relative to establishing goals, seeking support when needed, managing time, implementing learning strategies and evaluating outcomes.

Learning Outcomes: The knowledge and skills students are expected to achieve through the course.

Moderately Selective College: Admissions standards of 2.1 high school GPA for bachelor degree seeking students.

Structure: Rigidity or flexibility of the course's educational objectives, teaching strategies and evaluation methods.

Student Satisfaction: Attitudes and opinions students have about the overall quality of the course and effectiveness of the instructor.

Support: The level of advice and guidance provided by the instructor.

Traditional-Age Undergraduates: Students who are first time college students in the age group of 18-24.

This work was previously published in Critical Examinations of Distance Education Transformation across Disciplines edited by Abigail G. Scheg, pages 178-195, copyright year 2015 by Information Science Reference (an imprint of IGI Global).

Chapter 45
Blended for Student Engagement and Retention:
The Case of Cinema and Visual Culture and Healthy Lifestyle Studies

Ishmael I. Munene
Northern Arizona University, USA

Flower Darby
Northern Arizona University, USA

John Doherty
Northern Arizona University, USA

ABSTRACT

Facetiously described as the "third generation" of distance learning, blended learning is now the new kid on the block in the deployment of technology to support teaching and learning. Its versatility as a pedagogical strategy for creating learner-centered instruction lies in the capacity to exploit the potentials of both the traditional face-to-face instruction and online learning modality in order to provide students with multiple pathways of learning. Yet, developing a blended course to take advantage of these duo capabilities is a monumental challenge for faculty. This chapter presents an analysis of approaches and models employed by faculty at Northern Arizona University to develop and deliver two blended courses as part of the institution's strategy of using technology to enhance undergraduate student engagement and retention. The analysis shows that a multimodal approach that infuses technologies and media and a proactive institutional policy in favor of blended learning, coupled with strategic faculty development, provides the best pathway to developing robust blended courses that are truly learner-centered.

DOI: 10.4018/978-1-4666-8246-7.ch045

INTRODUCTION

Blended learning is the new darling of higher education. Blogs, conferences and scholarship on teaching and learning strongly emphasize the (almost) unbelievable benefits blended learning offers. Higher education institutions worldwide are also extolling the virtues of this most recent development of online learning, almost without discretion as to its appropriate pedagogical applications. As is often true with any trend, blended learning in many cases is being implemented 'willy-nilly' with very little rhyme or reason.

Often defined as the intentional and complementary merging of online and face-to-face learning into one harmonious whole, blended learning certainly has much to offer. The potential advantages of well-designed blended courses are significant: students demonstrate better performance in blended courses compared to those in either fully online or face-to-face classes (US Department of Education, 2009). In that they combine the strengths of both online and face-to-face courses, blended courses deliver improved outcomes and increased student satisfaction (Zhao, Lei, Yan, Lai, & Tan, 2005; Dziuban, Hartman, & Moskal, 2010). And blended learning synthesizes several increasingly recognized approaches such as learner-centered teaching, active and collaborative learning, and social constructivist learning. As such, blended learning initially appears to have no faults, no flaws or weaknesses.

However, whereas the empirical literature clearly demonstrates the superior learning experience offered by blended courses, the design of blended courses presents a formidable challenge to faculty who may not be experienced with this format. When executed properly, blended delivery leads to optimal learning. But the challenge lies in proper design and execution of blended courses. Faculty are often ill-equipped to succeed in this modality, and there are other contextual factors which determine whether a blended course will function well to maximize the learning potential in that course.

To delineate these determining factors, we examine what the contemporary studies demonstrate about blended learning; then we analyze exemplary cases of blended learning at Northern Arizona University. We then discuss lessons learned from poorly executed blended courses, drawing conclusions regarding the required contextual factors for effectively designed and delivered blended courses. The analysis illustrates the centrality of a proactive institutional policy in favor of blended learning coupled with strategic faculty development in providing the best pathway to developing robust blended courses that are truly learner-centered.

BLENDED LEARNING THROUGH THE SCHOLARLY LENSES

The recent avalanche of scholarly literature on blended learning is indicative of the centrality that this pedagogical model has attained in the discourse on teaching. It also gives a false impression that this teaching approach has been late in coming. A scrutiny of literature, however, suggests that a "Johnny-come-lately" nomenclature for blended learning is off the mark. It ignores the fact that face-to-face instruction in combination with aspects of a non-classroom technology-mediated delivery system has been in use for the last couple of decades. A sense of recent novelty in pedagogical practices is driven largely by new pedagogical emphasis (from teacher-led to student-centered learning paradigm), new technological innovations (the internet, social media and personal computers including mobile computing devices) and new learning theories (brain-based learning and social constructivism). All these have elicited a reconsideration of traditional approaches to teaching and learning thereby contributing to a paradigm shift in higher education (Buckley, 2002; DeZure, 2000; Barr & Tagg, 1995).

It is now accepted that the platform that has provided the node for the evolution of these new teaching and learning models is the online environment. This environment challenges the traditional approach to teaching and, thus, invites a reconceptualization of pedagogical practices. This is in contrast to earlier technologies such as instructional television that replicated the traditional face-to-face environment (Dzuiban, Hartman, & Moskal, 2004). It is not surprising, therefore, that online-based teaching is now the fastest growing model of providing higher education globally.

The surge in online-based teaching and learning coincides with scientific evidence indicating increased student satisfaction with this mode of instructional delivery (Sampson, Leonard, Ballenger, & Coleman, 2010; Aman, 2009; Drennan, Kennedy, & Pisarski, 2005; Chickering & Ehrmann, 1996). Of the factors contributing to the success, the following are identified as the most overarching: flexibility in program structure thereby permitting more time for students to complete work, cost effectiveness (Vaughn, 2007; Richardson & Swan, 2003); pacing of students' learning in a scaffolding format thus permitting additional time for reflection on the course content (Mathews, 1999; Berge, 1997). In the Sampson, Leonard, Ballenger, & Coleman (2010) study, student satisfaction was highest in the area of instruction but lowest in teamwork. These advantages notwithstanding there have been criticisms voiced on the quality, delivery model in online courses and the cultural consequences of reliance on computers for instruction (see for instance, Goldbert & Riemer, 2006; Manochehri & Young, 2006; Bowers, 2000). However, we shall not delve into details about these censures.

The new kid on the block in online-based instruction is blended learning (BL). From corporate to K-12 institutions, from virtual colleges to brick-and-mortar universities, BL has become the new mantra in delivering education via learning technologies. BL, as the name suggests, is the fusion between two teaching paradigms employing two divergent philosophical assumptions. We begin with a definition which allows us to share a common perspective of an important phenomena. Garrison and Vaughan (2007) define BL as "the thoughtful fusion of face-to-face and online experiences….such that the strengths of each are blended into a unique learning experience…. Blended learning is a fundamental redesign that transforms the structure of, and approach to, teaching and learning" (p. 5). Staker and Horn (2012) of the Clayton Christensen Institute for Disruptive Innovation, on the other hand, define it as "a formal education program in which a student learns at least in part through online delivery of content and instruction with some element of student control over time, place, path and/or pace and at least in part a supervised brick-and-mortar location away from home" (p. 3). The two definitions illustrate the remarkable differences in emphasis. While Garrison and Vaughan focus on the strengths that face-to-face and online delivery bring to an instructional environment, Staker and Horn concentrate on the student control (or lack thereof) of the learning environment, with supervision of student learning being an integral part of the process. In all, both definitions acknowledge, if only incidentally, the transformative nature of the new instructional modality.

Two important considerations are germane to BL. First, what proportion of time should be dedicated to online and in-class activities? This is always a challenging question for BL instructors and course designers and there are no hard and fast rules. A classification scheme adopted by Educause, a nonprofit agency dedicated to the intelligent use of technology in instruction, catalogues blended courses based on the amount of time spend on each modality. Accordingly, blended courses have between 30% and & 79% of activities online, and a fully online course can include up to 20% of face-to-face activities (Allen, Seaman, & Garrett, 2010). Second, what models of BL are in existence? Four models relevant to higher education can be discerned (Friesen, 2012; Staker & Horn, 2012). The *rotation model* involves the combination or embedding of online engagement within a range of face-to-face forms of instruction in a cyclical manner. In the *Flex model*, multiple students are engaged primarily online but under the supervision of a teacher who is physically present. The *Self-blending model* entails students choosing different courses to take independently, but they do so in a setting where a supervising teacher and other students are co-present. Finally, in the *Enriched-virtual model*, online experiences are viewed as enriching only periodically through arrangements of physical co-presence.

Research studies point to student satisfaction and improved learning outcomes in BL courses relative to purely online and face-to-face ones. In a meta-analysis involving 51 studies undertaken by the United States Department of Education, it was established that students enrolled in fully online and blended courses performed better than their face-to-face counterparts with blended learning students performing significantly better (U.S. Department of Education, 2009). Another meta-analysis study by Zhao et al. (2005) identified three types of interactions germane to good course design. These are instructor and students, student and their peers, and student and content. They established that blended courses reported more positive outcomes than wholly asynchronous courses. Dziuban et al. (2010) document the level of satisfaction with blended courses among the three generations of Boomers (57%), Generation X (41%) and Millennials (33%) confirming that older students are more satisfied with this teaching modality than their counterparts.

BL has also the potential to reduce course attrition rates in addition to increasing student learning outcomes in tandem with fully online courses. At the University of Central Florida, in research undertaken between 2001 and 2003, the blended model was comparable or even better than the face-to-face instruction in terms of success rate (students attaining grades A, B, or C). In terms of students withdrawing from classes, blended learning attrition rates were comparable to the face-to-face modality for all ethnic groups (Dziuban et al., 2010).

The combination of online and in-class activities in a course allows students the opportunity to learn in different styles and at different paces. Placing rote knowledge tasks online gives students the freedom to undertake self-directed asynchronous study. Class time can then be dedicated to the elaboration of foundational knowledge acquired online or in textbooks. This combination makes the teaching flexible, approachable, and, most of all, motivating to students (Behnke, 2012). A corollary advantage of this blended learning strategy is the inculcation of lifelong learning skills in students. Since a significant proportion of learning is leased to the students at a relatively early stage, they are likely to develop a desire and the skills to continue learning throughout their lives (Glazer, 2012). They gain skills in acquisition, organization and presentation of information that helps them acquire knowledge about the world. These skills are the linchpin for success in the knowledge-driven economy that we live in today.

Additionally, BL encourages active and collaborative learning by students. Students not only acquire information but also process it to ensure they understand it, can organize it as well as make connections with their existing knowledge. After this, they then have to share it with colleagues either in class or online (Ambrose, Bridges, DiPietro, Lovett, & Norman, 2010; Svinicki, 2004). So the combination of both synchronous and asynchronous learning strategies leads students to greater learning than would otherwise have been feasible. It is also significant that the flexibility of the blended option helps students navigate the multiple demands on their time; blended learning may ameliorate some of the pressure on family, work and commuting time.

Faculty also gain from BL courses. A major relief for faculty is the resuscitation of chronically low-enrollment courses thereby protecting jobs and averting loss of income. Hartwell & Barkley's (2012) use of blended learning strategy in their redesign saw their music class enrollment increase from the perpetual low of 45 students to 1,200 students annually. Not only did this lead to job protection but it also resulted in hiring of additional faculty. Since blended classes also raise student enthusiasm, engagement levels and overall student satisfaction, they play a critical role in cushioning disinterested students from sabotaging the morale of the class. The differentiated instructional structure and scaffolding of the class permit such students to control aspects of the learning process outside the class. This is a major relief for instructors who need not worry about class management issues from such disinterested students.

Finally, faculty enjoy the benefits of increased flexibility in their available time to pursue scholarly or service activities arising from time saved from decreased attendance in class. Because of releasing a portion of the course for independent study by the student coupled by reduced hours of face-to-face instruction time, faculty have additional time for other professional pursuits. Furthermore, with a course using a team teaching structure, it is conceivable for one faculty member to handle the online portion while the other specializes in the face-to-face segment which also contributes to freeing the instructors for other engagements.

In sum, BL represents the third sector in the continuum of distance learning. It blends the strengths of the traditional face-to-face instruction and online asynchronous learning to develop a new learning strategy, both philosophically and structurally. It represents a paradigm shift in both teaching and learning. In keeping with this transformation of pedagogy using the technology medium Osguthorpe & Graham (2003) propose six attributes cardinal to the creation of successful blended courses: (a) pedagogical richness, (b) access to knowledge, (c) social interaction, (d) personal agency, (e) cost effectiveness and (f) ease of revision. Our case analysis of the various BL courses developed at Northern Arizona University (NAU) document the extent to which these design attributes have been articulated in the development of the classes.

BLENDED LEARNING AT NAU

Northern Arizona University has had an official course designation for hybrid learning for at least 10 years. This form of learning has a very flexible definition, including classes that meet once or twice a semester in person and the rest of the time online, or classes that meet in person once a month and the rest of the time is online. There are as many iterations to hybrid learning as there could possibly be. Indeed, the term hybrid learning has begun to be used interchangeably with blended learning, though it is only recently that the University has begun work on a specific definition for blended learning.

The interest in hybrid or blended learning was very informal until just a couple of years ago. Until then the modality of the blend was entirely in the individual faculty member's purview. The only caveat was that the face-to-face meetings had to be listed in the course catalog. Faculty could not require face-to-face meeting times that were not listed. This was also true for fully online courses. The recent Great Recession saw funding to the university severely cut by the State. However, there was no commensurate cut in the State's expectations of the university, especially as it concurrently dealt with an increase in student enrollments. NAU has seen enrollments increase by over 6,000 full time equivalent students since 2005.

On campus enrollment was particularly a concern as the university saw an influx of students without fiscal resources to support them. Also, as the leadership looked ahead demographics suggested that increasing enrollments were here to stay. At one point, the strategic plan called for a potential 35,000 FTE by 2020. Clearly there was a need to accommodate this increase, with less state funding than was available in 2008. Technology was seen as one potential solution, and blended learning in particular as a way to begin to more effectively use the physical and human resources available without sacrificing the high quality, high touch, learner-centered education that the university was credited with offering.

Table 1. First-year student academic experience at NAU, 2010

Courses Rigor	Percent (%)
1. Academic Challenge • High Faculty Expectations • More than 15 hours/week homework • Exams require best performance	 52 33 47
2. Active Learning • Class topics discussed outside • Students work collaboratively inside & outside class • Student applying classroom learning to real life • Student opportunities to tutor each other	 58 49 50 24
3. Student-Faculty Interaction • Faculty members accessible & supportive	 42

Source: (Northern Arizona University (2010)

Also, new thinking on student success as epitomized by rigorous courses and independent learning skills is in consonance with what the students would like to see in their courses. Table 1 summarizes the findings of some key variables of course rigor that first year students ranked as being low. Academic challenge has been perceived as being low with exam performance expectations and homework assignments being rated particularly low. In terms of active learning strategies, the students ranked discussion of classroom topics outside as the highest but this was only slightly above 50%. It is this student concern and the risk of additional student attrition in subsequent years that has been the catalyst for reframing instruction at the undergraduate level with a blended learning approach being the focal point.

Therefore, in 2011 the university instigated the President's Technology Initiative, a program specifically supported by the Office of the President that was designed to encourage high enrollment lower division courses to explore a blended approach to course design and delivery. As of writing, there have been four calls for proposals for this program, out of which 10 course redesigns have been funded. The faculty coordinator receives a stipend to fund the redesign, a budget to bring in resources to enable the redesign, and one or two semesters in which to pilot the redesigned version of the course. Full implementation of the redesign means that the course would be delivered in a blended learning format across all of its sections, except those that were being delivered online. Additionally, departments that support these redesigns are awarded up to $30,000 and they keep any cost savings realized from the redesign.

NAU developed two forms of support for faculty who intended to apply for the grant and for those that were successful and were working on their projects. First, a blended learning workshop was developed and required for anyone interested in submitting a proposal. This workshop, led by instructional designers at the university's e-Learning Center, introduced participants to blended learning designs and modes and also modeled one particular blended learning approach. The focus of the workshop was twofold: developing an integrated and intentional approach to blended learning that was not just an online course with a social hour; and, assisting faculty in completing the application process and in developing a cost savings and program assessment plan. Also, during the pilot and implementation phases the faculty would have priority access to a team of instructional designers, instructional technologists, creative designers, and assessment experts.

The projects highlighted in this chapter were successful applicants for this program. Both have demonstrated the need to build in a pilot phase to any institution-wide blended learning initiative. Also, they clearly called for a peer group of faculty developers and instructional designers to share ideas, challenges, brainstorms, and problems. Consequently, the e-Learning Center and the Faculty Professional Development Program invited participants and other faculty to join a Faculty Learning Community on Blended Learning Course Redesign, the second form of support that was co-facilitated by one of the first course coordinators to avail themselves of the grant, an Instructional Designer, and the director of Faculty Professional Development. This learning community built on the peer aspect of the blended learning workshop with a focus on working through the meaning of and the pedagogy behind blended learning at Northern Arizona University.

Concurrently to these initiatives the Office of the Provost appointed a senior faculty member and returning American Council on Education (ACE) Fellow to bring a stronger focus to blended learning at the university. One of Dr. Denise Helm's first actions was to call together a Blended Learning Leadership Team to begin discussions on what exactly blended learning meant for the campus. The group developed a working definition of blended learning and shared it with the university community for feedback and further refinement. Currently, the definition states:

NAU defines blended learning as an approach that combines the best elements of face-to-face teaching with a variety of technologies, resulting in increased learning effectiveness and improved efficiency. Ideally, a blended course at NAU replaces 50% of the conventional class time with out-of-class activities. However, a course that replaces as little as 25% of the seat time with out-of-class activities can still be considered blended. (see http://www.nau.edu/blendedlearning/).

This group has also opened up the President's Technology Initiative to include a broader focus on courses that are not strictly lower division and high enrollment. As of writing, 27 faculty coordinators representing all colleges are taking the Blended Learning Workshop with a view to submitting a proposal for funding a blended learning course redesign. Also, the Faculty Learning Community on Blended Learning Redesign is in its second iteration, with 12 faculty participating who are also eligible to apply for the grant.

Case 1: CINE 101: Introduction to Cinema and Visual Culture

The Need for a Blended Approach and Pedagogical Orientations

It is not always the case that the world of humanities, cinema studies and critical analysis will find fusion in blended learning. Conventional wisdom dictates that humanities are best experienced through instructor-student interaction in a classroom setting. The cardinal traits of a successful humanities program rest on the ability to provide students with dispositions that enable them to be receptive, critical and constructive. Further, wise rack from yore has consistently held that academic study of movies is best achieved when they are watched and critiqued in a classroom, a deviation reminiscent of today's popcorn-enhanced movie theater entertainment experience. So, the academic study of movies has remained a consistently predictable affair, translating into a boring routine for the instructor and disengaged students. That enrollment numbers in such classes have remained consistently low is not surprising. It is this reality that propelled Astrid Klocke of the humanities program at NAU to redesign CINE 101 Introduction to Cinema and Visual Culture from a face-to-face class to a blended one.

Necessity is the mother of invention. It forces reflection on goals, re-examination of strategies and a consideration of the consequences. The truism of this age old wit could not have been enunciated better in blended learning at NAU than in Cinema 101. A triumvirate of student needs, university interests and instructor necessity provided the impetus for course redesign. Looking at the horizon, the potential reward was a stimulating and engaging curriculum for students, a course that supports the university's freshmen academic programming and a professionally satisfying course for the instructor.

Students' needs were at the apex of the instructor's concern. Nothing is more injurious to a class than disengaged and demotivated students; they are disruptive and indifferent to the content being delivered. Their demeanor, most often, is infectious, rendering havoc to the teaching-learning climate of the whole class. In a class like Cinema 101, students, according to Klocke:

….expected to sit disengaged in class and watch a cinema and then discuss it, meaning pseudo psychologize the meaning and characters and then empathize with them. That is it. What they need is a critical analysis of the film. They need the ability to know the techniques that went into film-making and the tools of the trade of film analysis which includes things such as mise en scene and cinematography. All these tools of analyzing a film, they do not have but they do not think they need them. (Klocke, personal communication, November 15, 2013)

For a long time, that had been the pedagogical approach the class had taken—movie screening in class followed by discussions. Furthermore, since this class fulfills the NAU liberal studies requirements for the freshmen class, most of those who had signed up assumed it would be an easy and "cool" option comprising of watching movies followed by a few discussion points. When students enroll in a course on cinema with its visual, artistic and entertaining attributes but do not attain and develop skills, knowledge and aptitudes in film analysis, then the class becomes an inevitable ritual of movie screening followed by discussions.

The professor's intrinsic motivation to redesign the class was driven by the need to eschew any semblance of a "sage on stage" with its inevitable practice of standing before a class to deliver lectures on cinema. Though the lecture method appears to be the most ubiquitous teaching method in higher education on account of its efficiency, its functional limits in creating an engaging student-centered learning experience are well enough documented not to warrant additional considerations here (see for instance Khan, 2012). Nonetheless for the Cinema 101 instructor, lecturing was no longer intellectually engaging:

….standing there and repeating myself semester after semester doing the same very basic telling them what they needed to do seemed very superfluous, seemed tiring and unnecessary because we have people doing it online, they have short videos….I could even tape myself and put it online…why do I have to deliver the lecture? (Klocke, personal communication, November 15, 2013)

The course redesign was also driven by two institutional imperatives. The first was the First Year Learning Initiative (FYLI) program, "a unique, locally-developed and faculty-driven program for building academic success in the early college career" (Northern Arizona University, 2013). FYLI is based on the premise that students need—and want—high standards in the lower level courses in order to be successful at the undergraduate level. Students want such standards clearly articulated in the first session in the course and, in order to be successful, they need, throughout the course, support, guidance, highly engaging pedagogy and clear, frequent feedback. Courses selected for FYLI designation, as CINE 101 was, must conform to three important principles during the redesign process: socializing students for excellence, maximizing student engagement, and aligning learning outcomes to learning activities and assessments. To incorporate these elements effectively in CINE 101, a blended approach employing a combination of the best practices in humanity pedagogy and modern technology was the most appropriate pathway. This course redesign was facilitated by a generous grant from the NAU President's Technology Initiative, a competitive funding program for 100 and 200 level courses with large enrollment taught by multiple instructors.

Efficiency in the use of lecturer room, as the institutional imperative, required that instructors, if need be, structure their courses for optimal use of such resources. With the healthy growth in undergraduate numbers, current classrooms have become inadequate and efficient use of existing ones is imperative. Where permissible, instructors have been encouraged to use modern instructional technologies to deliver content that may not warrant frequent face-to-face sessions. Lower-level factual activities like watching movies and discussing the plot can best be undertaken outside the class.

The pedagogical underpinnings informing Professor Klocke are borrowed heavily from her background in linguistics. Communicative language teaching, a language teaching approach that focuses on interaction as a means and goal of study, meant that students would acquire skills in the use of language to communicate ideas meaningfully. Equally important is task-based language teaching where students undertake an activity arising from the text they have covered. Students are expected to generate a product from the content rather than merely asking questions of the professor. This is a decentered, facilitative approach that puts emphasis on learning rather than teaching. These pedagogical approaches could best be facilitated by technology in order to move the class from teacher-centered lecture-based instruction to a cognitively-rich student-centered environment.

Course Structure

Like many blended courses in the humanities (see for instance Gau, 2012) Cinema 101 is divided into learning modules consisting of a scaffolding of learning activities both in-class and out-of-class. There are 4 modules that mirror the class text, *The Film Experience: An Introduction (3rd Edition)* by Timothy Corrigan and Patricia While. Each module contains a number of chapters, and consists of: (1) chapter summary that highlights the key points of the pertinent chapter in the course text, (2) chapter quizzes, (3) chapter discussion topics, (4) movies linked to the chapter, and (5) additional readings. The course assessment structure encompasses the following: (1) class attendance, (2) 3 surveys, (3) chapter quizzes which are generated from the test bank provided by the class text publisher, (4) 7 written discussions, (5) group project, (6) midterm exam, and (7) final exam portfolio. These study and assessment activities keep the students engaged throughout the semester.

Rather than two face-to-face class meetings of 75 minutes each week, only one is held. The instructor uses the in-class meetings to provide a forum for critical analysis and discussion of the course text and the movies associated with the particular chapter. The class format calls for students' application of the concepts identified in the readings to movies that they have watched. They are required to demonstrate, with solid evidence from the assigned movies, that they have internalized the cinematography concepts they encountered in the readings. They are also presented with an opportunity to demonstrate why their perspective on the film matters to them. Some of these in-class activities are undertaken in class groups. In-class activities are geared towards what Krathwohl (2002) refers to as medium level conceptual learning skills—where students use factual knowledge to make interpretations and inferences through application, analysis and interpretations of information acquired.

Out-of-class activities include chapter and supplemental readings, online discussions, chapter quizzes, and watching movies. The preference is for the students to watch the movies on the weekend after they have undertaken the readings and the chapter quiz. Doing so provides important background materials with which to critique the movie. After watching the movie, students participate in an online discussion using the topic provided by the instructor. Online discussion is also undertaken in class groups. These semester-long class groups consist of about 8 students constituted by the instructor at the beginning of the semester.

Another out-of-class activity is a mini-internship. Here students can opt to volunteer in the fall Flagstaff Mountain Film Festival or they take part in the various film series on campus. They then write a reflective group paper arising from this mini-internship experience. Online activities provide the student with opportunities to learn at two levels as per Krathwohl's (2002) classification. First is the low level learning skills (literal and factual) where they build essential foundational knowledge through recall, recognition and classification such as watching movies and online discussions. Second is the high level metacognitive knowledge where students begin to evaluate, construct and create as seen in the collaborative group projects and internships.

Course assessment takes place through a variety of activities. Besides class attendance, quizzes, 3 surveys, online written discussions and the group internship project, the course assessment also involves midterm and final exams, an essay paper as well as a comprehensive final exam portfolio. The group internship project forms the basis of the semester-long essay paper in which they are required to not only write a reflective piece but also to undertake a class presentation critically documenting their experience in the internship. The comprehensive final exam portfolio, which each student is required to produce at the close of the semester, includes: a one-page reflective essay, a two-page analysis essay and the final exam. In all, the course assessment is structured as presented in Table 2.

Table 2. Cinema 101 course assessment structure

Assessment Activity	Points
Class Attendance	12
3 Surveys	3
7 Chapter Reading Quizzes	14
7 Written Online Discussions	14
Group Project	10
Midterm Exam	10
Essay Paper • 1st draft (5points) • Peer review (5 points) • Revised draft (10 points)	20
Final Exam Portfolio • 1-page reflective essay (2 points) • 2-page analysis essay (10 points) • Final exam (5 points)	17
Total Points	**100**

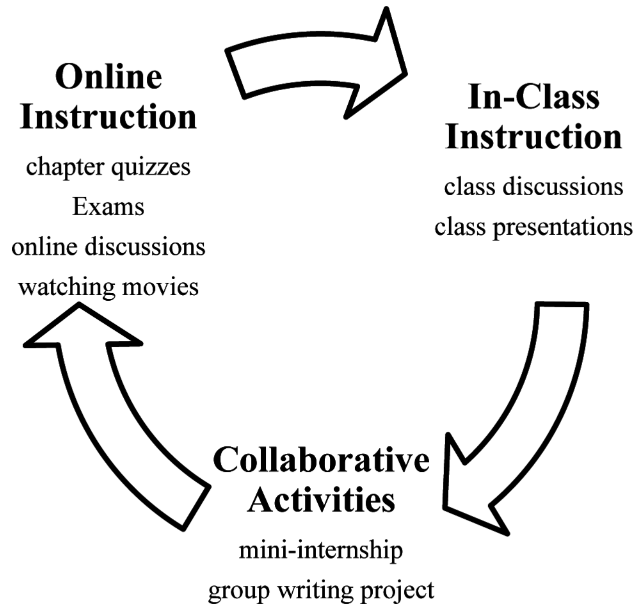
The course taps into a variety of learning styles through visual, audio, interaction and collaboration. The course is recursive in structure with both in-class and out-of-class activities complementing and reinforcing each other as captured in Figure 1. The recursive process employs technology to deliver large scale efficiency, profound engagement opportunities and unlimited learning possibilities.

The Blended Benefits

The rewards arising from blending Cinema 101 are the aspiration of every student, instructor and institution. Pedagogically, students have registered increased satisfaction with the course both in terms of content, organization and delivery. Remarkable evidence of student satisfaction is found in students' written evaluation narratives, in which they comment that the course has changed their entire perspective on watching movies. A substantial number indicate that they now watch films with a critical-entertainment mindset as opposed to only entertainment as was the case previously.

At the departmental level, enrollment in the course has quadrupled from 35 students a semester in one section to around 150 students in 4 sections. As a result, the humanities program has had to hire 4 adjuncts to match the increased enrollment. Though this has entailed an additional supervisory role for Prof. Klocke, the satisfaction of being instrumental in developing and growing a cinema studies minor in the humanities program far outweighs the added responsibilities. In addition, since there is only one in-class session per week in contrast to the two sessions each week that took place prior to blending, classroom utilization in the humanities building has improved. There are now more classrooms available for other classes in the College of Arts and Letters despite the resurgence in student numbers in the last two years in CINE 101.

Figure 1. The recursive structure of cinema 101



Case 2: HS 200: Healthy Lifestyles

Revitalizing a Course through Blended Delivery

Redesigning HS 200: Healthy Lifestyles for blended delivery has caused the course to "come alive," according to Professor Ellen Larson. Faced with apathetic students, limitations in available classroom space and faculty salary, and her own desire to encourage active learning among the primarily freshmen students in this class, Larson applied for and received institutional support in the form of two initiatives underway at NAU. Of primary importance was the necessity of restructuring the use of class time:

I wanted the in class time spent applying knowledge. In order for this to happen, I needed a mechanism for students to learn the basic content knowledge prior to class. Building the content into the course shell, and holding students accountable for learning it (online quizzes, self-assessments, online discussion, etc.) made the difference. (Larson, personal communication, December 13, 2013)

The factor that created the greatest impact on blended HS 200 was Larson's focus on student responsibility for their own learning. Holding students accountable through intentionally designed online activities "made the difference" for this course. Like CINE 101, HS 200 was redeveloped using a blended approach according to the parameters of the First-Year Learning Initiative (FYLI) and the President's Technology Initiative. The result is an engaging, dynamic and successful blended course that showcases the best of what blended learning can be. As described above for CINE 101, FYLI certification requires a course to intentionally support student success through careful monitoring and frequent communication with students regarding their progress. The President's Technology Initiative provides the support to redesign classes for blended delivery to promote efficient use of faculty time and classroom space. Together, these two programs afforded Larson the opportunity to dig in and rebuild HS 200 from the ground up. Having piloted the course for two semesters before delivering it across multiple sections taught by multiple instructors, Larson testifies to the benefits of blending this course:

I am able to use my time well. I don't think 70 students need me to stand in front of them and go over what's in the textbook, the basics.… The thing I like best about the blended class is I get to do what I love best. And that's working with the students, establishing relationships with them, and having a very interactive, experiential type of classroom environment. (Larson, personal communication, November 1, 2013)

Larson claims increased personal job satisfaction as one of the primary benefits of the blended approach. Delivering this content is "so much more rewarding" than it was in a more traditional in-person format. The ability to focus her time and energy on engaging with her students, rather than delivering the same basic knowledge semester after semester, has brought new life to Larson's teaching methodologies and is the most successful element of the redesign.

Blended Course Structure and Redesign Process

HS 200 bears many similarities to CINE 101. Larson delivered the first iteration of blended HS 200 in Fall 2012. In that initial semester, Larson taught two sections of 35 students each. Like CINE 101, prior to redesign HS 200 met twice weekly for 75 minutes per session. So much of in-class meeting time was devoted to content delivery—content that students were to have acquired *before* coming to class—that little time was left over for active and collaborative learning activities, which were Larson's preference. Indeed she often felt frustrated at her students' passive learning experience as she was forced to cover basic knowledge in class. Lecturing to a roomful of disengaged undergraduates was neither a successful strategy for Larson nor for her students.

Redesigning HS 200 has allowed the basic content delivery to be moved online. Students can now benefit much more from interactive and dynamic class meetings. Similarly to CINE 101, HS 200 students now meet once per week in a 75-minute session. The other class content takes place online. Larson meets with one section of the students on Tuesday, the other on Thursday. Students reserve the class meeting time on both days in order to be able to meet as a large group for a guest speaker or exam. This additional flexibility enhances the success of the asynchronous element of the blended format.

In deciding which learning activities were best delivered online vs. in-person, Larson turned to Bloom's Taxonomy. Basic knowledge acquisition, the lower level of the taxonomy, takes place online. Interpretation and application of the content are reserved for class meetings. Students come to class prepared to engage with the content, with each other, and with the instructor. "There is never more than 15 minutes of passive learning in a class period", according to Larson. "The rest of the class time must be interactive" (Larson, personal communication, October 25, 2013).

Fostering Active Learning and Student Responsibility

As part of the FYLI structure, students who are not motivated to do the online work are identified early in the semester while they have time to change their approach. "[Blended delivery] does not work for every student. But it works for many students.… In class, we build community; we build camaraderie" (Larson personal communication, October 25, 2013). Improved connection to the learning community has had a direct impact on student engagement and success in this course.

Larson acknowledges that students' ability to adjust to blended courses vary, but argues that with appropriate instructor support, they can be successful:

Some students quickly grasp the blended concept; some need nudging, some need shepherding all semester. I'm not willing to drag the students through. I'm willing to meet them halfway… to help *them and show them and guide them and support them. I'm into [student] accountability. (Larson, personal communication, November 1, 2013)*

Some of Larson's methods of encouraging students to take responsibility for their own learning include using a gatekeeper syllabus quiz, requiring hard-copy assignments at the beginning of each class meeting, and allowing students two attempts to take online reading quizzes. Students must score 100% on the syllabus quiz before they can access the first module of the online content. They may attempt the quiz as many times as they need to, but until they answer every question perfectly, they can not proceed in the class. Similarly, students who come to class without their hard-copy assignment are unable to participate in that day's learning activities, since class activities have been specifically designed to build on and apply the content from the homework assignment due at the beginning of each class. Both of these strategies keep students accountable for their own learning in the class.

For each online reading quiz, students are permitted up to two attempts. If they are content with their grade on the first attempt, students keep it. If not, students may re-attempt the quiz and will earn the average of both scores. Thus, Larson further encourages students to prepare carefully and take responsibility for their learning experience.

Like in CINE 101, online activities in HS 200 are intentionally designed to support and reinforce in-class activities. Online, students complete a variety of tasks including reading, listening to a mini-lecture, participating in an online discussion, evaluating their own lifestyles using an online self-assessment, and "submitting other materials to help prepare them for engagement as soon as they walk through the door [for the next class meeting]" (Larson, video). The online material is divided into clear tasks with labels such as "Read It," "See It," "Hear It," "Do It," and "Review It." Helping students come to class prepared for active learning has been one of the primary benefits of blending HS 200.

After piloting the blended course in Fall 2012, Larson made minor revisions for Spring 2013. Based on two semesters' experience and student feedback, Larson made further improvements before rolling out HS 200 across seven sections with multiple instructors in Fall 2013. The opportunity to revamp the course several times before "turning it loose" on multiple instructors was "such a gift," according to Larson (personal communication, November 1, 2013). That opportunity resulted directly from NAU's complementary FYLI and President's Technology initiatives.

Teaching in the Blended Format is "So Much More Rewarding"

Students engage more actively with the content of HS 200, and apply it more effectively, as a result of blending the class. Additionally, there is more consistency between sections now that the content is captured in the online class shell. Establishing "continuity across the sections, many of which are taught by adjuncts who may or may not stay on" is yet another advantage of the course redesign.

But the primary improvement for Larson centers around the more effective use of class time and richer learning experience that results:

The course has changed dramatically as a result of going from a traditional face-to-face approach to a [blended] approach. More in-depth learning occurs, I am able to customize the in-class portion based on student need/interest, and I am able to get to know each of my students in a small (35-student) venue instead of a 70-student venue. (Larson, personal communication, December 13, 2013)

In Larson's observation, students are coming to class better prepared because they have been held accountable to complete the online material prior to the next class meeting. And Larson's student-centered, active learning approach to in-class activities benefits both her and her students. "Using class time to do application and see the changes, [observing the] students process info and ask questions that are relevant, [seeing them] engage with the material in a way not seen previously… is so much more rewarding" (Larson, personal communication, November 1, 2013).

Despite her success, Larson is not convinced that blended delivery is for everyone. She encourages faculty to consider whether a blended design would support and enhance "the student achievement of [your] course outcomes" before deciding whether to proceed. "However, I do feel that depending on the course and the outcomes, it can really make a class come alive" (Larson, personal communication, November 1, 2013).

LESSONS LEARNED

These two cases highlight two very successful and, as of writing, mature implementations of blended learning at NAU, as well as three major lessons learned:

- Blended course redesign needs to be accomplished with the student in mind.
- The institution needs to fully support the redesign and faculty need to buy in to it.
- Blended learning redesign needs to start from scratch.

As previously noted, there have been 10 courses funded by this grant program and all have demonstrated similar levels of success: increased student engagement, increased capacity, and increased faculty satisfaction. Introductory courses in Political Science, Chemistry, and Economics demonstrate that student success is positively impacted as well. A lab science course in Biology that was constrained by physical space has doubled its capacity by going to a 50/50 blended model.

Yet there have also been some misfires in informal approaches to blended learning. A prime example was in the NAU first year seminar, where two courses attempted a 50/50 blend, where the class would only meet one day of the week instead of two. These courses were directed at entering first year students; it became clear that the students were ill-prepared for the blended approach. In other words, a successful blended course redesign needs to be accomplished with the student's ability to take control of his or her own learning in mind.

This first lesson can be seen in the implementation of CINE 101 and HS 200. In both instances the courses were intentionally designed to integrate the online and face-to-face components in a fully transparent and obvious way for the students to see the connections and the importance of both. The essential point here is that while blended learning design presents faculty with many challenges, it impacts the students as well. This adds a requirement that faculty design their blended courses to scaffold student learning in this new (to the students) way. Both examples, by adopting the NAU FYLI model, did this from the outset, where there was early and frequent assessment of student learning, and thus the ability to intervene with those students for whom the blended model was not quite working from the outset.

A second lesson learned from NAU's approach to blended learning course redesign is the need for institutional support and faculty buy-in. Many of the courses in the blended learning grant project had issues that faculty and administrators were already well aware of, from lack of student engagement, to DFW rates that were relatively high, to lack of physical space. Also, in most courses there was a high demand for seats from students but not enough resources to fulfill that demand. Thus, these courses would likely have looked for a way to solve these concerns without the grant program.

Yet the grant program put institutional resources firmly behind the faculty as they worked on solutions to their issues. CINE 101 saw increased engagement; HS 200 saw increased student accountability for their own learning. Both of these benefits played well into the goals of the grant program. These courses and others in the grant program also saw faculty fundamentally redesigning their pedagogy. This third lesson is basically that blended learning course redesign needs to start from scratch. In all instances faculty went back to the basics: what are my student learning outcomes and how am I going to assess that students have met these? Only after these questions were answered would the faculty designers then focus on the learning activities, and decide which were best delivered online or face-to-face. For example, in HS 200 Prof. Larson fell back on Bloom's Taxonomy to determine where these activities best belonged. Prof. Klocke, in CINE 101, followed a similar model, ensuring her face-to-face classes were focused on more in-depth student learning.

CONCLUDING REMARKS: THE ROAD TRAVELLED

The recent surge in blended courses in higher education is a testament that institutions and faculty recognize the benefits that advanced technology brings to bear in traditional face-to-face and online classes. It is also a recognition that the hitherto bifurcation between the teaching modalities is slowly, but inevitably, giving way to a new pedagogical approach that is more robust, elevates student engagement and provides the instructor with tremendous opportunities for innovative teaching. This embrace of blended learning cuts across institutions in America; this analysis has documented the experience at Northern Arizona University (NAU), a doctoral-intensive southwest institution.

The success of blended learning courses at NAU is an outcome of the fusion between a facilitative institutional environment, student needs and a committed faculty. The Blended Learning Policy framework, the President's Technology Initiative grant and the First Year Learning Initiative are the high-level institutional policy mechanisms that have catalyzed and facilitated faculty technology-oriented course redesign at undergraduate level in classes that previously eschewed technology. Furthermore, the E-Learning Center at the university has been critical in providing the requisite support for the course redesign. That these classes have registered remarkable success also owes a great deal to students' demand for classes that are more engaging, interactive, and provide independent learning opportunities.

The two blended courses discussed in the chapter, *Cine 101: Introduction to Cinema and Visual Arts* and *HS 200: Healthy Lifestyle*, offer a rich panoply of in-class and out-of-class activities that are superbly integrated by a sophisticated deployment of technology. The mosaic of online discussions, online written assignments, video clips, a broad array of online assessments, face-to-face instruction and presentations along with individual and group projects serve to break the instructor-textbook monotony that characterized the course before redesign. The outcomes have been evident in increased student enrollment, improved satisfaction with the classes as reflected in student evaluation comments, optimal use of university classroom space, and additional time for instructors to engage in their research activities.

REFERENCES

Allen, I., Seaman, J., & Garrett, R. (2010). *Blending In: The Extent and Promise of Blended Education in the United States.* Retrieved from The Sloan Consortium: Individuals, Institutions and Organizations Committed to Quality Online Education: http://sloanconsortium.org/publications/survey/blended06 (Retrieved 11/4/2013)

Aman, R. (2009). *Improving Student Satisfaction and Retention with Online Instruction Through Systematic Faculty Peer Review of Courses.* (Unpublished Doctoral Dissertation). Oregon State University, Eugene, OR.

Ambrose, S., Bridges, M., DiPietro, M., Lovett, M., & Norman, M. (2010). *How Learning Works: Seven Research-based Principles for Smart Teaching*. San Francisco, CA: Jossey-Bass.

Barr, R., & Tagg, J. (1995). From Teaching to Learning-A New Paradigm for Undergraduate Education. *Change*, *27*(6), 12–25. doi:10.1080/00091383.1995.10544672

Behnke, C. (2012). Blended Learning in Culinary Arts: Tradition Meets Technology. In F. Glazer (Ed.), Blended Learning: Across the Disciplines, Across the Academy (pp. 13 - 30). Sterling: Stylus Publishing.

Berge, Z. (1997). Computer Conferencing and the Online Classroom. *International Journal of Educational Telecommunications*, 3–21.

Bowers, C. (2000). *Let Them Eat Data: How Computers Affect Education, Cultural Diversity and the Prospects of Ecological Sustainability*. Athens: The University of Georgia Press.

Buckley, P. (2002). In Pursuit of the Learning Paradigm: Coupling Faculty Transformation and Institutional Change. *EDUCAUSE Review*, *37*(1), 29–38.

Chickering, A., & Ehrmann, S. (1996). Implementing the Seven Principles: Technology as Lever. *AAHE Bulletin*, 3 - 6.

DeZure, D. (2000). *Learning from Change: Landmarks in Teaching and Learning in Higher Education from Change Magazine.* Stylus Publishing.

Drennan, J., Kennedy, J., & Pisarski, A. (2005). Factors Affecting Student Attitudes Toward Flexible Online Learning in Management Education. *The Journal of Educational Research*, *98*(6), 331–338. doi:10.3200/JOER.98.6.331-338

Dziuban, C., Hartman, J., & Moskal, P. (2010). *Blended Learning and the Generations.* Retrieved from University of Central Florida: Center for Distributed Learning: http://dl.ucf.edu/files/2010/04/Online-blended-generations-presentation.ppt

Dzuiban, C., Hartman, J., & Moskal, P. (2004). Blended Learning. *EDUCAUSE Research Bulletin*, *7*, 2–12.

Friesen, N. (2012). *Report: Defining Blended Learning.* Retrieved from Learning Spaces: http://learningspaces.org/papers/Defining_Blended_Learning_NF.pdf

Garrison, D., & Vaughan, N. (2007). *Blended Learning in Higher Education: Framework, Principles and Guidelines*. San Francisco, CA: Jossey-Bass. doi:10.1002/9781118269558

Gau, T. (2012). Combining Tradition with Technology: Redesigning a Literature Couse. In F. Glazer (Ed.), Blended Learning: Across the Disciplines, Across the Academy (pp. 87 - 114). Sterling: Stylus Publishing.

Glazer, F. (2012). Introduction. In F. Glazer (Ed.), Blended Learning: Across the Disciplines, Across the Academy (pp. 1 - 12). Sterling: Stylus Publsihing.

Goldbert, A., & Riemer, F. (2006). All Aboard-Destination Unknown: A Sociological Discussion of Online Learning. *Education Technology and Society*, *9*(4), 166–172.

Hartwell, R., & Barkley, E. (2012). Blended, With a Twist. In F. Glazer (Ed.), Blended Learning: Across the Disciplines, Across the Academy (pp. 115 - 126). Sterling: Sylus Publishing.

Khan, S. (2012, October 2). Why Long Lectures are Ineffective. *Time Magazine*. Retrieved from http://ideas.time.com/2012/10/02/why-lectures-are-ineffective/

Krathwhol, D. (2002). A Revision of Bloom's Taxonomy: An Overview. *Theory into Practice, 41*(3), 212 218.

Manochehri, N., & Young, J. (2006). The Impact of Student Learning Styles with Web-based Learning or Instructor-based Learning on Student Knowledge and Satisfaction. *The Quarterly Review of Distance Education*, *7*(3), 313–317.

Mathews, D. (1999). The Origins of Distance Education and Its Use in the United States. *T.H.E. Journal*, *27*(2), 54–66.

Northern Arizona University. (2010). *The Student Experience in Brief: NAU*. Northern Arizona University.

Northern Arizona University. (2012). *Academic Chairs Council Committee Report on Faculty Evaluation & Student Success (CFESS)*. Northern Arizona University.

Northern Arizona University. (2013, November 22). *FYLI: First Year Learning Initiative*. Retrieved from Northern Arizona University: http://www2.nau.edu/fyli-p/wordpress/

Osguthorpe, R., & Graham, C. (2003). Blended Learning Environments: Definitions and Directions. *The Quarterly Review of Distance Education*, *4*(3), 227–233.

Richardson, J., & Swan, K. (2003). Examining Social Presence in Online Courses in Relation to Students Perceived Learning and Satisfaction. *Journal of Asynchronous Learning Networks*, *7*(1), 68–88.

Sampson, P., Leonard, J., Ballenger, J., & Coleman, J. (2010). Student Satisfaction of Online Courses for Educational Leadership. *Online Journal of Distance Learning Administration, 13*(3). Retrieved from http://www.westga.edu/~distance/ojdla/Fall133/sampson_ballenger133.html

Staker, H., & Horn, M. (2012). *Classifying K-12 Blended Learning*. Retrieved from Clayton Christensen Institute for Disruptive Innovation: http://www.innosightinstitute.org/innosight/wp-content/uploads/2012/05/Classifying-K-12-blended-learning2.pdf

Svinicki, M. (2004). *Learning and Motivation in the Postsecondary Classroom*. Boston: Anker.

U.S. Department of Education. (2009). *Evaluation of Evidence-based Practices in Online Learning: A Meta-analysis and Review of Online Learning Studies*. Washington, DC: U.S. Department of Education.

Vaughn, N. (2007). Perspectives on Blended Learning in Higher Education. *International Journal on E-Learning*, *6*(1), 81–94.

Zhao, Y., Lei, J., Yan, B., Lai, C., & Tan, S. (2005). What Makes the Difference: A Practical Analysis of Research on Effectiveness of Distance Education. *Teachers College Record*, *107*(8), 1836–1834. doi:10.1111/j.1467-9620.2005.00544.x

KEY TERMS AND DEFINITIONS

Active Learning: Learning through doing and applying, not passively absorbing content through reading or lectures.

Blended Learning: The intentional, complimentary fusion of online and face-to-face teaching and learning into a harmonious whole.

Institutional Support: Mechanisms put in place by the college or university to facilitate course redesign (such as blended courses) including expertise and funding.

Instructional Design: The systematic theory-based development of instructional delivery methods and approaches.

Recursive Course Structure: Cyclic nature of active learning activities in a blended course involving in-class, online and out-of-class collaborative activities complementing and reinforcing each other.

Retention: Student success as evidenced through continuing and increased enrollments.

Scaffolding: The intentional inclusion of early and frequent feedback opportunities including low-stakes learning activities to promote student responsibility and allow for timely intervention with students who may benefit from more support (tutoring, counseling etc.).

Student Engagement: The motivation and active involvement of students in their own learning, non-passive learning.

This work was previously published in Models for Improving and Optimizing Online and Blended Learning in Higher Education edited by Jared Keengwe and Joachim Jack Agamba, pages 129-146, copyright year 2015 by Information Science Reference (an imprint of IGI Global).

Chapter 46
The Effects of Problem-Based Learning with Flipped Classroom on Elementary Students' Computing Skills:
A Case Study of the Production of Ebooks

Chia-Wen Tsai
Ming Chuan University, Taiwan

Pei-Di Shen
Ming Chuan University, Taiwan

Yu-Jui Lu
Ming Chuan University, Taiwan

ABSTRACT

This study investigated, via quasi-experiments, the effects of problem-based learning with flipped classroom (FPBL) on the development of students' learning performance. In this study, 144 elementary school students were selected from six grade sections taking a course titled 'Production of Ebook', and were assigned into the following three groups: FPBL group (n = 50), PBL group (n = 48), Control group (n = 46). The authors collected both quantitative and qualitative data, including interviews with students and teacher's journal. Based on the analysis in this study, it is found that the effect of FPBL on improving students' learning performance was significantly higher than other teaching methods investigated. This research provides an innovative design and illustration of PBL for teachers, educators, and schools which pay attention to enhancing students' learning performance.

DOI: 10.4018/978-1-4666-8246-7.ch046

INTRODUCTION

In this age of digital technology, students have more opportunities for contact with digital electronic products, including personal computers, tablet computers, and smart phones. The functions of these products include rich video and audio effects, various software applications, and Internet connections. With the popularization of Internet access, increase in bandwidth, and applications of cloud technology, there are numerous opportunities for students to use various Internet applications. Recently, it was found that an average student who graduated from a university in the U.S. has spent less than 5000 hours on studying but over 10,000 hours on computer games, email, and social networking sites (Deshpande & Huang, 2011). Moreover, online learning is increasingly common in recent years (King, 2008). Other research indicates that 65% of higher educational institutions offer courses with Internet access for students to study, and as many as 63% offer university-level online learning courses (Allen & Seaman, 2013).

Accordingly, the researchers in this study discussed this topic with some teachers teaching computing courses in elementary schools and found that students are highly interested in the content of the computer courses at school. Yet, after observing how students use computers after school, it was found that most of them simply go online to play games or browse social networking sites. Unfortunately, that type of usage of computers and networks is not for learning or practicing what they have learned in computing courses.

On the positive side, with the development of the Internet technology, there are many applications and more feasible opportunities for online learning. Flipped classroom is one such innovative teaching model. Traditionally, a teacher teaches in a classroom and her/his students go home to do their homework. Teaching in a flipped classroom offers students a video of the course content so that they can study in advance. Then, students perform and join learning activities such as practice and group discussions in the traditional classroom environment (Herreid & Schiller, 2013). The change in time and space of teaching helps to improve teacher-student interactions and discussion in the classroom (Miller, 2012). The idea of flipped classrooms is a popular topic in education reform and innovation. According to the report of a survey regarding flipped classroom by Classroom Window in June 2012, 67% of teachers believed that their students' learning effects were improved with the flipped classroom model, and 80% of teachers indicated that their students' learning attitudes were improved. Furthermore, 99% of the interviewed teachers would continue using the flipped classroom model next year (Francl, 2014). The advantages of flipped classroom include offering students a more diversified learning method, increasing in-class discussions and interactions, and achieving individual learning based on each student's competence (Herreid & Schiller, 2013). Therefore, this study aimed to apply the flipped classroom model in a computer course to explore the beneficial effects of this model on students' computing skills.

One of the authors in this study is a computing teacher in an elementary school. Based on the authors' reflections and teaching experience, it is found that students experience a disconnect with their learning in computing courses. In Taiwan, elementary school students are required to take computing courses; however, after students learn to use computer software, they still cannot apply it in their daily lives. They rarely have experience in solving a real problem with a computer (Lee, Shen, & Tsai, 2008). Problems in real life are much more complex than those in text books. Thus, students' learning must be connected to field experiences and their ability to solve problems should be improved via critical thinking (Chan & Ho, 2014). It is indicated that teachers' adoption of problem-based learning (PBL) and teaching design for students' learning activities is helpful for students' learning through problem-solving and directing of their knowledge (Schwartz, 2013). Therefore, the researchers integrated PBL with flipped classroom, and explored the effects on improving students' learning performance.

LITERATURE REVIEW

Flipped Classroom

In a flipped classroom, students can perform collaborative learning with their classmates and teacher with knowledge learning completed in advance (Bergmann & Sams, 2012). The key of a flipped classroom is not how the teacher creates the before-class preview video, but how teaching interactions will be performed in class (November & Mull, 2012). Watching a teaching video helps students to absorb some basic knowledge. When the class begins, the teacher can offer her/his help to each team or individual based on students' specific needs (Sams & Bergmann, 2013).

In traditional teaching, teachers begin with low-level cognitive teaching goals. Their lecturing is one-way as they teach students concepts to be memorized and comprehended, and integrate some examples and news events in order to raise the cognitive goals to incorporate applications, analyses, evaluations, and creation. Then, students' high-level concepts are self initiated (Herreid & Schiller, 2013). Yet, in a flipped classroom, students watch an easy-to-comprehend video at their own pace and then develop their high-level cognitive goals with assistance from their peers and teacher. This process allows students to actively explore and learn through cooperation, and further develop their cognitive competence (Sams & Bergmann, 2013).

In some universities, flipped classroom has already improved students' learning in courses including biology, mathematics, and physics. In class, students can directly ask questions when they encounter something they do not understand. They are inspired to keep an active attitude toward learning, to discuss with classmates, and have more opportunities to correct their vague concepts (Berrett, 2012). In a flipped classroom, peers' help could improve the process of learning and internalizing knowledge. Students' resulting levels of comprehension and capability to resolve problems are higher than those taught through a traditional teaching method (Dasgupta & Tuttle, 2013; Crouch & Mazur, 2011). Thus, flipped classroom is applied in this study to enhance students' computing skills in producing Ebook.

Problem-Based Learning

PBL is considered as one of the most primitive learning methods of human beings before classrooms and courses (Boud & Feletti, 1998). Because humans are always solving problems, what one has learned from the process of solving a problem is absorbed and internalized. Thus, solving problems is one of the most natural learning methods. PBL stresses adopting a teaching model based on problems and developing learners' abilities to think and to solve problems in real situations in order to internalize important concepts in courses (Tarmizi & Bayat, 2012). This learning model places learners' focus on problems themselves instead of on an individual academic subject. Teachers come up with unstructured vague questions regarding a structured issue to facilitate their students to use resources in more multi-dimensional ways. Then, students can learn to understand problems and to find solutions through discussions and develop the concept of integration (Budé, Imbos, vd Wiel, Broers, & Berger, 2009).

PBL is an approach in which students attempt to find a solution to a problem in a real situation, usually incorporating teamwork (Hatısaru & Küçükturan, 2009). Teachers can arrange a real situation with a problem, and help students to internalize their knowledge (Hmelo & Lin, 2000). In PBL, students resolve real problems from daily life, which generally increases their curiosity and maintains their learning motivation. Through PBL, students can obtain positive learning experiences from the process of solving problems as it also encourages students to study, obtain permanent knowledge, and develop their confidence (Celik, Onder, & Silay, 2011).

It is reported that PBL could result in better learning effects than traditional teaching. In students' understanding of mathematical knowledge under learning of mathematical concepts, self-learning, exploration and resolving problems is better with PBL than traditional teaching (Tarmizi & Bayat, 2010). PBL allows teachers to review their students' tasks at each stage and offer feedback to ensure completion of each learning stage (Pearson, 2006). Students' learning motivation and cognitive capability can be increased through learner group interactions, feedback, and problem solving. When PBL is applied to an online course, learners' critical thinking can be enhanced (Şendağ & Ferhan Odabaşı, 2009). One reason for this is that in order to solve problems, students should adopt effective learning strategies. For example, they may enhance their memory and thinking capability. During the process, their cognitive development can also be improved (Tarmizi & Bayat, 2012). Therefore, PBL is integrated in the implementation of flipped classroom to improve students' learning performance.

METHOD

Participants

The participants in this study were 144 sixth-grade elementary school students. Among them, 61 were male, 83 were female. These students did not have prior experience in editing an Ebook nor using software for editing Ebook. The researchers first checked that that students participating in this study had computers with Internet access at home. The experiment was designed with three groups: The first was the group learning through flipped classroom and PBL (FPBL group, n=50), the second was the group learning through PBL (PBL group, n=48), while the last one was the control group without PBL nor flipped classroom (Control group, n=46).

Course Setting

In this study, the computer course was 20 weeks long. During the first five weeks, the topics included operation of the Internet, computer hard drive, information literacy, paper-book layout introduction combining a reading course provided by the school, and cloud library. During the subsequent 15 weeks, the students learned to use Zmaker, a software package for creating Ebooks, along with Photocap, an image editing software package, and edited and produced their Ebooks.

The teacher introduced the features and interface of the Ebook software, and the students were divided into teams for learning. Each team had to decide their Ebook subject, set a schedule and actually create two Ebooks through collaboration and discussion based on the knowledge and skills they had learned. The teaching goal of this course, in the aspect of cognition, was to help students create Ebooks; in the aspect of affection, it was to inspire the students' creativity through grouping and improve their abilities of communication and coordination; and in the aspect of skills, it was to help the students to learn to use Ebook editing software.

Interventions

The Intervention and Design of Flipped Classroom

In the flipped classroom for FPBL group, the teacher introduced how to use Moodle, a learning platform, in the class, so that the students could use it to share files and have online discussions. The students were asked to watch the teacher-produced teaching videos in advance at home. They were told that they would be grouped in the class to create Ebooks.

The students watched the teaching videos at home and discussed with their classmates through the Moodle platform. They could also ask questions through this course website. Before each class, the teacher recorded a ten-minute teaching video. The video contents became more and more complex as the production contents got more and more complicated and refined. In the class, the teacher played the role of a guide, assigning tasks to the groups, engaging them in discussions, introducing course contents step by step, and interacting with the students. During discussions, the teacher offered guidance to students. This experiment combining flipped classroom and PBL was a one-semester activity, with a 40-minute class every week. Based on the contents of the pre-recorded videos for flipped classroom and group discussions, Ebooks were produced. From the process of collecting materials, editing, using software, and discussions upon discussions, the knowledge of how to create Ebooks was built. Finally, by the end of the semester, the Ebooks produced by teams in FPBL group were presented.

The Intervention and Design of Problem-Based Learning

In the PBL teaching model for FPBL group and PBL group, the students were guided by the teacher to edit and create their Ebooks. In the initial stage, the teacher created an interesting and challenging atmosphere by first introducing the functions of Zmaker, demonstrating how to use the software, then asking the students to practice the basic functions. After the software function practice, the teacher grouped the students and asked them to discuss how to create an Ebook with Zmaker in accordance with the situations the teacher designed. In the class, the teacher played the role of a guide, assigning tasks to the groups and engaging them in discussions, introducing course contents step by step, and interacting with the students. The groups were required to follow the editing process to complete the initial version of their Ebooks. The students were required to create Ebooks according to the guidelines. Through the process of collecting materials, editing, using software, and discussions upon discussions, the knowledge of how to create Ebooks was built. Finally, by the end of the semester, the Ebooks made by teams in PBL group were presented.

Intervention for Control Group

The Control group received traditional lecture instruction with the same hours and tasks as those in FPBL group and PBL group. Although students were also required to create Ebooks, they completed the requirements based on the teacher's lectures, and did not interact through peer discussions, nor did they learn in a flipped classroom.

Measurement

The teacher in this study first checked whether students had any experience in using any Ebook editing software before this course. The students involved in this study expressed that they did not have any related prior experience. Thus, the researchers could rule out the potential factor that students' learning performance resulted from previously learned editing skills.

The teacher in this study evaluated students' designs and Ebooks based on the core components of Ebook design (Jonathan, 2011), which is comprised of text content, presentation, and work setting. The text content scores are based on correctness of word use, creativity, and information use ethics. The presentation scores are based on graphic design and layout and overall aesthetics. The work setting scores are based on animation setting and background setting. This study then attempted to explore the effects of flipped classroom and PBL on improving students' learning performance.

Table 1. Comparison of grades: FPBL group and PBL group

Group	n	Mean	S. D.	F	t-value	df	*p*
FPBL group	50	94.36	3.009	3.082	2.953	89.795	.004**
PBL group	48	92.79	2.202				

**p*<0.05, ** *p*<0.01

RESULTS

Quantitative Analysis

The Effects of Flipped Classroom

The independent sample t-test was used in this study to investigate the effects of FPBL on improving students' learning performance. The results are reported in Table 1. The average score of the FPBL group (94.36) was significantly higher than that of the PBL group (92.79). Therefore, it is believed that flipped classroom could lead to better development of students' computing skills in designing Ebook.

The Effects of Problem Based Learning

As for the effects of PBL on students' enhancing computing skills, based on the data shown in Table 2, there is no significant difference in students' computing skills between PBL group (92.79) and Control group (93.52). That is, the expected effect of PBL is not found in this study.

Qualitative Analysis

As for the combined effects of FP and PBL, based on the interviews conducted, it is found that the students were still unfamiliar with Ebook editing even though they had taken some computer-related basic courses before. In this study, the combination of flipped classroom with PBL could improve students' learning effects, so that students could be more efficient when editing their Ebooks at school and have more time for practice. Some of the interviewed students reflected on their learning and made the following statements:

S1: I watched the recorded video of the Ebook course at home. Then, when I went to school, I could directly start to create (my Ebook), unlike before when I had to follow the examples in the textbooks. Now, I can present my ideas through Ebooks. I found a lot of stories behind idioms and novels as the materials for my Ebooks.

S3: I love this course of Ebook. In this course, I learned different modules and functions. During the process, there were videos as supplementary materials. I searched for images, uploaded my editing, created my Ebooks, and even found someone online to teach me how to modify images using photo-cap so that my Ebooks could be even better.

S6: If there was an exam question that I did not know how to solve, I would try to find the solutions in the teaching videos (in the flipped classroom).

After a semester of learning activities in a PBL environment, the students affirmed this series of problem-solving and learning processes. They believed that PBL could raise their learning motivation and they were able to practically resolve the problems encountered while creating their Ebooks. Finally, they all produced Ebooks on the subjects assigned by their teacher. Some interviewed students expressed their thoughts:

S1: Every time when our teacher asked us a question, we went through all the possibilities and finally we made decisions through discussions.

S5: I enjoyed creating Ebooks with my classmates. I had made a few mistakes; however, we col-

Table 2. Comparison of grades: PBL group and control group

Group	n	Mean	S. D.	F	t-value	df	*p*
PBL group	48	92.79	2.202	9.776	-1.23	92	.222
Control- group	46	93.52	3.443				

$*p<0.05$, $**\ p<0.01$

> lected the ideas of all the team members and came up with solutions. It was a wonderful experience. We worked as a team. Even we had some conflicts, there was nothing too serious.

According to the result of the qualitative analysis, after the students participated in the experiment combining flipped classroom and PBL, they developed some initial concepts regarding Ebook editing. They were also able to create personal pages and the content for the Ebooks of their group. During the PBL process, students had to resolve problems through discussions and work as a team. The effect of PBL was positive and proper such that students could obtain various experiences through individual learning and group discussions and learn the computing skills required for Ebook editing.

DISCUSSION

This study combined flipped classroom with PBL for the purpose of improving students' learning effects. According to the instructional design and the results of this study, contribution was made to e-learning theory in three ways. Firstly, in the flipped classroom applied in this study, the students could receive feedback immediately in class, so that they were able to find solutions to their problems and improve their computing skills. Secondly, this study offered an online teaching environment, a PBL online platform, for the purpose of computer skill learning. Through this, these elementary school students could get used to online learning and self-directed learning earlier than many of their peers. Finally, this study may be one of the early attempts that simultaneously adopted an innovative teaching method of combining flipped classroom and PBL to improve students' learning. The approach and experience of the adoption of new education models can be used as a reference for other teachers in related courses.

This study explored the effects of combining flipped classroom and PBL on improving students' learning performance. The results show that the average computer score of the students receiving flipped classroom (FPBL group, mean = 94.36) intervention was significantly higher than that of the students not receiving flipped classroom (PBL group, mean = 92.79) (p=0.004) intervention. This finding in the present study is similar to that of Bergmann and Sams's (2013) study, which was that flipped classroom could help improve students' learning. Thus, this study suggested that teachers can consider integrating activities combining flipped classroom and PBL in their courses in order to improve their students' learning performance.

Different from the inflexible models of traditional teaching, the combination of flipped classroom and PBL allows students to perform initial learning to discover their own problems, inspire them to have an active learning attitude and create an atmosphere of cooperative learning. Peer assistance can be helpful for facilitating the process of absorbing and internalizing knowledge (Herreid & Schiller, 2013). Furthermore, with the teacher's assistance, the students were encouraged to actively find problems and resolve them. The goal of interactive learning was achieved as the students were guided and assisted by the teacher and discussed with their team members face to face. Through the interview records, it was found that the students from the FPBL group, during their learning process, not only learned the skills to edit Ebooks, but also expanded their learning through using other software. At school, under the framework of PBL, the students had more time to create Ebooks and more opportunities to work on different subjects, so they became more interested in learning. Thus, the intervention of flipped classroom and PBL could result in better development of students' computing skills.

With regard to the effects of PBL on the development of students' computing skills, the data shown in Table 2 indicates the difference of students' computing skills between PBL group (92.79) and Control group (93.52) is not significant statistically ($p = 0.222$). The expected effect of PBL is not found in this research. A potential reason may be that the students have received the traditional spoon-feeding or didactic approach of teaching in previous computer-related courses and thus were not familiar with the PBL method as this was their first experience. Moreover, in the problems-solving processes, possibly students could not put themselves into the situations of the problems due to the time pressure, which may have further resulted in the insignificant difference of students' computing skills between PBL group and Control group. It may also be true that the creation of an Ebook is inherently a problem-based activity, thus making it difficult to distinguish between the effects of PBL and Control group approaches.

CONCLUSION

In this research, it is found that the adoption of flipped classroom could result in better development of students' computing skills in producing Ebooks and improved the quality of students' assignments. As the students learned through the online course at home, during the class they were more efficient in problem solving and discussions. The class time could be more meaningful, as well as allow for discussion of higher-level problems, and the teacher could offer timely assistance. Thus, the effect of FPBL on students' learning was positive and significant. The researchers in this study expect that the design and integration of FPBL, and the lack of significant effect found in the implementation of PBL alone can provide references for teachers who plan to provide flipped classroom or implement PBL in their courses.

Limitations

This study adopted the experimental method of two experimental groups and one control group. The results may have been influenced by other potential factors. For example, the teacher may have spent more time and efforts on the students in the experimental groups, who may have known that they were under experiment so that their performances were influenced. In addition, the Hawthorne effect or the John Henry effect may be at play as the students from the control group were not to be outdone, causing bias in this study. Teachers and researchers who may adopt the flipped classroom and PBL in this study should be aware of these factors that may influence the effects claimed in this study.

REFERENCES

Allen, I. E., & Seaman, J. (2013). *Changing Course: Ten Years of Tracking Online Education in the United States*. Newburyport, MA: Sloan Consortium.

Bergmann, J., & Sams, A. (2012). Why Flipped Classrooms Are Here to Stay [Online forum comment]. Retrieved from http://www.edweek.org/tm/articles/2012/06/12/fp_bergmann_sams.html

Berrett, D. (2012). How 'Flipping'the classroom can improve the traditional lecture. *The Chronicle of Higher Education,* Retrieved from http://moodle.technion.ac.il/file.php/1298/Announce/How_Flipping_the_Classroom_Can_Improve_the_Traditional_Lecture.pdf

Boud, D., & Feletti, G. (1997). *The challenge of problem-based learning*. London: Kogan Page.

Budé, L., & Imbos, T., vd Wiel, M. W., Broers, N. J., & Berger, M. P. (. (2009). The effect of directive tutor guidance in problem-based learning of statistics on students' perceptions and achievement. *Higher Education*, *57*(1), 23–36. doi:10.1007/s10734-008-9130-8

Celik, P., Onder, F., & Silay, I. (2011). The effects of problem-based learning on the students' success in physics course. *Procedia: Social and Behavioral Sciences*, *28*, 656–660. doi:10.1016/j.sbspro.2011.11.124

Chan, L. S., & Ho, L. M. (2014). Problem-Based Learning in the Field Setting. In *Geoscience Research and Outreach* (pp. 55–77). Springer Netherlands. doi:10.1007/978-94-007-6943-4_5

Deshpande, A. A., & Huang, S. H. (2011). Simulation games in engineering education: A state-of-the-art review. *Computer Applications in Engineering Education*, *19*(3), 399–410. doi:10.1002/cae.20323

Francl, T. J. (2014). Is Flipped Learning Appropriate? *Journal of Research in Innovative Teaching*, *7*(1), 119–128.

Hatısaru, V., & Küçükturan, A. G. (2009). Student views on problem-based learning of 9th grade industrial vocational high school. *Procedia: Social and Behavioral Sciences*, *1*(1), 718–722. doi:10.1016/j.sbspro.2009.01.126

Herreid, C. F., & Schiller, N. A. (2013). Case studies and the flipped classroom. *Journal of College Science Teaching*, *42*(5), 62–66.

Hmelo, C. E., & Lin, X. (2000). Becoming self-directed learners: Strategy development in problem-based learning. In D. Evensen & C. E. Hmelo (Eds.), *Problem-based learning* (pp. 227–250). Mahwah, NJ: Erlbaum.

Jonathan. (2011, February 7). The 13 Core Components of E-Book Design. [Web blog message]. Retrieved from http://www.bybloggers.net/13-ebook-design-elements/

King, E. (2008). Can PBL-GIS work online? *The Journal of Geography*, *107*(2), 43–51. doi:10.1080/00221340802202237

Lee, T. H., Shen, P. D., & Tsai, C. W. (2008). Enhancing computing skills of low-achieving students via e-learning: A design experiment of web-based, problem-based learning and self-regulated learning. *Cyberpsychology & Behavior*, *11*(4), 431–436. doi:10.1089/cpb.2007.0080 PMID:18721091

Miller, A. (2012). *Five best practices for the flipped classroom.*

November, A., & Mull, B. (2012). Flipped learning: A response to five common criticisms. Retrieved from http://novemberlearning.com/educational-resources-for-educators/teaching-and-learning-articles/flipped-learning-a-response-to-five-common-criticisms-article/

Pearson, J. (2006). Investigating ICT using problem-based learning in face-to-face and online learning environments. *Computers & Education*, *47*(1), 56–73. doi:10.1016/j.compedu.2004.09.001

Sams, A., & Bergmann, J. (2013). Flip Your Students' Learning. *Educational Leadership*, *70*(6), 16–20.

Schwartz, P. (2013). Forward from the Retreat. In Schwartz. P & Mennin. S & Webb. G (Eds.), Problem-based learning (pp. 60-67). New York, NY: Psychology Press.

Streiner, D. L. (2013). 22 A checklist for evaluating the usefulness of rating scales. A guide for the statistically perplexed. *Selected Readings for Clinical Researchers, 267*.

Tarmizi, R. A., & Bayat, S. (2010). Effects of problem-based learning approach in learning of statistics among university students. *Procedia: Social and Behavioral Sciences*, *8*, 384–392. doi:10.1016/j.sbspro.2010.12.054

Tarmizi, R. A., & Bayat, S. (2012). Collaborative problem-based learning in mathematics: A cognitive load perspective. *Procedia: Social and Behavioral Sciences*, *32*, 344–350. doi:10.1016/j.sbspro.2012.01.051

This work was previously published in the International Journal of Information and Communication Technology Education (IJICTE), 11(2); edited by Lawrence A. Tomei, pages 32-40, copyright year 2015 by IGI Publishing (an imprint of IGI Global).

Chapter 47
Barriers to Blended Teaching and Learning in Sub-Saharan Africa:
Challenges for the Next Decade and Beyond

Nwachukwu Prince Ololube
University of Education, Nigeria

Kennedy E. Umunadi
Delta State University, Nigeria

Peter James Kpolovie
University of Port Harcourt, Nigeria

ABSTRACT

This chapter explains the need to better design blended teaching and learning curricula, the need to address infrastructural problems, and the need to organise programmes so that faculty and students can better plan for unanticipated and unintended situations that confront them in the teaching and learning processes. Improving the quality of education through the diversification of content and methods and promoting experimentation, innovation, the diffusion and sharing of information, and best practices are among UNESCO's recent strategic objectives in education. Discussions in this chapter centre on (1) the contexts of blended teaching and learning, (2) the barriers to blended learning usage, integration, and diffusion, and (3) the need to consider policy outcomes when evaluating blended teaching and learning resources. This study uses a qualitative research method, as both document materials and observation were an essential part of this chapter. This study concludes that the great enthusiasm around blended teaching and learning in sub-Saharan Africa has been dampened by inadequacies in essential services and infrastructures, such as electricity and telecommunication services, and institutional, socio-cultural, and economic barriers. Nonetheless, the development of blended teaching and learning resources continues.

DOI: 10.4018/978-1-4666-8246-7.ch047

INTRODUCTION

Amid the advent of the blended learning revolution (Graham, 2005), the world is witnessing an expansion of blended teaching and learning. This revolution enabled academic institutions to provide flexible and more open teaching and learning environments for faculty and students. The convergence and availability of new blended learning technologies such as computers, satellites, WebCT, PowerPoint, and other learning and fibre optic technologies is making it easier for institutions to implement and achieve their educational objectives (Nel, 2005; Akhahowa & Osubor, 2006). Blended teaching and learning methods have become the foremost tools in some learning institutions and have had a remarkable impact on how educational development is viewed around the world. Blended Learning involves a combination of face-to-face and technology-based learning, distinct from other learning strategies that is highly conducive to faculty teaching and increased students learning (Ololube, 2011). This revolution, however, is not a universal one and needs to be reinforced to reach a larger percentage of the student population worldwide (Nel, 2005; Mac-Ikemenjima, 2005; Olalekan, 2012; Mpofu, Chimhenga, & Mafa, 2013).

The effective use of blended learning as a method in the teaching and learning processes addresses many of the problems associated with technology-based learning, seeking synergistic results that benefit faculty and students as they move beyond their studies and execute their responsibilities as professionals. In order to demonstrate the previous assertion, this paper will embark on a discussion of blended learning and the factors that hinder its effective use in educational institutions as means of achieving educational objectives in sub-Saharan Africa. Blended teaching and learning are central to enabling us to better manage contemporary complex information flows and integrating these flows into effective teaching and learning aimed at the maximisation of human capital. To this end, we must develop integrated methods and training modules that enable blended teaching and learning application.

Stakeholders, parents, governments, faculty and students rely on universities to educate those enrolled through certification and accreditation in approved programmes. Still, despite efforts by sub-Saharan African governments to establish these programmes to help in the preparation of an effective workforce (Nel, 2005; Yusuf, 2005a, 2005b, 2006; Ololube, 2011; Ololube, Amaele, Kpolovie, & Egbezor, 2013), a number of fundamental problems have incapacitated their full development. These same problems have hindered the successful implementation of blended teaching and learning in institutions of higher education. More than half of the students and lecturers in sub-Saharan Africa, for example, lack e-knowledge and most students have limited (or no) experience in the use of WebCT's interactive features (such as discussion forums and assignment submission) (Nel, 2005). Likewise, Yusuf's (2005a) study, which investigated teachers' self-efficacy in implementing computer education in Nigerian schools, found that most teachers in Nigeria lack competence in using computers and computer software for educational purposes. Another recent study (Mpofu, Chimhenga, & Mafa, 2013) found that most of the professionals employed in Zimbabwe Open University (ZOU) Regional Centres are not effectively trained in the design and use of e-learning materials. As a result, where computers have been secured e-learning as a form of blended learning is not used to interact with the student on a regular basis.

The popularity of blended teaching and learning methods has brought swift changes in educational technology and has caused a global educational and economic transformation, particularly in developed countries. To be effective in the innovations relevant to blended teaching and learning, faculty need training not only in computer literacy but also in the application of various kinds of educational software; they need to learn how to integrate blended teaching learning into their academic activities (Ololube, 2006a, 2006b).

The quality of faculty in higher education institutions is widely accepted as a main predictor of the quality of student learning (Ololube, 2011). Faculty training is thus crucial in the adoption of blended teaching and learning methods. Higher education in this paradigm refers to the post-secondary section of the national education system delivered in Universities, Polytechnics and Colleges of Technologies including courses provided by Colleges of Education and such institutions as may be allied to them (Ololube, Ubogu, & Egbezor, 2007). Information Technology (IT) and Information Systems (IS) are tools that can both facilitate faculty training and help faculty to take full advantage of the potential of technology to enhance student learning through effective integration of blended learning programmes. IT and IS have ushered in a new era in teaching methods and offer new educational experiences to both faculty and students (Ololube et al., 2013). In a complex society like Nigeria, however, there are still many factors that affect the usage and integration blended learning methods.

BACKGROUND

The higher education landscape in sub-Saharan Africa includes the teaching and learning process, educational programmes and courses, the pedagogy or methodology of teaching, the research process, including publication and the dissemination of knowledge, libraries and information services, on-line education options, etc. Despite these many dimensions, the majority of the higher education institutions in the region are not accomplishing their stated objectives and are in no particular hurry to redesign their programmes to ensure that faculty are thoroughly prepared for their role in improving curriculum, instruction and student academic achievement through blended learning (Ololube, 2011; Fry et al., 2006).

Sub-Saharan African countries (See Figure 1) have fared poorly on the various indices used to assess a country's readiness to participate in the information age, despite their abundant resources (Ifinedo & Ololube, 2007; Ifinedo, 2005b, Ifinedo & Uwadia, 2005). This lack of readiness has largely been attributed to corrupt practices. Sub-Saharan Africa has enormous economic potential. It has a vibrant private sector, highly motivated entrepreneurs, and a large domestic market. It represents the world's largest reservoir of natural resources, including petroleum, natural gas, tin, coal, limestone, zinc, columbite and lead. In spite of these resources, however, its progress towards meeting the Millennium Development Goals (MDGs) has been very slow. According to the International Monetary Fund (IMF) (2012), increased public spending on education alone is not the answer; the quality and equity of spending are equally important.

According to the 2006 World Bank Report, countries in Africa remain the world's largest development challenge. More than 314 million

Figure 1. Map of Africa showing sub-Saharan African countries
Source: Wikipedia, the free online encyclopedia.

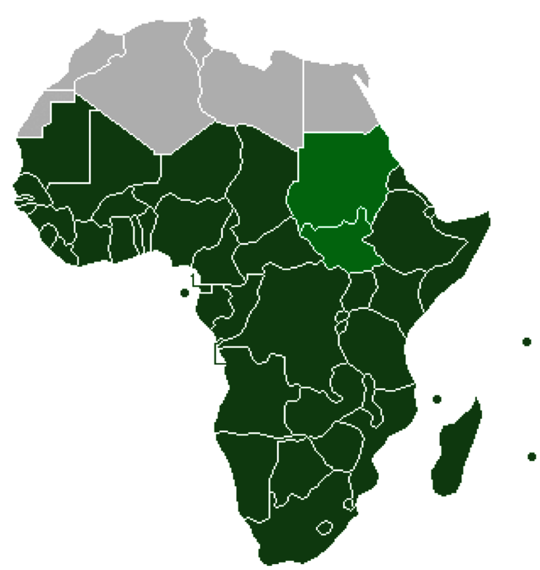


Table 1. Socio-economic indicators for selected countries in sub-Sahara Africa, Western Europe, and North America

Country	Region	Population	Literacy Rate (%)	Life Expectancy	GDP per Capita	Internet Users	Electricity (KW) Production
Nigeria	Sub-Sahara Africa	170.1 m (July 2012)	61.03 (2010)	52.03 (July 2012)	US$ 2,700 (July 2012)	43,989 million (2009)	18.82 billion (2009)
Ghana	Sub-Sahara Africa	24.6 m (July 2012)	67.3 (2010)	61.45 (July 2012)	US$ 3,300 (July 2012)	1.297 million (2009)	8.764 billion (2009)
Cameroon	Sub-Sahara Africa	20.1 m (July 2012)	75.9 (2003)	54.71 (July 2012)	US$ 2,300 (July 2012)	748.600 thousand (2009)	5.589 billion (2009)
South Africa	Sub-Sahara Africa	48.8 m (July 2012)	86.4 (2003)	49.4 (July 2012)	US$ 11.300 (July 2012)	4.42 million (2009)	232.1 billion (2009)
U.K	Europe	63,05 m (July 2012)	99% (2003)	80.17 (July 2012)	US$ 36,700 (July 2012)	51.444 million (2009)	352.7 billion (2010)
Finland	Europe	5,3 m (July 2012)	100% (2012)	79.41 (July 2012)	US$ 36,500 (July 2012)	4,393 million (2009)	76.16 billion (2010)
Germany	Europe	81.3 m (July 2012)	99% (2003)	81.19 (July 2012)	US$ 39.100 (July 2012)	65.125 million (2009)	558 billion (2010)
USA	North America	313.8 m (July 2012)	99% (2003)	78.49 (July 2012)	US$ 49.800 (2012)	245 million (2009)	4.12 trillion (2010)
Canada	North America	34.3 m (July 2012)	99% (2003)	81.48 (July 2012)	US 41.500 (July 2012)	26.96 million (2009)	580.6 billion (2010)

Source: CIA: The World Factbook (last updated January 2013)

Africans—nearly twice as many as in 1981—live on less than $1 a day. Thirty-four of the world's 48 poorest countries, and 24 of 32 countries ranked lowest on the United Nations Development Programme's Human Development Index, are in Africa. Most African countries are heavily indebted, often to the IMF and World Bank. In order to reduce this burden, the Joint IMF-World Bank comprehensive approach to debt reduction has been designed to ensure that no poor country faces a debt burden it cannot manage. To date, debt reduction packages under the HIPC Initiative have been approved for 36 countries, 30 of them in Africa, providing US$76 billion in debt-service relief over time (IMF, 2013). Table 1 displays several comparative socio-economic indicators, perhaps collectively indicative of e-readiness, for select sub-Sahara African, Western European and North America countries.

GLOBALISATION AND TECHNOLOGY EDUCATION

National economies, and even national cultures, are globalising. Everything, including relations among family and friends, are rapidly being organised around a much more compressed view of space and time (Carnoy, 2005). Globalisation means that national borders do not limit a nation's investment, production, and innovation, and that competition for local businesses is no longer limited to a physical city or region.

According to Tabb, Queens College and the Grad Centre (n.d), we are often told today that education can only be rendered more efficient by adopting a market model and moving away from the notion of education as a publicly provided and monitored social good. This manifestation of neoliberalism—the belief that today's problems are best addressed by the market and that government regulation and the public sector should remain as marginal as possible—is not unique to debates about education: it dominates economics, politics and social policy across most of the world.

Globalisation can be described as the emergence of altered global structures driven by a skill revolution, an organisational explosion, and a continuous flow of ideas, money, goods, and people that is rendering long-standing territorial boundaries increasingly obsolete and fostering an extensive decentralisation of authority (Pulkkinen, 2004). It is the concentrated increase in cross-border economic, social, and technological exchange and a process that leads to greater interdependence and mutual awareness (reflexivity) among economic, political and social units worldwide. One might be tempted to think of globalisation as only a matter of industry and business separate from national governance and systems of education. If we understand education as part of the future business climate of a country or as an important part of a country's service sector, then education can be seen to be at the core of the globalisation process. Some governments, for example, are trying to enhance their global competitiveness by reformulating the objectives of education policy to ensure the production of the "human capital" most appealing to global "buyers" (Webster in Pulkkinen, 2004). Post-secondary educators would do well to include their own future prospects as they consider the impact of globalisation in the coming years. The university will be a very different place in another decade or two, and what it will look like depends to a large degree on what version of globalisation is triumphant.

According to Stromquist (2005), globalisation today is a concept that everyone uses and, consequently, has acquired multiple meanings. Despite this multiplicity, two very different understandings are emerging: one in which the technological aspects are emphasised and another in which the economic and political aspects dominate. In both versions, education is posited as central. It is, for some, the major tool for incorporation into both the "knowledge society" and an increasingly technological economy. These are, arguably, exaggerated expectations. While education is being democratised, as more and more people achieve higher levels of schooling, education is only one factor among many in economic growth, and the societal rewards of education are quite finite, being felt mostly by those with the highest levels of education.

BLENDED LEARNING AND SUB-SAHARA AFRICA EDUCATION

Sub-Saharan African countries came late and slowly to the use of collaborative learning in all sectors, especially in education. This is as a result of the unceasing limitations brought about by economic disadvantages and government policies (Ololube, 2006b) that have direct consequences on educational development. The negative impacts are many and a large number of sub-Saharan higher education institutions are still unable to find effective ways to use technology assisted methods of teaching (blended learning) in their classrooms or any other aspect of their teaching and learning (Nel, 2005). The most common justification for this lack of success is that the use of technology in the classroom has not been encouraged and faculty members are not well trained in the use of computer aided instruction as a means for educational sustainability (Ololube, 2011).

A recent study conducted by Global Information Technology (2012), used the Networked Readiness Index (NRI), covering a total of 142 economies in 2011-2012, to measure the degree of preparation of a nation or community to participate in and benefit from ICT development. South Africa ranked 72nd out of the 142 countries surveyed, followed by Cape Verde 81st, Rwanda 82nd, Botswana 89th, Kenya 93rd, Ghana 97th, Senegal 100th, and.Nigeria 112th. Sweden topped the list, followed by Singapore, Finland, Denmark,

Table 2. The 2012 networked readiness index

Rank	Country/Economy	Score
1	Sweden	5.94
2	Singapore	5.86
3	Finland	5.81
4	Denmark	5.70
5	Switzerland	5.61
6	Netherlands	5.60
7	Norway	5.59
8	United States	5.56
9	Canada	5.51
10	United Kingdom	5.50
72	South Africa	3.87
81	Cape Verde	3.71
82	Rwanda	3.70
89	Botswana	3.58
93	Kenya	3.51
97	Ghana	3.44
100	Senegal	3.42
101	Gambia	3.41
105	Namibia	3.35
109	Zambia	3.26
112	Nigeria	3.22

Switzerland, Netherlands, Norway, United States, Canada, and the United Kingdom (See Table 2).

Given the results of the 2012 Networked Readiness Index, administrators and trainers must work to make educational technology an integral part of teaching and learning so as to provide a clear demonstration of how instructional technology tools can address the personal and general concerns of teaching and learning in sub-Saharan Africa.

In recent times, the integration of blended teaching and learning methods in higher education teaching has been the topic of much debate. Blended learning has impacted the quality and quantity of teaching, learning, and research in education institutions around the world. In concrete terms, blended learning methods and literacy in its methods has enhanced teaching and learning through its dynamic, interactive, and engaging content and has provided real opportunities for individualised instruction (Newhouse, 2002a). Educational systems around the world are thus under increased pressure to use new Information and Communication Technologies (ICTs) to impart to students the knowledge and skills required in the 21st century (Larose et al., 1999). Institutions that train teachers in turn are faced with the challenges of preparing a generation of teachers to effectively use the new learning tools in their teaching practices (UNESCO, 2002).

To Newhouse (2002b) technology has been developed to solve problems, improve living standards and to increase productivity. It is reasonable that we expect educational technology to have been developed with similar objectives. Ideally, educational technology should influence both educational outcomes and costs: if faculty members select the most appropriate educational technology and student learning is optimised, this means an increase in the value of the outcomes.

It has been argued (Creemers, 1994a) that faculty members who are focused on improving their competence are likely to contribute directly or indirectly to the growth of students' academic achievements. Similarly, studies concerning faculty training and education demonstrate the need to offer faculty better educational and development opportunities in order to increase job effectiveness (Kautto-Koivula, 1996). To this end, faculty need contemporary techniques, tools and assistance to help them develop blended learning based projects and activities designed to raise the level of teaching and improve student learning and academic achievement (Aduwa-Ogiegbaen & Iyamu, 2005). Realistically, the inclusion of blended learning materials in higher education is of little value if faculty members are not adept in their applications.

BARRIERS TO BLENDED LEARNING IN SUB-SAHARAN AFRICA

The zeal of institutions of higher learning to establish quality education programmes is not in contention in this paper. These institutions however are confronted with enormous challenges that often impede proper execution. The greatest of these is poor IT penetration and usage among education practitioners. This is compounded and driven by the fact that basic IT/IS infrastructures are inadequate in almost all African countries due to a lack of electricity to power IT materials, poor telecommunication facilities, and insufficient funds with spending on education generally reaching just 12% of national budgets.

Technological (ICT) Barriers

An on-going problem in the sub-Saharan African educational systems is the lack of attention paid to emerging innovations in education. The success of education depends upon its ability to identify and respond to technological changes in order to advance teaching and learning processes (Ololube, 2009). Over the years, a number of technological changes have taken place and involve the incorporation of modern tools into teaching and learning. These advances have created a rich global resource and collaborative environment for the dissemination of literacy materials, interactive discussions, research information, and the international exchange of ideas, all of which are critical for advancing meaningful educational initiatives, training highly skilled labour forces, and understanding emerging issues related to economic development.

As educational systems around the world are encouraged to use these new blended learning technologies to teach students the knowledge and skills they need to thrive in the 21st century, individual institutions face the challenging task of ensuring the financial and human resources needed to acquire and deploy these technologies in a teaching environment. African nations came late to the technological table and have progressed slowly in their use of ICT. Delayed access to basic ICT equipment, low Internet connectivity, a lack of computers, and inadequate use of audio-visual materials and equipment including films, slides, transparencies, projectors, globes, charts, maps, and bulletin boards, as well as programmed materials such as information retrieval systems and instructional television, remain barriers to the effective and professional development of students in the region.

Institutional Barriers

The basic barrier to the implementation of blended learning in educational programmes in sub-Saharan Africa is the issue of educational technology. One of the goals of educational technology is to provide as complete an education as possible to students. IT and IS knowledge and skills are essential today. Thus, educational technology allows students to stay up-to-date with computer and telecommunications technology. This is highly challenging if not impossible in sub-Saharan Africa where only limited efforts support the integration of technology in education. There are few to no blended teaching and learning methods that students can use to expand their perception and understanding of IT and IS. As a result, students often lack the language to access the contemporary terminology used in describing and deploying educational technology (Ololube, 2006a, b). It is also evident that policy makers, administrators and faculty members in developing countries lack the necessary expertise to manage new innovations, including the implementation and delivery of IT-enabled education (Mac-Ikemenjima, 2005, Nel, 2005).

Socio-Cultural Barriers

Socio-cultural barriers to blended teaching and learning include people's attitudes, behaviour patterns, gender, and demography. All of these factors have influenced the way education has developed in sub-Saharan Africa. In general, given these culture and social attitude/anxiety constraints, sub-Saharan African countries have not developed a mechanistic view of the world (Ifinedo, 2005a, 2005b; Ifinedo & Ololube, 2007).

Available evidence suggests that the digital divide is closing rapidly. Over the last decade, millions of people each year, especially in advanced countries, have gained access to computers. Never in human history have there been so many people with access to computers, digital networks, and electronic communication technologies (Tuomi, 2000). A research study (Ololube, 2009) in sub-Saharan Africa, however, found that post-secondary students' attitudes towards computers relate to prior experiences, particularly those of their early years of education. The study suggests a correlation between the unpleasantness of early experiences and current anxiety toward computer mediated learning. This in turn has led to the slow rate of use and integration of Computer Communication (CC) and ICTs amongst higher education students. Students with positive early access to CC/ICTs have far fewer computer phobias. Studies by Parasuraman and Igbaria (1990), Agnetha-Broos (2005), and Igbaria and Chakrbarti (1990) found similar results.

A 2011 population estimate for sub-Saharan African countries stands at 874,841,049 million. This population boom has meant that some rural campuses struggle to maintain enrolments, and most urban campuses are overcrowded, thereby making teaching and learning difficult.

Infrastructural Barriers

On a range of ICT indicators, African countries score lower than the global average; in other words, the digital gaps between African and other developed countries and emerging economies persist; indeed, they have intensified over the last decade (Gillwald, 2005). The term digital divide is used to refer to imbalances such as these between countries poised to reap the benefits of the information age and those unable to do so (Ifinedo, 2005a). The growing digital divide includes ICT products and outputs (Internet access, e-mail, fax, television, radio, cell phones, etc.) and inputs (knowledge, programmers, engineers, scientists, etc.) (Gillwald & Esselaar, 2005) and could make other development gaps impossible to bridge.

In a recent survey in sub-Saharan Africa (2009), Nigeria had an estimated 43.989 million Internet users, followed by South Africa at 4.42 million, and Ghana at 1.297 million. Camerron trails far behind with only 748, 600 thousand users. Not surprisingly, sub-Saharan African countries tend not to have the same ICT infrastructural facilities and support as the developed West, prerequisites for this new era in education (Ifinedo, 2005b). According to Yusuf (2006), education today is not complete without use and knowledge of communication and technological tools (e-mail, fax, Internet, television, radio, etc.). Several cities and rural areas in Africa are yet to secure electricity or endure fluctuations in its supply, and most Africans students (69%) cannot access technology-aided learning tools and other telecommunication facilities. Even telephone lines in urban centres are inadequate when it comes to meeting the needs of the expanding population. Despite the recent introduction of Global System for Mobile communications (GSM) in sub-Saharan Africa, access is still limited, services are yet to be perfect, and service charges make GSM unattractive for most learners (Ololube, 2006b).

Economic Barriers

The Gross Domestic Product (GDP) and the Gross National Product (GNP) form an important economic indicator in the measurement of development. The economic circumstances of a nation determine the level and purchasing capabilities of its citizens. Currently, over 80% of the sub-Saharan Africa population live below poverty line. This is compared to 15.1% in developed countries.

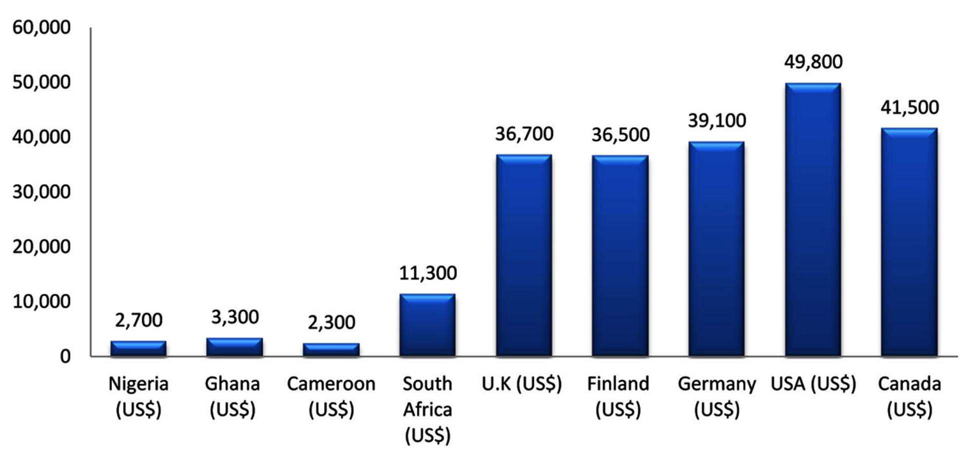
An average middle-income earner in a sub-Saharan African country cannot afford even basic technological and communication devices. The same is true of most higher education students and institutions. The cost of these devices in the region is generally three times the monthly wage of an average worker, and so they remain luxuries at home, school and the office. The cost of subscribing to a telephone or Internet service is beyond the reach of the average sub-Saharan citizen. This has made the integration of necessary on-line resources (e-mail, newsgroups, e-libraries, the world-wide-Web, etc.) into higher education institutions difficult at best. Most African countries spend less than 12% of their annual budget on education in general and far less on IT and IS in the classroom. All of this is compounded by high levels of illiteracy, which is endemic, in these countries. Approximately 25-33% of the population in the region are still unable to read and write (CIA: The World Factbook, 2013). Figure 2 outlines the income levels of selected countries relative to countries in sub-Saharan Africa.

Competency Barriers

The level of technology illiteracy in sub-Saharan Africa is alarming (Langmia, 2005). Sub-Saharan African countries lack qualified information communication technology professionals; this is so because higher education institutions do not graduate enough skilled ICT professionals to match current blended learning needs (Ifinedo, 2005a; Ifinedo & Ololube, 2007). The enthronement of mediocrity in all spheres of life in sub-Saharan Africa is, in turn, a by-product of educational ineffectiveness. That is, the education systems in many Third World countries, particularly sub-Saharan African countries, have failed to prepare youth for successful and industrious living and involvement in national development (Ololube, 2006b).

The quality and quantity of ICT materials in sub-Saharan higher education institutions are poor and faculty trained through these programmes are not technologically equipped to carry out their duties effectively in terms of the global transformation in science and technology. Consequently, the existing curriculum, designed for the training of students in sub-Saharan Africa, does not include the practical usage of ICT materials such as computers, computer software, slides, overhead projectors, etc. When it is included, it tends to be theory-based alone. Students rarely come into contact with ICT instructional materials, including those in the department of computer science and educational technology (Ololube, 2006b).

Figure 2. Per capita income of selected countries
Source: CIA: The World Factbook (2013)



The institutions responsible for the provision of education programmes provide programmes within the confines of the mandate given to them by the federal and state governments through various bodies such as the National Commission for Colleges of Education (NCCE), National Universities Commission (NUC), and the National Board for Vocational Colleges and Technical Education (NABTECH). Ultimately, however, their ability to be effective is dependent on the availability of funds to purchase the needed ICT equipment.

Education Facilities/Material Resources Barriers

Well-designed and functional education programmes, with a wide array of technology-aided teaching enable the effective delivery of a school's curriculum and are positively related to students' academic achievement (Ololube, 2011). Adequate and modern education facilities and/or material resources are vital to this sought after achievement. Educational facilities are those things which enable a skilful faculty to achieve a level of instructional effectiveness that far exceeds what is possible when they are not provided. These "things of education" or educational facilities are therefore numerous and include any materials or services that help to facilitate teaching and learning. This can include teaching aids, computers, Internet connections, projectors, fix-line connectivity, and e-libraries. In most higher education institutions in sub-Saharan Africa, there are not enough facilities to adequately aid teaching and learning.

Problems supplying instructional technology aided materials in education systems often stem, in part, from an inadequate availability of materials either in the finished or raw form and their high cost. According to Adeniyi (2001), there is constant competition and demand for financial resources by all sectors of the economy. The education sub-sector (within the social services sector) is no exception. Almost all sub-Saharan African countries are poor and indebted. The dire economic situation in these countries exacerbates an existing inability to make use of ICT products, especially those related to educational technology (Ololube, 2006b).

FUTURE TRENDS

Rapid growth in blended teaching and learning around the world has acted as a catalyst for educational transformation in recent years. Sub-Saharan African countries and indeed African countries in general are attempting to take advantage of this technological revolution in order to make strides in education. Blended learning offers tremendous possibilities in terms of meeting present day educational challenges around access and quality higher education (Boitshwarelo, 2009; Halverson et al., 2012).

African higher education is confronted with numerous challenges in its external and internal environments. Higher education institutions are forced to respond to these challenges, such as continual developments in ICT, in order to graduate capable and prepared students. At the same time, a rapid decline in educational standards is evident due to crumbling infrastructure, an unpredictable academic calendar, flight of researchers and professionals abroad, and declining respect for its graduates across the globe. Providing access to quality education for every student in higher education institutions is a significant task. African Colleges of Education, Polytechnics and Universities must follow the prevailing trend in most parts of the world by applying new technological advancements to overhaul and enhance their educational materials and resources in pursuit of effective educational achievement.

Higher education in sub-Saharan Africa must find a way to foster educational environments that are responsive to technological change as one way to provide access to quality education is through electronic learning. This form of learning helps to provide faculty and students with the opportunity to access the very best experts, resources and up- to-date information (Akhahowa & Osubor, 2006). To this end, blended learning is fast becoming an accepted and indispensable part of mainstream educational systems around the world, especially in the more developed West (Ifinedo & Ololube, 2007).

CONCLUSION

This chapter has focused on barriers to blended teaching and learning in sub-Saharan African institutions of higher education. The practical implications of blended learning in relation to higher education include the need for faculty and students to use different methods and approaches to teaching and studying. These new methods and approaches are likely to be dependent on social, economic, institutional and infrastructural support. It is hoped that this chapter has made some contributions to the understanding of the impact of blended learning on professional competencies and the training of a new calibre of faculty whose professional abilities are essential in the teaching and learning processes.

Social, economic, institutional, infrastructural and technological changes in the past decades in the West are making education and training more crucial than ever. Higher education systems worldwide, however, are struggling to different degrees to afford educational opportunities to all, and to provide their graduates with the ICT knowledge and skills needed to meet emerging trends in the marketplaces and in our increasingly sophisticated living environments. In this context, countries must now focus concurrently on expanding access, improving internal efficiency, promoting the quality of teaching and learning through blended learning, and improving higher education management.

The strength, security and well-being of sub-Saharan Africa rests directly on the quality of education provided to its citizens. Quality education has been and remains a great asset on an individual, community and national level as well as a source of qualified and prepared employees for the national economy, especially in the West where education is accepted as an effective instrument for national progress and success.

Despite considerable hurdles and setbacks, technology aided learning is beginning to play a major role in the future of education agendas in sub-Saharan Africa. Emerging blended learning technologies show that teaching and learning are shifting from teacher-centered and lecture-centered instruction to student-centered interactive learning environments (Newhouse, 2002a). According to Newhouse (2002b), a good balance between discovery learning and personal exploration on one hand, and systematic instruction and guidance on the other characterises a powerful technological sensitive learning environment. Designing and implementing successful blended learning programmes is thus in many ways the key to fundamental and necessary wide-ranging educational reforms. Higher education institutions must either assume a leadership role in this transformation of education or be left behind (Ololube, 2011).

In order for higher education to reap the full benefits of technology assisted learning, faculty and students must be able to effectively use blended learning tools in the teaching and learning processes. It is essential that sub-Saharan African countries recognise that faculty members are crucial to successful teaching and learning using blended learning methods and strategies on the path to improved standards of education. Higher education institutions thus must provide proactive leadership and new models, pedagogies and tools for teaching through effective strategic engagements and plans. That is, leadership in higher education must be visionary about conceiving a desired future state which includes the picturing of where and what the education programme should be in the future, without being constrained by such factors as economic, social, funding and human resources (Ololube, 2006b).

Such successful and effective strategic plans, however, depend on the extent to which proper implementation and monitoring are carried out. This in turn is heavily dependent on the government, which must ensure that all parts of the country, including rural regions and communities, receive telecommunication services. Universal access must be a priority. Consequently, the sub-Saharan African telecommunications sector needs increased investment. Ongoing activities and efforts in this area will help to improve the teledensity rates for sub-Saharan African. There is also an urgent need to increase the number of computers available to the population and so Sub-Saharan African governments may have to waive certain import duties and tariffs for goods and equipment imported for education services. Shortages in infrastructural facilities, for example power generation, need to be addressed. The electricity (KW) productions of all sub-Saharan African countries are dismal. Governments' commitment to improve power generation must be unequivocal. Lastly, nearly all Africa countries are deficient in IT/IS professionals. Sub-Saharan Africa needs more highly trained and skilled people to help the rest of the population reap the benefits of using ICT in education (Ifinedo & Ololube, 2007).

REFERENCES

Adeniyi, E. O. (2001). The situation in Nigeria: The problem of Nigeria educational system. In R. Pillai (Ed.), *Strategies for Introducing New Curricula in West Africa*. Lagos, Nigeria: Academic Press.

Aduwa-Ogiegbaen, S. E., & Iyamu, E. O. S. (2005). Using information and communication technology in secondary schools in Nigeria: Problems and prospects. *Journal of Educational Technology & Society*, *8*(1), 104–112.

Agnetha-Broos, M. A. (2005). Gender and information and communication technologies (ICT) anxiety: Male self-assurance and female hesitation. *Cyberpsychology & Behavior*, *8*(1), 21–31. doi:10.1089/cpb.2005.8.21 PMID:15738690

Akhahowa, A. E., & Osubor, V. I. (2006). E-learning: A technology-based teaching method for providing sccess to sustainable quality education. *The African Symposium, 6*(3-4), 17-25.

Boitshwarelo, B. (2009). Exploring blended learning for science teacher professional development in an African context. *International Review of Research in Open and Distance Learning*, *10*(4), 1–19.

Carnoy, M. (2005). Globalization, educational trends and the open society. In *Proceedings of the OSI Education Conference 2005: Education and Open Society: A Critical Look at New Perspectives and Demands.* Open Society Institute.

CIA. The World Factbook. (2013). *Country report*. Retrieved January 31, 2013, from http://www.umsl.edu/services/govdocs/wofact2012/

Computer Professionals. (2013). *Benefits of the launch of NIGCOMSAT-1R to Nigeria*. Retrieved February 13, 2013, from http://www.cpn.gov.ng/index.php?page=shownws&id=19

Gillwald, A. (2005). *Toward an African e-index: Introduction*. Retrieved November 26, 2012, from http://www.researchictafrica.net/images/upload/Toward2.pdf

Gillwald, A., & Esselaar, S. (2005). *A comparative analysis of ICT access and usage in 10 African countries.* Retrieved November 26, 2012, from http://www.researchictafrica.net/images/upload/Chapter02new(latest).pdf

Global Information Technology Report. (2004). *The networked readiness index rankings 2004*. Retrieved February 13, 2013, from http://www.weforum.org/pdf/Global_Competitiveness_Reports/Reports/GITR_2011_2012/Networked_Readiness_Index_Rankings.pdf

Halverson, L. R., Graham, C. R., Spring, K. J., & Drysdale, J. S. (2012). An analysis of high impact scholarship and publication trends in blended learning. *Distance Education*, *33*(3), 381–413. doi:10.1080/01587919.2012.723166

Ifinedo, P. (2005a). E-government initiative in a developing country: Strategies and implementation in Nigeria. In *Proceedings of the 26th McMaster World Congress on Electronic Business*. Hamilton, Canada: McMaster.

Ifinedo, P. (2005b). Measuring Africa's e-readiness in the global networked economy: A nine-country data analysis. *International Journal of Education and Development Using ICT*, *1*(1), 53–71.

Ifinedo, P., & Ololube, N. P. (2007). A discourse on the problems, prospects, and progress of distance education in a developing country. In E. P. Bailey (Ed.), *Focus on distance education developments* (pp. 183–194). New York: Nova Science Publishers.

Ifinedo, P., & Uwadia, C. (2005). Towards e-government in Nigeria: Shortcomings, successes, swish or sink. In *Proceedings of the International Federation of Information Processing (IFIP) WG 9.4 Conference*. Abuja, Nigeria: IFIP.

Igbaria, M., & Chakrabarti, A. (1990). Computer anxiety and attitudes towards microcomputer use. *Behaviour & Information Technology*, *9*(3), 229–241. doi:10.1080/01449299008924239

IMF. (2012). *Factsheet: The IMF and the millennium development goals*. Retrieved February 2013 from http://www.imf.org/external/np/exr/facts/mdg.htm

IMF. (2013). *Factsheet: Debt relief under the heavily indebted poor countries (HIPC) initiative*. Retrieved February 2013 from http://www.imf.org/external/np/exr/facts/hipc.htm

Kautto-Koivula, K. (1996). Degree-oriented adult education in the work environment. In P. Ruohotie & P. P. Grimmett (Eds.), *Professional growth and development: Direction, delivery and dilemmas* (pp. 149–188). Canada: Career Education Books.

Langmia, K. (2005). The role of ICT in the economic development of Africa: The case of South Africa. *International Journal of Education and Development using Information and Communication Technology, 2*(4), 144-156.

Larose, F., David, R., Dirand, J., Karsenti, T., Vincent Grenon, V., Lafrance, S., & Judith Cantin, J. (1999). Information and communication technologies in university teaching and in teacher education: Journey in a major Québec university's reality. *Electronic Journal of Sociology.* Retrieved November 30, 2012, from http://www.sociology.org/content/vol004.003/francois.html

Mac-Ikemenjima, D. (2005). e-Education in Nigeria: Challenges and prospects. In *Proceedings of the 8th UN ICT Task Force Meeting*. Dublin, Ireland: UN.

Mpofu, J., Chimhenga, S., & Mafa, O. (2013). The impact of ICT in learning through distance education programmes at Zimbabwe Open University (ZOU): Roles of ICT in learning through distance education programmes. *Turkish Online Journal of Distance Education, 14*(1).

Nel, E. (2005). *Creating meaningful blended learning experiences in a South African higher education classroom: An action inquiry*. (Doctoral dissertation). The Centre for Higher Education Studies and Development, Faculty of the Humanities, University of the Free State, Bloemfontein, South Africa.

Newhouse, C. P. (2002a). *The impact of ICT on learning and teaching*. Perth, Australia: Special Educational Service.

Newhouse, C. P. (2002b). *A framework to articulate the impact of ICT on learning in schools*. Perth, Australia: Special Educational Service.

Olalekan, D. O. (2012). The impact of information and communication technology proficiency on labour productivity in Nigeria: A case of University of Ilorin. *Continental Journal of Social Sciences*, *5*(3), 35–55. doi:10.5707/cjsocsci.2012.5.3.23.34

Ololube, N. P. (2006a). The impact of professional and non-professional teachers' ICT competencies in secondary schools in Nigeria. *Journal of Information Technology Impact*, *6*(2), 101–118.

Ololube, N. P. (2006b). Appraising the relationship between ICT usage and integration and the standard of teacher education programs in a developing economy. *International Journal of Education and Development using ICT, 2*(3), 70-85.

Ololube, N. P. (2009). Computer communication and ICT attitude and anxiety among higher education students. In A. Cartelli & M. Palma (Eds.), *Encyclopedia of information and communication technology* (pp. 100–105). Hershey, PA: IGI Global.

Ololube, N. P. (2011). Blended learning in Nigeria: Determining students' readiness and faculty role in advancing technology in a globalize educational development. In A. Kitchenham (Ed.), *Blended learning across disciplines: Models for implementation* (pp. 190–207). Hershey, PA: IGI Global. doi:10.4018/978-1-60960-479-0.ch011

Ololube, N. P., Amaele, S., Kpolovie, P. J., & Egbezor, D. E. (2013). The issues of digital natives and tourists: Empirical investigation of the level of IT/IS usage between university students and faculty members in a developing economy. In *Digital literacy: Concepts, methodologies, tools, and applications* (pp. 1384–1401). Hershey, PA: IGI Global.

Ololube, N. P., & Egbezor, D. E. (2009). Educational technology and flexible education in Nigeria: Meeting the need for effective teacher education. In S. Marshall, W. Kinuthia, & W. Taylor (Eds.), *Bridging the knowledge divide: Educational technology for development* (pp. 391–412). Charlotte, NC: Information Age Publishing.

Ololube, N. P., Ubogu, A. E., & Egbezor, D. E. (2007). ICT and distance education programs in a Sub-Saharan African country: A theoretical perspective. *Journal of Information Technology Impact*, *7*(3), 181–194.

Parasuraman, S., & Igbaria, M. (1990). An examination of gender differences in the determinants of computer anxiety and attitudes toward microcomputers among managers. *International Journal of Man-Machine Studies*, *32*(3), 327–340. doi:10.1016/S0020-7373(08)80006-5

Pulkkinen, J. (2004). *An analysis of the communication structures in the research on information and communication technology integration in education in the years 2000–2001*. (Academic Dissertation). Faculty of Education, University of Oulu. Retrieved November 20, 2012, from http://herkules.oulu.fi/isbn9514272463/html/x464.html

Stromquist, N. P. (2005). The impact of globalization on education and gender: An emergent crossnational balance. *Journal of Education*, *37*, 7–37.

UNESCO. (2002). *Information and communication technologies in teacher education: A planning guide*. Paris: UNESCO.

Yusuf, M. O. (2005a). An investigation into teachers' self-efficacy in implementing computer education in Nigerian secondary schools. *Meridian: A Middle School Computer Technologies Journal, 8*(2). Retrieved January 6, 2013, from http://www.ncsu.edu/meridian/sum2005/computer_ed_nigerian_schools/index.html

Yusuf, M. O. (2005b). Information and communication technologies and education: Analyzing the Nigerian national policy for information technology. *International Education Journal*, *6*(3), 316–321.

Yusuf, M. O. (2006). Problems and prospects of open and distance education in Nigeria. *Turkish Online Journal of Distance Education*, *7*(1), 22–29.

ADDITIONAL READING

Colle, R. D. (2005). Building ICT 4D capacity in and by African universities. *International Journal of Education and Development using Information and Communication Technology, 1*(1), 101-107.

Hadden, C. M., & Voss, B. D. (2006). E-mail: Paradigms, options and outsourcing. *EDUCAUSE Center for Applied Research: Research Bulletin, 23*.

Hergenhahn, B. R., & Olson, M. H. (1997). *An introduction to theories of learning* (5th ed.). Upper Saddle River, NJ: Prentice Hall.

Nwokeocha, S. (2011). *The digital divide between students and lecturers: A case study of access and attitudes towards information communication technology (ICT) in selected Nigerian universities.* Retrieved March 21, 2011, from http://www.iiis.org/CDs2010/CD2010IMC/ICSIT_2010/PapersPdf/HB369QL.pdf

Oblonger, D., & Oblinger, J. (2005). *Is it age or IT: First steps toward understanding the net generation.* Retrieved May 23, 2011, from http://net.educause.edu/ir/library/pdf/pub7101.pdf

Open education. (2011a). *Of digital immigrants and digital natives teaching the net generation*. Retrieved December 30, 2012, from http://www.openeducation.net/2011/03/01/digital-immigrantsand-digital-natives-teaching-the-net-generation/

Open Educaton. (2011b). *Though net generation concerns over-hyped, integrating technology the right dtep*. Retrieved December 30, 2012, from http://www.openeducation.net/2008/09/26/thoughnet-generation-concerns-overhypedintegratingtechnology-the-right-step/

Orr, L. V. (n.d.). *Computer anxiety*. Retrieved March 13, 2013, from http://www.usm.maine.edu/~com/lindap~1.htm

Pelgrum, W. J., & Law, N. (2003). *ICT in education around the world: Trends, problems and prospects*. Paris: UNSCO, International Institute for Educational Planning.

Philip, D. (2007). The knowledge building paradigm: A model of learning for net generation students. *Innovate, 3*(5). Retrieved December 23, 2012, from www.personal.psu.edu/...blog/.../humancapital-theory-and-criti.html

Postholm, M. B., Pettersson, T., Flem, A., & Gudmundsdottir, S. (2002). *The teacher's role when pupils use ICT as a mediating artefact in project work*. Retrieved March 13, 2012, from http://www.psy.vu.nl/iscrat2002/postholm.pdf

Prensky, M. (2001). Digital natives, digital immigrants. *MCB University Press*, *9*(5), 1–6.

Rosen, L. (2010). *Rewired: Understanding the iGeneration and the way they learn*. New York: Palgrave Macmillan.

Sala, N. (2004). Web based teaching and learning: Two Swiss examples. In *Proceedings of the 2004 IRMA International Conference*. IRMA.

Sam, H. K., Othman, A. E. A., & Nordin, Z. S. (2005). Computer self-efficacy, computer anxiety, and attitudes toward the Internet: A study among undergraduates in UNIMAS. *Journal of Educational Technology & Society*, *8*(4), 205–219.

Siragusa, L., & Dixon, K. C. (2008). Planned behaviour: Student attitudes towards the use of ICT interactions in higher education. In *Proceedings of ASCILITE* (pp. 942-953). Melbourne, Australia: ASCILITE.

Tiemo, P. A., Emiri, O. T., & Tiemo, A. J. (2010). Information and communication technology (ICT) training among lecturers in the south-south zone in Nigeria by the Nigeria communication commission (NCC). *International Journal of Information and Communication Technology Education*, *6*(1), 55–66. doi:10.4018/jicte.2010091105

Toledo, C. A. (2007). Digital culture: Immigrants and tourists responding to the natives' drumbeat. *International Journal of Teaching and Learning in Higher Education*, *19*(1), 84–92.

Tucker, H. (2010). *Digital natives and digital immigrants.* Retrieved June 3, 2011, from http://ccnmtl.columbia.edu/enhanced/primers/digital_natives.html

KEY TERMS AND DEFINITIONS

Barriers: Are things that block or impede the development of blended teaching and learning in sub-Saharan Africa.

Blended Learning Infrastructures: This includes blended learning components and resources such as computers, satellites, WebCT, PowerPoint, and other learning and fibre optic technologies.

Blended Learning Knowledge: Are the knowledge, skills, and experiences needed to stay informed of current blended learning developments, which is a collective knowledge that effectively contributes to further blended learning knowledge that will, in turn, lead to individual, national and global development.

Blended Teaching and Learning: Is a combination of face-to-face and technology-based learning, distinct from other learning strategies that is highly conducive to faculty teaching and increased students learning.

Challenges: A fight to overcome obstacles, accomplish things and able to learn how to work together effectively.

Learning: Is regarded as the central most powerful, engaging, rewarding and enjoyable aspect of learners personal and collective experiences.

Sub-Saharan Africa: Is the area of the continent of Africa that lies south of the Sahara, which consists of all African countries that are completely or in part located south of the Sahara.

Teaching: Is a framework that guides learners and help keep them in focus and develop their understanding.

This work was previously published in Advancing Technology and Educational Development through Blended Learning in Emerging Economies edited by Nwachukwu Prince Ololube, pages 232-247, copyright year 2014 by Information Science Reference (an imprint of IGI Global).

Chapter 48
Introducing a Teaching Innovation to Enhance Students' Analytical and Research Skills:
A Blended Learning Initiative

Hela Miniaoui
University of Wollongong in Dubai, UAE

Avneet Kaur
University of Wollongong in Dubai, UAE

ABSTRACT

The term "blended learning" has gained considerable interest in recent years as a description of particular forms of teaching combined with technology. This chapter reports in some detail the experience of a small group of undergraduate learners as they progress through their Bachelor course at University of Wollongong in Dubai (UOWD) in the United Arab Emirates. In particular, this study looks at discussion forum approach as a blended learning initiative and what that entails to the learners in terms of making the subject more interactive and enhancing students' analytical and research skills. From the findings, a conclusion has been drawn regarding the role of the Blackboard tool in learning by helping students to obtain a deep sense of understanding of how to operate in a virtual team despite the challenges.

INTRODUCTION

In psychology and education, a common definition of learning is a process that brings together cognitive, emotional, and environmental influences and experiences for acquiring, enhancing, or making changes in one's knowledge, skills, values, and world views (Illeris, 2000; Ormorod, 1995).

Many other theories consider that the Human learning is a social process. In fact, learning is not an isolated activity (Hung & Nichani, 2001) and interaction and collaboration between learners is a major enabler of the knowledge construction paradigm (Duffy & Jonassen, 1992).

A combination of traditional learning within the classroom and Web-based learning is called blended learning. It is the mix of face-to-face

DOI: 10.4018/978-1-4666-8246-7.ch048

instructions and online interactions between the students and teacher to optimize the learning outcome. It is considered more effective than only face-to-face learning or fully online learning as it makes the teaching learning process more interactive and allows regular feedback.

This case study examines how undergraduate students pursuing Bachelor of Business Administration and Bachelor of Commerce, majors Finance and Accountancy, enrolled in International Trade Theory and Policy subject, worked collaboratively in small work groups on assignments over a period of thirteen weeks. Particular focus in this chatper is given on how to make the subject more interactive and inculcate analytical and research skills in students by using discussion forum approach of blended learning.

The rest of the chapter is organized as follows: Section 1 reviews relevant research on blended learning and its impact on students' learning. Section 2 describes the application of discussion forum as a tool to optimize students' learning. Within this section, the outcomes, rationale, assessment and the findings of the study are discussed. Section 3 suggests certain future research directions. The final section concludes the chapter.

BACKGROUND

Blended learning is facilitated by the effective combination of different modes of delivery, models of teaching and styles of learning, and founded on transparent communication amongst all parties involved with a course (Heinze & Procter, 2004).

According to Hisham *et al.* (2006), the definition of Blended learning is varied and contrasting. Some studies (Whitelock and Jefts, 2003; Alavi and Gallupe, 2003; Arbaugh, 2005; Peterson, 2003) referred to Blended learning as the integrated combination of traditional learning with Web-based online approaches. Singh (2003) defined Blended learning as models that combine various delivery modes.

Blended learning is being used as a combination of face-to-face learning including hard copy study materials and online learning with a variety of online resources (Bawaneh, 2011).

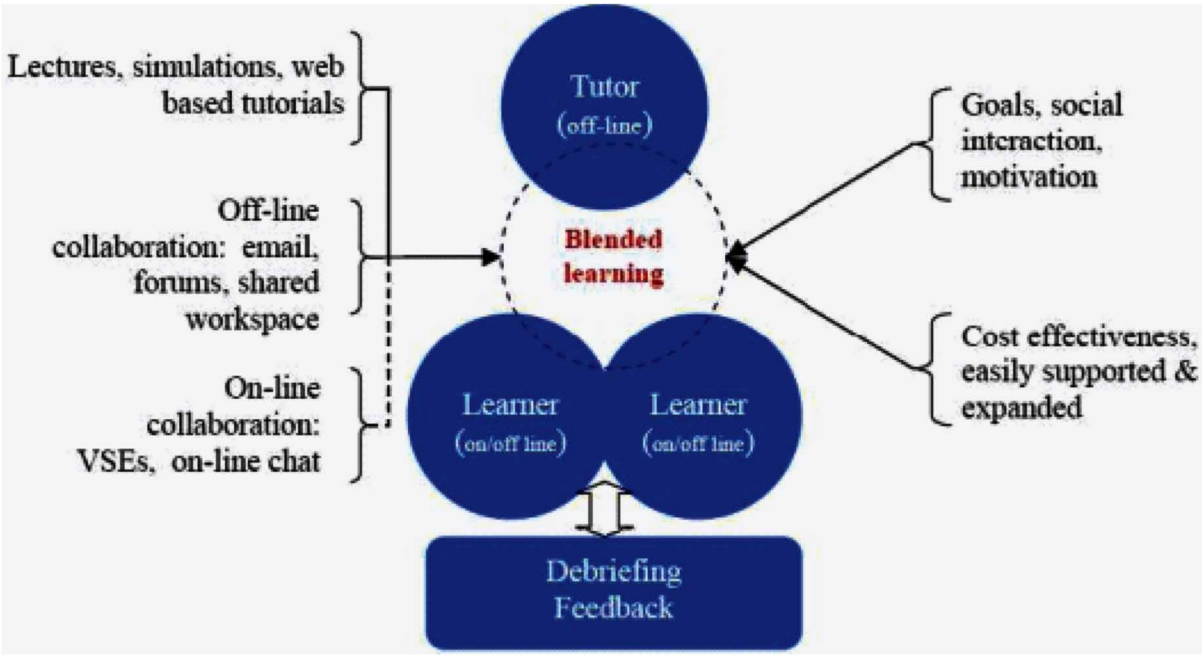
Many works have focused on the definition of the main functions of blended learning systems and we choose here to mention the classification of (Siemens, 2004):

- Different levels of permissions for users (students, teachers, tutors, administrator, visitor).
- Search functions (simple search and advanced search).
- Multimedia application for digital material.
- Collaborative workspace.
- Knowledge share and reuse.

Blended learning can combine the positive aspects of the two learning environments; classroom based learning and e-learning (Bonk & Graham, 2006). According to Rastegarpour (2010), blending learning provides various benefits over using any single learning delivery medium alone. Learners not only learn more, their interaction and satisfaction improves. Moreover, several linked options for learners; in addition to classroom training increases learning. According to Citera (1988), shy students are more likely to participate in an online discussion because it is less intimidating than speaking up in class.

According to Doiron (2006), blended learning approach was successful in encouraging individual participation. Statistically significant high correlations were found between performance and posting frequency. For Karayan and Crowe (1997), and Smith and Hardaker (2000), the advantage of a discussion forum, as opposed to the traditional face-to-face class discussion session lies in its asynchronous nature, which allows for wider student participation and offers them more time to process their thoughts.

Figure 1. The blended learning model



According to Oliver (2002), through technology-facilitated approaches, contemporary learning settings now encourage students to take responsibility for their own learning.

Blended learning approach can be summarized in Figure 1.

DISCUSSION FORUM AS A BLENDED LEARNING INITIATIVE

Blackboard Learning System or Web Course Tools (WebCT) is an online virtual learning environment system that is available to all faculty members at UOWD, from University of Wollongong in Australia via Staff Intranet for e-learning.

Initiated by Dr. Payyazhi Jayashree, Head of Centre for Academic Staff Professional Development (CASPD), this program was launched in Spring 2011 where many faculty members volunteered to use the Blackboard and help understand the benefits and problems of using the new system as opposed to "MyUOWD" account which is a student's account based on Dubai campus. Every student of the university has a "MyUOWD" account where they can find a range of online services and access the lecture materials, tutorials, notices, time tables, policies, etc.

CASPD was instrumental in organizing three training sessions to introduce the Blackboard system to self-nominated volunteers. These training sessions were specifically focused on the functionality of the learning interface. The participants were then advised to think about an effective use of pedagogy, with the sole objective of achieving an improvement in teaching and learning.

The target was to develop skills in the usage of the E-learning platform (Blackboard/WebCT) to enhance the teaching and learning experiences of students. At a later stage, after having experimented with the use of Blackboard for a semester, the volunteers were asked to follow a cascading process and mentor other faculty members to embed the usage of Blackboard at an institutional level.

In Autumn 2011, we experimented with implementing the system with second-year student cohort to understand how a range of Blackboard functionalities can be incorporated as part of assessments and as a learning enhancement tool, to improve teaching and learning.

The Outcomes

At the start of this experiment we broadly listed out the main outcomes that we would like to achieve.

On completion of this project, we will have:

- Designed and implemented an online assessment tool (Discussion forum) in the International Trade Theory and Policy (ECON216) subject.
- Evaluated the impact of this assessment tool on students' learning and engagement.

With the help of this tool it is expected that students will be able to:

- Have a strong hold on the concepts being taught in the subject.
- Develop their reading, writing and communication skills.
- Develop research and analytical skills.
- Learn how various variables of the economy are interrelated and impact each other.

Rationale

The major objectives behind adoption of Blackboard were first to increase students' involvement with the subject by engaging students in discussion forums and hence make the subject as interactive and dynamic as possible, which would further help students to develop their communication skills. The second objective for using Blackboard, was to cover most of the program objectives and to catch-up with the significant learning outcomes of the subject. Thirdly to enable collaborative learning among the students by involving them in various discussions on the topics posted on the discussion forum. Finally, to extend students learning experience beyond the classroom and the textbook reading.

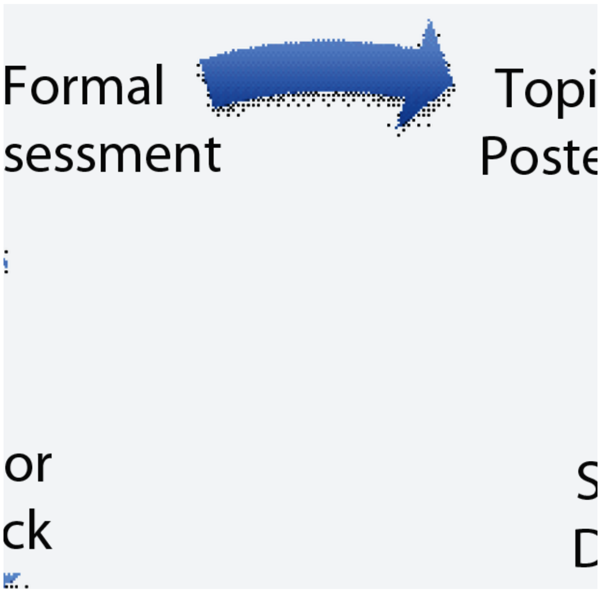
Description of the Assessment

The discussion forum assessment was worth 10% of the total marks of the subject. In the beginning of the semester, the whole class was divided into groups with a maximum size of 5 students per group. Students were asked to discuss the topics posted on Blackboard within their respective groups using the student forum (also hosted on Blackboard) before posting their final answers on the discussion forum. These postings were then evaluated to provide regular feedbacks to the students. Few interesting postings were also brought to the classroom to motivate students to be active participants on the discussion forum.

The topics and case studies posted, motivated the students to participate in the initiative during the 13 week-semester. In fact, the topics were guided by couple of questions that the students could refer to before starting their research on the given topics.

During the 4th week of the semester, the first topic, with case studies was posted on Blackboard for one week. Basically, this topic, among the 5 topics posted, was to give the students a basic idea of how to adopt this tool, how to use it and to increase their confidence. This topic was informally assessed and feedback was given to the students regarding what was expected from them for the rest of topics. The remaining four topics were posted for discussion on the forum at equal intervals during the rest of the semester. Regular feedbacks were provided on the discussion forum for the postings made by the students after getting responses for each of the topic. The postings made by the students were then formally assessed. The five topics that were discussed through the WebCT/Blackboard system are Trade Restrictions, Political Economy of Protectionism, Economic Integration, The Foreign Exchange Market and

Figure 2. Strategy of use of "discussion forum" to assess students



Exchange Rates and Macroeconomic Policy Coordination. The topics accompanied with guiding questions were framed in a manner such that they provided students with an opportunity to carry out research and apply the concepts learnt in the classroom to the real world situation.

Once introducing and explaining to students the use of Blackboard system, different phases were adopted to implement Discussion forum as a blended learning tool to assess the students. Figure 2 describes the strategy of students' assessment through a "Discussion forum" tool.

Methodology of Implementation of the Approach

Seventy-four students, pursuing Bachelor of Business Administration and Bachelor of Commerce during the Autumn 2011 semester were administered for this case study. These undergraduate students with different background and different nationalities were enrolled for the core subject International Trade Theory and Policy (ECON216).

A blended learning experience that combines traditional practices and e-learning was implemented to discuss key concepts, clear up misconceptions and factual errors related to the topics. The major purpose to adopt Blackboard tool was to cover the four following significant learning outcomes of the subject:

- Understand the microeconomic underpinnings of trade theory and explain the basis of trade and the gains and losses from free trade.
- Understand the working of the foreign exchange market and how it facilitates or impedes international trade.
- Explain the different forms of economic integration and the reasons for closer economic ties particularly with reference to the Gulf Cooperation Council countries.
- Evaluate open-economy macroeconomic policies and performance under the various international monetary systems.

A further aim was to help students acquire the intellectual skills necessary for this subject by means of interactive discussions via online forums. In addition, we encouraged the students to be active respondents to the postings for the discussion forum by uploading the subject outline, lecture slides, tutorials including multiple choice questions and problem solving problems on Blackboard itself. This was done to make students familiar with the system as most of the students were using Blackboard for the first time. Apart from this, all the announcements during the semester were made through Blackboard in the form of notices.

RESULTS AND DISCUSSION

This kind of assessment motivated the students to engage in discussions related to economic concepts, interpretation of international economic situations, and to interact among themselves on their point of view.

Indeed, topics covered important concepts and different economic situations and their impact on international trade that were also part of the midterm and final examinations. The discussion forum provided students an opportunity to analyse the economic situations and express their viewpoints about these situations by applying the concepts learned within the classroom in real world situation.

Throughout the semester the students posted a total of 250 messages on the 5 topics. The discussions made by the students were well supported with evidences. The postings included statistical data's, tables, graphs etc. to support their view points, the explanations were also supported with several figures showing relationship between various economic variables. The students were encouraged to participate in the discussions by providing regular feedbacks for their postings; apart from this the most appropriate postings were included in the discussions done in the classroom while reviewing the same topics during the tutorial sessions. Another motivation for students to participate in discussions was the assessment marks worth 10% of the total marks for the subject.

Most of the students were quite regular and posted their discussions for all the topics. While, there were a few students who did not make any post to the discussions at all. When this issue was discussed with the students during the tutorials, they revealed that they were comfortable using "MyUOWD" system, which was being used for the rest of the subjects, and found it difficult to change. This indicates a resistance to change from the traditional "MyUOWD" system.

At the completion of the semester when the results were finalized, it was noticed that students' performance improved, as evident from their grades in comparison to previous semesters. Improvement was also seen in the answers' scripts of the final exam papers in terms of the quality of explanations as they were supported with relevant examples based on real situations. In fact, 82.43% passed the subject. The top performers' achievements with HD (High Distinction, 85% to 100%) and D (Distinction 75% to 84%) as 22% demonstrated motivation in using this new tool and the quality of their postings was good. This was also reflected in the final examination answers to the topics covered in the Blackboard that helped these students getting good grades. On the other hand, the middle range performers with C (Credit 65% to 74%) and P (Pass 50% to 64%) stood at 60% that seems to reflect improvement in students' Performance. Only 1.35% stood at PC (Pass conceded 45% to 49%). The overall result reflected the achievement of significant learning outcomes of the subject. Eight students out of twelve who failed to post their discussions on the topics also failed the subject (66.66%).

This Discussion forum offered opportunity for appreciation of students' work, hence reinforcing their positive learning experience.

Blackboard was a useful resource for discussion and analysis. In fact, we enjoyed the opportunity to respond to the students' remarks, queries and reflections and it was a fruitful experience for students as it enhanced their independent learning at their own pace and in their own time.

In order to get a feedback from students about their experience with Blackboard, a questionnaire (see appendix) with four sections was used. First section had questions based on students' attitudes towards technology (questions 1 and 2), following this was the section about students' attitudes towards using WebCT/Blackboard as a tool of blended learning (questions 3 to 7). Section 3 had questions related to students' attitudes towards learning through WebCT/Blackboard system (questions 8 to 15). The final section (questions 16 and 17) was asking students suggestions about how this platform might be improved in order to help their learning process.

On the basis of the survey distributed to the whole class it can be said that the student valued the experience indicating that this new tool has strengthened the class discussion and came up with other ideas and it has answered any question that was not asked in the class. Moreover, the survey indicated that students have coped with this platform but there are still some technical challenges that demotivate them from using the system. Seventy-three out of seventy-four students have responded to the questionnaires. 41% stated that they were quite regular and using the Blackboard few times a week. Moreover, the use of this system is more convenient and encompasses the teaching-learning process beyond the boundaries of classrooms as 74% of the total students were using the system from home.

On the basis on the survey, it was found that most of the students enhance their learning because of the Blackboard. Around 60% of the students felt more connected to the subject.

The average of the class considered that Blackboard improved their communication not only with the instructor but also with other students. Around 70% of the students agreed that this platform gave them more access to resources and learning materials that also helped the students in their examinations. Moreover, around 70% agreed that updates given by the instructor were regular and frequent which also made their learning easier.

Below are some selected comments made by the students via the survey.

Question 16: Do you have any suggestions about how the WebCT /BlackBoard is used in this class and how it might be improved to help your learning process?

I suggest the WebCT to be used frequently in class that will help the students learning process, in addition greater success will be attained.

It has improved the communication between the students & instructors.

It's used very well where we can post discussion & answer without any paper or hard copy.

In my opinion if the assignments are for more than 20% it will be better.

I prefer to have more assessments on WebCT.

Question 17: Additional comments on WebCT/ BlackBoard and how you would feel about using in other classes in the future:

Yes I would strongly recommend using the WebCT because it enhances the students learning and it's very crucial to use it in other classes.

Web CT/Blackboard is a good tool and I recommend that each class should utilize it, as it will strengthen the class discussion and come up with other ideas and it will always answer any questions that was not asked in the class. This will always make the student efficient to think and perform well in his education."

It is good & should be used in other subjects as well.

Very helpful, easy to use understand.

Yes, please use it other classes also.

Yes i would strongly recommend using the WebCT because it enhances the students learning & it's very crucial to use it in other classes.

During this project, some barriers and challenges that learners had encountered were noticed. In fact, based on the survey administered on students, most of the students were comfortable using Blackboard but some of them resisted this change. In fact, 18 students representing 24.32% did not make discussion on any of the topics and got zero out of this 10% assignment. This can be because students were busy with other subjects and they were not excited to do it and they did not have the motivation as well.

Some technical challenges were faced. The biggest challenge was how to familiarize students with the new system. In fact, students kept comparing WebCT to "MyUOWD." According to some students "MyUOWD" is more than enough and it is accessible from almost anywhere including Blackberry. For them, it is very confusing to have so many systems and technically challenging to access materials through these different systems. Moreover, some students have suggested a separate login bar at the main Website instead of going through Student online services (SOLS). Few of them reported that it takes too long to open and download the files posted on Blackboard.

Below are some selected comments made by the students via the survey.

Change the color of the background.

It should be used for more subjects but it should not replace MyUOWD.

Sometimes I have a problem of connection.

I would prefer sticking to the conviction in simplicity of MyUOWD.

Our uowddubai Website is much better & easy to use & it's very useful.

FUTURE RESEARCH DIRECTIONS

Blended learning approach is considered as a bridge between sole classrooms based learning and fully online learning. It acts as a platform wherein these two mediums of teaching can be combined to enhance the teaching-learning process. Discussion forum as a tool of Blended learning is used to provide an opportunity for students to discuss and debate academic ideas through which they can improve on their writing and communication skills. Apart from this, they also improve on their research and analytical skills.

The need for blended learning will continue for academic institutions to support teaching and learning. In fact, in order to implement blended learning process successfully, attention has to focus on innovating new ways of teaching and learning and also designing different educational Web-technologies (for instance, mobile blended learning, wed-blogs, online Labs…).

The advancement in technology will create exciting opportunities for blended learning as a tool of teaching and encourage students' responsibility for learning. Indeed, online environment will enable learners to have their voices heard and will foster independent learning. On the other hand, instructors will be able to comprehend the practical implications of the topics covered on the class.

In future research, discussion forum can be used for testing larger groups and can also be implemented in courses that are based on different pedagogical models with varied students' attitudes and proficiency levels.

Continued research on blended learning, as a tool of teaching and learning is required to design advanced pedagogical and visual models that encourage students' learning and make teaching learning process more efficient.

CONCLUSION

By using Blackboard, students accept more responsibility for their learning, within a clearly structured framework. As students reflect on their learning, they become aware of what they know and where their weaknesses lie. Moreover, students develop the capacity to evaluate their own work. Apart from this, discussion forum also helped the students who are shy and resist making contributions to the classroom discussions and gave them the opportunity to express their viewpoints on the topics posted on discussion forum. The use of Blackboard in the subject also helped students to learn the application of the subject concepts in real world situations and hence developed their research and analytical skills.

Overall, this experience was very interesting for us, lecturer and tutor, as it helped us to strengthen our teaching. Indeed, because of this tool of learning, the coordination between the lecturer and the tutor has improved as we were meeting more often to monitor the discussions as compared to the previous time, (during Spring 2010), where we together taught the same subject but without using Blackboard.

At the end, most of the students have expressed an appreciation for having had the opportunity of using a discussion forum as it enhanced their learning experience. What was most rewarding is the fact that they have obtained a deep sense of understanding of how to operate in a virtual team despite the challenges. We would definitely encourage this blended learning tool to be continued when we get the chance to teach the subject again and use it in other subjects as well.

Based on the survey conducted, more than half of the students were ready to move to the new system believing that this process enhanced their learning and took them outside the boundaries of the classroom. However, they suggested that if all grades are also posted on Blackboard then the system might be used more often. While, there were a few students who did not post their discussions at all this is an evidence of resistance to change from the traditional system.

Based on the final results of the students, it was identified that the performance of the students who were regular and committed to making posts on the discussion forum on Blackboard was far better than those who failed to discuss the topic on the forum.

As improving teaching could be achieved by paying attention to voice, gestures and physical movements during lectures, we reckon that incorporating many of Blackboard's tools into subjects, will make students' learning experience more interactive and will invariably enhance students' learning process and encourage students to be more engaged with the lecturer and the tutor and the subject as well. In fact, our teaching philosophy joins theory 3 of Ramsden (2003) "Teaching as making learning possible," insofar as it includes blended methods to help students learning. Moreover, we are improving learning during discussions as theories of learning of Race and Brown (1998) stating that by allowing our students to interact through discussion forums to analyze and evaluate different economic situations, we enabled students' learning as per the concepts of 'learning by doing' and 'learning through feedback'.

In addition, our learning approach joins the theory of experiential learning of Stewart (2004). Indeed, student's experience is important in the role of education since no two individuals share the same past experience. Indeed, students have shared their experiences especially through case studies discussed on the forums.

Finally, as volunteers using Blackboard, we think that this experience contributed to improve our teaching approach and it allowed us (the lecturer and the tutor) to make contact and interact with all the students especially through discussion forums. Interactions between the lecturer and the tutor also improved drastically.

REFERENCES

Alavi, M., & Gallupe, R. B. (2003). Using information technology in learning: Case studies in business and management education programs. *Academy of Management Learning & Education*, *2*(2), 139–154. doi:10.5465/AMLE.2003.9901667

Arbaugh, J. B. (2005). How much does subject matter matter? A study of disciplinary effects in on-line MBA courses. *Academy of Management Learning & Education*, *4*(1), 57–73. doi:10.5465/AMLE.2005.16132549

Bawaneh, S. S. (2011). The effects of blended learning approach on students' performance: Evidence from a computerized accounting course. *International Journal of Humanities and Social Science*, *1*(6), 63–69.

Bonk, C. J., & Graham, C. R. (2006). *Handbook of blended learning: Global perspectives, local designs*. San Francisco, CA: Pfeiffer Publishing.

Citera, M. (1988). Distributed teamwork: The impact of communication media on influence and decision quality. *Journal of the American Society for Information Science*, *49*(9), 792–800. doi:10.1002/(SICI)1097-4571(199807)49:9<792::AID-ASI4>3.0.CO;2-K

Doiron, J. A. G. (2006). On-campus blended learning: Using discussion forums for peer collaboration on tutorial assignments. In W. Nejdl & K. Tochtermann (Eds.), *Innovative approaches for learning and knowledge sharing (LNCS)* (Vol. 4227, pp. 585–590). Berlin: Springer-Verlag. doi:10.1007/11876663_57

Duffy, T. M., & Jonassen, D. (1992). *Constructivism and the technology of instruction: A conversation*. Hillsdale, NJ: Lawrence Erlbaum Associates.

Heinze, A., & Procter, C. (2004). Reflections on the use of blended learning. In *Education in a changing environment*. Academic Press.

Hung, D., & Nichani, M. (2001). Constructivism and e-learning: Balancing between the individual and social levels of cognition. *Educational Technology*, *41*(2), 40–44.

Illeris, K. (2000). Lifelong learning as mass education. In C. Symes (Ed.), *Proceedings of the International Conference on Working Knowledge: Productive Learning at Work*. Sydney, Australia: University of Technology Sydney.

Karayan, S., & Crowe, J. (1997). Student perspectives of electronic discussion groups. *Technological Horizons in Education*, *24*(9), 69–71.

Oliver, R. (2002). The role of ICT in higher education for the 21st century: ICT as a change agent for education. In *Proceedings of the Higher Education for the 21st Century Conference*. Miri, Australia: Curtin University.

Ormerod, R. (1995). The role of methodologies in systems strategy development: Reflections on experience. In F. Stowell (Ed.), *Information systems provision: The contribution of soft systems methodology* (pp. 75–101). London: McGraw-Hill.

Peterson, P. M. (2003). New directions to the global century. *Frontiers: The Interdisciplinary Journal of Study Abroad*, *9*, 189–198.

Race, P., & Brown, S. (1998). Refreshing your lecturing. In *The lecturer's toolkit* (pp. 19–49). London: Korgan Page.

Ramsden, P. (2003). University teachers' theories of teaching. In *Learning to teach in higher education* (2nd ed., pp. 106–116). London: Routledge.

Rastegarpour, H. (2010). What is the hoopla about blended learning: Something old is new again. In *Proceedings of the Second International Conference on E-Learning and E-Teaching (ICELET 2010)*. IEEE.

Richey, R. C. (2008). Reflections on the 2008 AECT definitions of the field. *TechTrends*, *52*(1), 24–25. doi:10.1007/s11528-008-0108-2

Siemens, G. (2004). *E-learning categories*. Retrieved from http://www.elearnspace.org/Articles/elearningcategories.htm

Singh, H. (2003). Building effective blended learning program. *Educational Technology*, *43*(6), 51–54.

Smith, D., & Hardaker, G. (2000). e-Learning innovation through the implementation of an internet supported learning environment. *Journal of Educational Technology & Society*, *3*, 1–16.

Stewart, M. (2004). Learning through research: An introduction to the main theories of learning. JMU Learning and Teaching Press, 4.

Whitelock, D., & Jefts, A. (2003). Editorial. *Journal of Educational Media*, *28*(2-3), 99–100. doi:10.1080/1358165032000177407

ADDITIONAL READING

Ackerman, R., & Goldsmith, M. (2008). Learning directly from screen? Oh-no, I must print it! Metacognitive analysis of digitally presented text learning. In Y. Eshet, A. Caspi, & N. Geri (Eds.), *Learning in the Technological Era III: Proceedings of the 2009 Chais Conference* (pp. 1-7). Raanana, Israel: The Open University of Israel.

Andrews, R., & Haythornthwaite, C. (2007). *The sage handbook of e-learning research*. Thousand Oaks, CA: Sage Publications.

Bates, A. R., & Khasawneh, S. (2007). Self efficacy and college students' perception and use of online learning systems. *Computers in Human Behavior*, *3*(1), 175–191. doi:10.1016/j.chb.2004.04.004

Bersin, J. (2004). *The blended learning book: Best practices, proven methodologies and lessons learned*. New York: Wiley & Sons.

Bliuc, A.-M., Goodyear, P., & Ellis, R. A. (2007). Research focus and methodological choices in studies into students' experiences of blended learning in higher education. *The Internet and Higher Education*, *10*(4), 231–244. doi:10.1016/j.iheduc.2007.08.001

De George-Walker, L., & Keeffe, M. (2010). Selfdetermined blended learning: A case study of blended learning design. *Higher Education Research & Development*, *29*(1), 1–13. doi:10.1080/07294360903277380

Dzakaria, H., Mustafa, C. S., & Abu Bakar, H. (2006). Moving forward with blended learning (BL) as a pedagogical alternative to traditional classroom learning. *Malaysian Online Journal of Instructional Technology*, *3*(1), 11–18.

Dziuban, C. D., Hartman, J. L., & Moskal, P. D. (2004). Blended learning. *Research Bulletin. EDUCAUSE Center for Applied Research*, *7*, 1–12.

Evans, C. (2008). The effectiveness of m-learning in the form of podcast revision lectures in higher education. *Computers & Education*, *50*(2), 491–498. doi:10.1016/j.compedu.2007.09.016

Garrison, D. R., & Vaughan, N. D. (2012). *Blended learning in higher education: Framework, principles, and guidelines*. New York: John Wiley & Sons.

Ginns, P., & Ellis, R. A. (2007). Quality in blended learning: Exploring the relationships between online and face-to-face teaching and learning. *The Internet and Higher Education*, *10*(1), 53–64. doi:10.1016/j.iheduc.2006.10.003

Ginns, P., & Ellis, R. A. (2009). Evaluating the quality of e-learning at the degree level in the student experience of blended learning. *British Journal of Educational Technology*, *40*(4), 652–663. doi:10.1111/j.1467-8535.2008.00861.x

Glazer, F. S. (2012). *Blended learning stylus*. London: Eurospan.

Guri-Rosenblit, S. (2005). Eight paradoxes in the implementation process of e-learning in higher education. *Higher Education Policy*, *18*(1), 5–29. doi:10.1057/palgrave.hep.8300069

Hill, J. R., Hannafin, M. J., & Domizi, D. P. (2005). Resource-based learning and informal learning environments: Prospects and challenges. In L. T. W. Hin & R. Subramaniam (Eds.), *E-learning and virtual science centers* (pp. 110–125). Hershey, PA: IGI Global. doi:10.4018/978-1-59140-591-7.ch006

Horn, M. B., & Staker, H. (2011). *The rise of K-12 blended learning*. Mountain View, CA: Innosight Institute. Retrieved from http://www.innosightinstitute.org/media-room/publications/education-publications/the-rise-of-k-12-blended-learning/

Khan, Z. R. (2006). E-learning techniques in IT programs—Are they helping my sense of cyber ethics? In *Proceedings on the IEEE Second International Joint Conferences on Computer, Information, and Systems Sciences, and Engineering*. IEEE.

Khan, Z. R., & Samuel, S. D. (2007). e-Learning and e-cheating— Drawing a balance. In *Proceedings of the 7th Global Conference on Business and Economics*. Rome, Italy: IEEE.

Levy, Y. (2007). Comparing dropouts and persistence in e-learning courses. *Computers & Education*, *45*(2), 185–204. doi:10.1016/j.compedu.2004.12.004

Oliver, M., & Trigwel, K. (2005). Can 'blended learning' be redeemed? *E-learning*, *2*(1), 17–26.

Oliver, R. (2005). Using blended learning approaches to enhance teaching and learning outcomes in higher education. In *Proceedings of the International Association of University Presidents' Teaching Showcase*. Joondalup, Australia: Edith Cowan University.

Oliver, R., Wirski, R., Wait, L., & Blanksby, V. (2005). Learning designs and learning objects: Where pedagogy meets technology. In C. Looi, D. Joassen, & M. Ikeda (Eds.), *Towards sustainable and scalable educational innovations informed by the learning sciences* (pp. 330–337). Amsterdam: IOS Press.

Paechter, M., Brigitte, M., & Macher, D. (2010). Students' expectations of, and experiences in e-learning: Their relation to learning achievements and course satisfaction. *Computers & Education*, *54*(1), 222–229. doi:10.1016/j.compedu.2009.08.005

Precel, K., Eshet-Alkalai, Y., & Alberton, Y. (2009). Pedagogical and design aspects of a blended learning course. *International Review of Research in Open and Distance Learning*, *10*(2), 1–16.

So, H.-J., & Brush, T. A. (2008). Student perceptions of collaborative learning, social presence and satisfaction in a blended learning environment: Relationships and critical factors. *Computers & Education*, *51*(1), 318–336. doi:10.1016/j.compedu.2007.05.009

Wills, S. (2009). A taxonomy for simulation learning designs: Implications for repositories. In *Proceedings of the Future of Learning Design Conference.* Retrieved from http://works.bepress.com/swills/44/

Wills, S. (2010). Learning design for online role play versus simulation. *Academic Services Division—Papers.* Retrieved from http://works.bepress.com/swills/17/

Wills, S. (2011). Rethinking reusability: Implications from a longitudinal study of online role play in Australian higher education. *Academic Services Division—Papers.* Retrieved from http://works.bepress.com/swills/15/

Wills, S., & Bowles, K. (2009). An evolutionary approach to strategic planning for eLearning. *Academic Services Division—Papers.* Retrieved from http://works.bepress.com/swills/18/

Wills, S., Corderoy, R. M., Stace, R., & Ip, A. (2000). Improving teaching and learning through formative evaluation: Using a customised online tool to collect student feedback. *Academic Services Division—Papers*. Retrieved from http://works.bepress.com/swills/9/

Wills, S., Devonshire, E., Leigh, E., Rosser, E., Shepherd, J., & Vincent, A. (2007). Encouraging role based online learning environments. *Academic Services Division—Papers*. Retrieved from http://works.bepress.com/swills/2/

Wills, S., Hedberg, J., Oliver, R., Harper, B., & Agostinho, S. (2002). Creating a taxonomy for high quality learning outcomes using ICTs in higher education. *Academic Services Division—Papers*. Retrieved from http://works.bepress.com/swills/21/

KEY TERMS AND DEFINITIONS

Blended Learning: A mix of the effectiveness of classroom instructions with independence of expression via computer mediated activities with the objective to optimize learning.

Discussion Forum: An online system wherein students can hold conversations and share knowledge, and also can obtain feedbacks from their instructors and peers.

eLearning: Learning through technology.

Improving Learning: Innovating new methods to enhance student learning.

Information and Communication Technology (ICT): Technology that helps in communication and distribution of information.

Interactive Resources: Interaction between teacher/instructor and students and between students and their peers/learners.

Online Learning: Learning carried out via a platform hosted on the Web, providing anytime and anywhere access.

Web-Based Instruction/Tool: Instruction assisted by Internet/Web-supported courses.

This work was previously published in Advancing Technology and Educational Development through Blended Learning in Emerging Economies edited by Nwachukwu Prince Ololube, pages 21-35, copyright year 2014 by Information Science Reference (an imprint of IGI Global).

APPENDIX

UOWD WebCT/BlackBoard Questionnaire

Dear Student,

This short survey is intended to measure your satisfaction with the WebCT/Blackboard component of this class. Your responses are confidential and will be used solely for the purpose of improving our development of this system at UOWD. Thank you for your responses.

1. How often do you use WebCT/ BlackBoard? (Choose one)
   - Daily
   - A few times a week
   - Once a week
   - Once or twice per month
   - Never (have not yet used the system)
2. From where do you access WebCT? (Choose as many as apply)
   - Home
   - Workplace
   - UOWD Library
   - UOWD computer labs
   - My own laptop while at UOWD
   - Internet cafe
   - Mobile device
   - Other (specify) ____

Table 1.

Getting Started		Strongly Disagree	Disagree	Neutral	Agree	Strongly Agree
3.	I am comfortable with using computers					
4.	It is convenient for me to use the system (for example, at home, work, or at UOWD)					
5.	There was enough introduction to the system by the instructor in the classroom					
6.	It was easy to get started on the WebCT/Black Board system					

7. Is there anything that could have been done differently to make it easier for you to start using the WebCT/Black Board system? For example, instructor guidance, printed materials, instructions, etc.

Table 2.

WebCT/BlackBoard and Learning		Strongly Disagree	Disagree	Neutral	Agree	Strongly Agree
8.	Using WebCT/Black Board improves my communication with the instructor					
9.	Using WebCT /BlackBoard improves my communication with other students					
10.	Using WebCT /BlackBoard gives me more access to resources and learning materials					
11.	Using WebCT /BlackBoard makes me feel more connected to the subject					
12.	The instructor makes enough references in class to the system and the expectations for use by the students					
13.	Using WebCT /BlackBoard makes it easier for me to learn					
14.	There is enough material on the system from this class to make it worthwhile					
15.	Updates by the instructor are frequent enough to maximize the experience					

16. Do you have any suggestions about how the WebCT /BlackBoard is used in this class and how it might be improved to help your learning process?
17. Additional comments on WebCT /BlackBoard and how you would feel about using in other classes in the future:

Chapter 49
Blended Learning Methods in Introduction to Teaching and Sociology of Education Courses at a University of Education

Nwachukwu Prince Ololube
University of Education, Nigeria

ABSTRACT

In recent years, the use of the Blended Learning (BL) methods has experienced worldwide uptake and is responsible for enormous changes, not only in developed country education, but in developing country education, particularly sub-Saharan Africa. Given the role that blended learning can play in educational development, educational institutions, students, employers, and governments are increasingly urged to examine the economic, demographic, and technological environments of the present so as to ensure comprehensive preparedness for the future. This study employs a questionnaire for data gathering and results are analysed quantitatively. The findings reveal a significant improvement in the use of blended learning methods to achieve effective academic performance in students. The impact of blended learning in the educational sector is thus evidenced in the changing instructional pedagogies that lead to more interactive learning processes.

INTRODUCTION

Educational systems around the world are effective to the extent that they make use of available resources to achieve stated aims and objectives. The main objective of an educational system, irrespective of the level of education, is to offer high quality education to learners. The resources needed to provide high quality education include financial as well as human and material resources (Carrim & Shalem, 1999; Ololube, 2009). The success of any educational system also undoubtedly depends on methodological competence in the use of blended learning (BL) methods (Ololube, 2011).

Given the dramatic increase in educational methods rendered possible by technological advances, a more open and flexible approach to teaching and learning, particularly in higher

DOI: 10.4018/978-1-4666-8246-7.ch049

education institutions where various forms of online/e-learning are taking shape, has been advocated across the globe (Fisher, 2003, Ifinedo, 2005; Ololube & Egbezor, 2009; Ebrahimi, 2012). The most frequently used blended learning format combines the face-to-face (f2f) and online delivery methods (Graham, 2006; Osguthorpe & Graham, 2003; Jackson, 2005; Nel, 2005, Ololube, 2011), with the objective of providing a resourceful and effective instructional experience. More broadly, blended learning has been invoked to explain approaches that combine several different learning delivery methods. It is also used to describe learning that mixes event-based activities, such as face-to-face classroom learning, e-learning, and self-paced learning (Graham, 2006). Blended learning has resulted in more proactive and higher quality teaching methods. Its most recent manifestation, the incorporation of Information Communication Technology (ICT) in educational settings and curriculum has significantly altered the tools, content, dynamics and expectations of teaching and learning (Ololube, 2011).

The degree to which blended learning takes place, however, and the way it is integrated into the curriculum, can vary across institutions of higher learning. Blended learning in college and university based instruction is often employed to accommodate students' diverse learning styles and to enable them to participate fully in academic activities in ways not possible with traditional f2f classroom instruction. Blended learning has the potential to improve educational productivity by accelerating the rate of learning, taking advantage of learning time and hours more effectively, reducing the time cost-benefit scenario, and making better use of instructional materials (Heller, 2010; U.S Department of Education, 2012).

Blended learning is essential in enabling access to mainstream contemporary education. As such, it remains an important tool in Nigeria's educational development (Ololube, 2011). Nigeria must thus be diligent in integrating ICT into its education sectors, especially tertiary education, as this level of education is at the forefront of national and regional development, charged with the production of equipped and adept human capital. Nigerian higher education institutions are preparing, albeit slowly, for these new challenges and have been sluggish in responding to calls for the expansion of blended learning services (Ifinedo, 2005; Iloanusi & Osuagwu, 2009). Globally, there is an increasing demand for more and better ICT competencies among students and faculty given rapid advances in technology and global education (UNESCO, 2008). The effectiveness or success of teachers today thus depends on how well they are prepared for their roles within a changing and challenging system (Hennessy, Harrison & Wamakote, 2010).

The teaching methods employed by educators guide and subsequently evaluate the progress of students (Ololube & Egbezor, 2009). This progress, then, depends on the instructional strategies employed. Faculty are expected to have specialized training and knowledge in the application of several different instructional delivery methods and that their methodological application is appropriate to day-to-day pedagogical encounters with students (Ololube, 2011). According to Husu (2006) and Haßler, Hennessy and Lubasi, (2011), teacher competence, specialized training and knowledge in the application of instructional delivery methods, goes beyond skills to include the attitudes and stamina needed to carry out actions in even the most difficult situations.

A number of barrier to blended learning use in Nigerian universities have been identified. These include inadequate funding, limited computer availability, intermittent Internet access, poor infrastructure, power supply shortages and often complete black outs, lack of trained faculty and personnel, and poverty, among others (Ifinedo & Ololube, 2007; Ololube, 2011). These factors make it difficult a total shift to blended learning assisted classrooms in public universities difficult at best (Mulford; 2003; Aladejana, 2008). Nonetheless, it is imperative that colleges and universities continue to endeavour to use blended learning tools and resources in a variety of ways to support teaching and learning.

Purpose of the Study

The primary objective of this study is to codify and understand students' opinion and beliefs concerning blended learning tools and services. Despite studies confirming the importance of blended learning to student academic performance (Graham, 2006; Aladejana, 2008; Iloanusi & Osuagwu, 2009; Ololube, 2011), there remains the perception among academic and non-academic staff in Nigeria that the ability to learn effectively and with enthusiasm may not be tied to the use of blended leaning tools. Instead, they see student academic performance to be tied to intelligence, interest, and other personal traits.

Research on blended learning has become a major industry in the west, not only in the United Kingdom but also in Australia, Canada, and the United States of America. Although more than a decade in the making, this body of research has had a major impact on educational policy. As such, this study seeks to learn from the research on blended learning and to apply its lessons to policy aimed at improving higher education in Nigeria. This study also aims to identify best practices around the use of blended leaning management and planning strategies in higher education administration, particularly in this time of scarcity when educational systems the world over are doing more with less. This atmosphere of inadequate resources is one of the strongest influences on education in Nigeria today.

There are limited research publications in Nigeria on this topic and those that exist tend to be quite narrow in that they fail to address the full range of possible features that might improve the use of blended learning teaching methods. This study looks to offer new insights into the diverse factors that support the use of blended learning tools and methods. One of the central purposes of this study is to address the intellectual gap in understanding faculty competences around, and student readiness to, accept blended learning as a process meant to enhance college and university productivity. In doing so, this study enters into the global debate on the use of blended learning in educational improvement and students' academic achievement from the viewpoint of a developing country.

In its efforts to codify and understand faculty and student opinions and beliefs concerning blended learning tools and services, the under listed hypotheses were developed:

- Performance expectancy is not significantly related to the perceived impact of blended learning.
- Effort expectancy is not significantly related to the perceived impact of blended learning.
- Facilitating conditions are not significantly related to the perceived impact of blended learning.
- Attitude towards computer systems is not significantly related to the perceived impact of blended learning.
- Behavioural intentions are not significantly related to the perceived impact of blended learning.
- Computer systems use is not significantly related to the perceived impact of blended learning.
- Respondents' personal information is not significantly related to their opinion on the perceived impact of blended learning.

BACKGROUND

The Ignatius Ajuru University of Education is one of two universities of education located in Port Harcourt, the South-South geo political zone of Nigeria. The university is dedicated to excellence in teacher preparation and confers the degrees of

Bachelor of Science Education (B.Sc. Ed.) and Mater of Education (M.Ed.). Excellence, in an educational context, refers to effectively providing learning experiences that prepare students for the challenges of multifaceted, ever varying, and diverse workplaces in society (Ololube, 2011). The university is composed of six faculties: Natural and Applied Sciences, Business Studies, Humanities, Industrial Education, Social Sciences, and Education. The Faculty of Education is home to several departments, including the Department of Educational Foundations and Management.

At present, this department has a staff of thirty one (31) lecturers ranging from Professors to Assistance Lecturers. The department services six (6) B.Sc. (Ed.) courses for several other departments in the university, which, with the exception of one, are all compulsory. As the name implies, the department is comprised of lecturers in the core foundation courses as well as in management, planning and supervision. The vision of the department is to produce teachers that will be continuously relevant at present and into the future in the Humanities, Social Sciences, Arts, Pure and Applied Sciences, and Science and Technology, as well as in research through the provision of sound foundational and management courses in education.

The objectives of the department are:

- To make Educational Foundations and Management the reference point for other faculties in the University of Education and faculties of Education in other universities, within and outside Nigeria.
- To discourage and or even eliminate forms of social ills, such as examination malpractices, cultism, immorality, sorting, sexual harassment, etc., that are fast becoming part of the school system.
- To encourage hard-work, creativity, and scholarship among teachers and students so as to meet up the present and future demands of the country.
- To produce great thinkers (philosophers) sociologists, historians, management personnel and others in the field of education that can compete favourably with their contemporaries within and outside Nigeria.

Introduction to the Teaching Profession and Sociology of Education are compulsory courses in the department. Introduction to the Teaching Profession or EDU 111 is comprised of the general and philosophical contents of teaching, teaching as an occupation, career and a profession, teaching and its professional ethics, modern day teachers and their challenges, the teacher and the learner, the subject matter and the school environment, lesson preparation and presentation, teaching skills, methodology and techniques, teaching resources, evaluation outcomes, school records, and discipline. Sociology of Education or EDU 222 is comprised of the meaning, nature and scope of sociology, sociological theories, social organization, characteristics of organizations, education and social change, education and culture, school as a component part of larger society, socialization and education, types and agencies of socialization, social stratification and its implication for education, education and social mobility, deviant behaviours in school, common offences in Nigerian schools, the family, types of families and their characteristics and influence on education performances, changing structures of the family over time, and education and the law.

The successful completion of Introduction to Teaching and Sociology of Education is a critical step in the teacher education of undergraduate students. These courses are important for all who are planning to further their teaching careers and who, as graduates, will need to make informed teaching decisions as part of their professional competences. Consequently, both courses are requirement of all undergraduate programmes in the university. EDU 111 and EDU 222 courses are challenging classes to teach because the technical complexity of the course requirements are quite high while student interest in these required courses can, unfortunately, be quite low.

Throughout both courses, take home assignments are given to students with basic instructions and sources for materials on the Internet. Assignments are submitted to faculty via e-mail and feedback is provided to students two days after the deadline for submission. Students are advised to print the feedback for presentation and discussion in class. The use of Power Point presentations is encouraged throughout both courses. Students complete f2f contact sessions throughout the semester with two online delivery components. During each cycle of lectures, students are required to participate in at least 75% of classroom activities, as per university regulations, to qualify for examination.

CONCEPTS AND USES OF BLENDED LEARNING

The global evolution of Information Communication Technologies (ICTs) has modernized teaching methods. Blended learning is one such modernization (Graham, 2006; Lee, 2008; Garrison & Vaughan, 2008). The blending of different learning experiences has, however, naturally occurred both inside and outside of the classroom for hundreds of years and the precise origin of the term "blended learning" is uncertain (Friesen, 2011).

According to Friesen (2012), blended learning has been interpreted from a number of diverse perspectives and can mean:

- To combine or mix modes of Web-based technology (e.g., live virtual classroom, self-paced instruction, collaborative learning, streaming video, audio, and text) to accomplish an educational goal.
- To combine various pedagogical approaches (e.g., constructivism, behaviorism, and cognitivism) to produce an optimal learning outcome with or without instructional technology.
- To combine any form of instructional technology (e.g., videotape, CD-ROM, Web-based training, and film) with face-to-face instructor-led training. To mix or combine instructional technology with actual job tasks in order to create a harmonious effect of learning and working (p. 2).

Within the context of this chapter, blended learning is defined as the combination of f2f and online learning (Mortera-Gutiérrez, 2006; Naaj, Nachouki & Ankit, 2012). For Iloanusi and Osuagwu (2009), blended learning is a flexible form of learning that represents a suitable incorporation of the components of technological enabled learning and f2f teaching and interaction. At its best, it involves models that enhance the delivery of e-learning and classroom learning for the students and faculty involved in the teaching and learning processes. Well blended e-learning, for example, easily adapts to the needs of students and reduces forced student adaptation to tools and methods that are more problematic than suitable (Ololube, 2011).

Blended learning in this paradigm emphasizes active learning and a reduction in classroom time and is based on the concept of hybridization: the bringing together of two dissimilar parts to produce a third result. When successfully achieved, the result is an educational environment that is highly conducive to faculty teaching and student learning (Vaughan, 2007): a good balance between discovery learning and personal exploration on one hand, and systematic instruction and guidance on the other (Newhouse, 2002a).

In higher education, blended learning is often referred to as a hybrid model. The goal of hybrid courses is to join the best features of in-class teaching with the best features of online learning to promote active and self-directed learning opportunities for students with the added advantage of flexibility. Students have long indicated that blended learning model provide them with the ability to better schedule their own time and improved learning outcomes. Nonetheless, students may initially encounter issues around time management, taking greater responsibility for their own learning, and using sophisticated technologies (Vaughan, 2007). In terms of the concrete success of this delivery model, improved performance has been found in those taught with blended strategies compared to those taught with a single method. In Bonk, Kim and Zeng (2005), the majority of faculty who were experienced applying Web technologies to their teaching indicated that BL has significantly improved student academic achievement. Despite these very positive outcomes, the use of blended learning is still new or meek for most students and faculty in Nigeria.

Early assessments of the application of blended learning in higher education reinforce the need to:

- Integrate blended learning principles in Nigerian schools so as to create an enabling environment where teaching and learning can be advanced.
- Thoroughly articulate the professional competencies essential to the implementation of blended learning designs.
- Present illustrative scenarios of blended learning designs that contain practical guidelines for further blended learning design.
- Adequately describe the tools and techniques that actively engage students in the blended learning process (Garrison & Vaughan, 2008).

Unfortunately, as children grow their passion for learning often fades. Consequently, faculty find that a large number of students, while physically present in the classroom are mentally absent, and many more fail to invest themselves in the experience of learning at all (Ololube, 2009; 2011). The main purpose of education is to improve the reasoning process as it is applied to solving problems. As such, students need to know why they are learning something. Students also need to be encouraged towards self-directed learning as they better progress when they take control of how they learn. Students often prefer a problem solving approach to learning in that they learn best when the knowledge is presented in a real-life setting. For students to be motivated to learn, new knowledge must help them solve problems they perceive as important (Miller, 2005). They find satisfaction in learning based on the understanding that the goals are useful to them and less commonly based on the pure enjoyment of exploring new things (Austin, Dwyer & Freebody, 2003).

Most often, a student's readiness to embrace blended learning strategies comes with time, and faculty must support this development (Ololube, 2011). Faculty must encourage students to fully participate in the teaching and learning processes. Assigning homework that helps faculty to determine learning objectives and activities is a step in the right direction in terms of bringing out students' inner selves who are ready to learn. None of these methods, however, will create continual inspiration unless the goals are realistic for the learner. Effective faculty are thus those who enlist students in goal setting (Ebrahimi, 2012). Some students may bring with them unrealistic notions about what they can accomplish. Perhaps they do not understand the precision with which a skill must be carried out or have the deepness of understanding needed to master certain instructional material. To identify realistic goals in any case is an essential part of the profession and so faculty must be skilled in assessing student readiness or improvement in the direction of the stated objectives using better blended learning strategies (Ololube, 2011; Ololube, Eke, Uzorka, Ekpenyong, & Nte, 2009).

The teaching of EDU 111 and EDU 222 is a challenging task for most faculty and blended learning methods sound vague to many. Likewise, Internet-based environments or instructional materials can be daunting for non-computer literate faculty. Overcoming these insufficiencies in a blended learning environment is necessary to enhance learning. Not surprisingly, Zhongjun and Lijuan (2009) argue that adopting improved blended leaning methods will strengthen teaching effects on a large scale, especially teacher-student communication.

Competence in the use of blended learning methods means getting most students to engage in higher level cognitive processes that more academic students use spontaneously. It means getting students to engage in learning-related activity that helps them attain the particular objectives set for the unit or course, such as theorizing, generating new ideas, reflecting, applying and problem-solving (Ololube, 2011; Ololube, Amaele, Kpolovie, & Egbezor, 2013). Other important faculty competencies include inspiring students to compete against themselves, to take on tasks that seem to exceed their abilities, and to discover and develop their potential as thinkers. In order to affect these ends, faculty need to be curious, imaginative, empathetic, interesting, friendly, and hardworking, thereby creating an environment that enhances and strengthens the learning disposition of students.

METHOD

Design

This study falls within the action research paradigm, and employs quantitative assessment aimed at improving the best available practices, processes and performances of blended learning in higher education. These practices and processes are increasingly central to the creation and development of excellence and the discovery of new ideas. In this model, action research involves inquiring into one's own experiences throughout recurring processes, in other words, observing and reflecting on the progress of the teaching and learning process.

This study assesses the use of blended learning methods in the teaching of Introduction to Teaching and Sociology of Education in a University of Education. It looks at the role of faculty in employing blended learning as a method of teaching and learning. It also sought to determine blended learning successes and their effects on student academic achievements/performances. It is hoped that this research will offer useful insights to education planners and administrators and in the policy development process.

This study used a combination of observation and text-based materials (valuable records about educational research) to enrich the study. In terms of the observational component, the researcher is a full time faculty member and has been involved in teaching B.Ed. EDU 111 and EDU 222 as well as 100 and 200 level B.Ed. part-time and regular students of Accounting Education, Marketing Education, Management Education, and Secretarial Studies Education at the University of Education, Port Harcourt, Nigeria. Observations were made of student competences when using computer applications and software to solve EDU 111 and EDU 222 problems and the quality and skill of students in completing their assignments on time and participating in the classroom.

Prior to the commencement of lectures, it was noted that the majority of the students did not have email accounts intended to facilitate the submission of assignments and communication with faculty. Consequently, students were asked to open an email account of their choice. The sampling for this study was purposive, which means that every student who registered for the courses participated in the teaching and learning processes and the submission of assignments online for assessment and grading. The electronic grading process provided continuous prompt and detailed feedback to students on their performance.

Data Collection and Instrument

Data for this study was gathered during the 2011-2012 academic year. Data was collected from multiple sources including a comprehensive review of contemporary literature, faculty observations, and student questionnaires reflecting assignment exercises and analyses.

The student questionnaire, a six-point Likert type scale of (1) Totally Disagree [TD]; (2) Partly Disagree [PD]; (3) Disagree [D], (4) Partly Agree [PA]; (5) Agree [A]; and (6) Totally Agree [TA], was administered to both regular and part-time students. The questionnaire was divided into two sections. Section A was comprised of questions about respondents' personal data (gender, age, department of study, year of study, programme of study). Section B sought to elicit information on the variables that may or not be responsible for the perceived impact of blended learning (BL) and student performance (see Table 1).

Instrument Validity and Reliability

The questionnaire was guided by the characteristics of a good questionnaire as developed by Dillman, Smyth and Christian (2008), Fink (2008), Fowler (2008), and Bowen (2009). Assistance from professional colleagues validated and made the development of such a questionnaire for this study possible. Feedback from colleagues helped ensure that the measures reflected the content of the concept in the questions. Consequently, the face validity was determined to be intact.

The questionnaire was as simple as possible to accommodate different categories of students. The questionnaire was designed to gather information on both the overall performance of the blended learning system as well as its specific components. Since the questionnaire also includes demographic questions, it was used to correlate performance and satisfaction with the blended learning study methods among students. A Cronbach Alpha reliability estimate of .841 was used to judge the reliability of the instrument. The questionnaires provided, among others, feedback on students' expectations of blended learning, reflections on experiences with collaborative assignments, and suggestions on ways in which online collaborative learning could be enhanced.

Data Analysis

In analysing the data gathered from respondents, the Statistical Package of the Social Sciences (SPSS) Version 18 was used. A simple percentage (cross tabulation) method of data analysis was adopted for personal data. Multiple inferential statistical analyses, T-test (t) and One Way Analysis of Variance (ANOVA) were used to analyse the hypotheses at the .05 level of significance (two tailed).

Mean was used to determine the strength of some variables relative to the weakness of others and cross tabulation was used because it is one of the simplest and most common ways of demonstrating the presence or absence of a relationship (Bryman & Cramer, 2011; Norusis, 2012). T-test (t) analysis was used to determine the relationship and (or) differences between the variables in Section B of the questionnaire, while ANOVA was used to determine if significant relationships existed between respondents' personal information and the perceived impact of blended learning.

RESULTS

The statistical analysis for this study revealed the extent of the perceived impact of blended learning and student performance in the teaching of Introduction to Teaching and Sociology of Education. The majority of respondents agreed that the use of blended learning is effective and has a positive impact on student academic performance. An overwhelming number of respondents (students) felt that Introduction to Teaching and Sociology of Education courses are highly beneficial to students, especially students pursuing a professional degree in management-education, accounting-education, marketing-education and secretarial studies-education because of its ability to render students more competent in their chosen profession.

Table 1. Perceived impact of blended learning and student performance

	PERFORMANCE EXPECTANCY/BL	SD	D	PD	PA	A	SA
1.	I find computer systems useful in my studies	1	2	3	4	5	6
2.	Using computer systems enables me to accomplish assignments more quickly	1	2	3	4	5	6
3.	Using computer systems increases my learning ability	1	2	3	4	5	6
4.	If I use computer systems, I will increase my chances of getting a good job	1	2	3	4	5	6
5.	Using computer systems is good for my academic growth	1	2	3	4	5	6
	EFFORT EXPECTANCY/BL	**SD**	**D**	**PD**	**PA**	**A**	**SA**
6.	My interaction with computer systems is clear and understandable	1	2	3	4	5	6
7.	It would be easy for me to become skilful at using computer systems	1	2	3	4	5	6
8.	I would find computer systems easy to use	1	2	3	4	5	6
9.	Learning to operate computer systems is easy for me	1	2	3	4	5	6
	FACILITATING CONDITIONS/BL	**SD**	**D**	**PD**	**PA**	**A**	**SA**
10.	The university administrators believe that the use of computer systems provides significant benefits to teaching and learning	1	2	3	4	5	6
11.	I receive necessary assistance from my lecturer in the use of computer systems	1	2	3	4	5	6
12.	I have access to resources that would enable me use computer systems at school	1	2	3	4	5	6
13.	Persons are available to assist with difficulties arising from computer systems use	1	2	3	4	5	6
	ATTITUDES TOWARDS COMPUTER SYSTEMS/BL	**SD**	**D**	**PD**	**PA**	**A**	**SA**
14.	Using computer systems during BL classes is a good idea	1	2	3	4	5	6
15.	Computer systems make learning more interesting	1	2	3	4	5	6
16.	Using computer systems to learn is fun	1	2	3	4	5	6
	BEHAVIORAL INTENTIONS/BL	**SD**	**D**	**PD**	**PA**	**A**	**SA**
17.	I intend to use computer systems in my assignments and learning	1	2	3	4	5	6
18.	I predict I will use computer systems in the coming months	1	2	3	4	5	6
19.	I plan to use my computer systems whenever I have a need	1	2	3	4	5	6
20.	I am certain I'll use computer systems effectively in the coming months	1	2	3	4	5	6
	COMPUTER SYSTEMS USE/BL	**SD**	**D**	**PD**	**PA**	**A**	**SA**
21.	I frequently use computer systems to understand a problem	1	2	3	4	5	6
22.	I often use computer systems in my university	1	2	3	4	5	6
23.	I frequently use computer systems to find answers to a problem	1	2	3	4	5	6
24.	I very often use computer systems in my learning	1	2	3	4	5	6

Respondents (regular students N-166 and part-time students N-60) to this study completed a questionnaire that employed a six-point Likert-type scale. Results revealed that 99(42.5%) of respondents were male while 130(57.5%) were female. In terms of age, 35(15.5%) were younger than 21, 148(65.5%) were 21-30 years of age, 35(15.5%) were 31-40, 8(3.5%) were older than 40. See Table 2 for further details of respondents' demographic data.

Hypothesis 1: Performance Expectancy is Not Significantly Related to the Perceived Impact of Blended Learning

Table 2. Respondents demographic data

Variables		Freq.	%
Gender	Male	96	42.5
	Female	130	57.5
Age	Less than 21years	35	15.5
	21-30 years	148	65.5
	31-40 years	35	15.5
	More than 40 years	8	3.5
Department	Accounting/Education	18	8.0
	Management/Education	103	45.6
	Marketing/Education	94	41.6
	Secretarial Studies/Education	11	4.9
Level/Year of study	100 level	60	26.5
	200 level	166	73.5
Type of Programme	Full time students (Regular)	166	73.5
	Sandwich	60	26.5

The results in Tables 3 and 4 were tallied along agree and disagree. Based on the data as shown in the tables, 87.4% find computer systems useful in their studies during the use of blended learning methods. Table 4 shows a significant result in the t-test analysis at ($t = 43.328$, $P < .000$) such that 72% are of the view that using computer systems during blended learning classes enables them to accomplish assignments more quickly ($t = 34.506$, $P < .009$). Similarly, 81.6% of respondents were of the opinion that using computer systems during blended learning classes increases their learning ability. The t-test analysis here shows a significant relationship at ($t = 24.930$, $P < .001$).Almost all respondents, 90.2%, agree that the use of computer systems increases their chances of getting a good job at ($t = 26.758$, $P < .000$). Finally, 85.1% agree that using computer systems during BL classes is significantly related to their academic growth at ($t = 31.224$, $P < .000$). On the whole, the results show that performance expectancy is significantly related to the perceived impact of blended learning. Hypothesis 1 is therefore rejected.

Hypothesis 2: Effort Expectancy is Not Significantly Related to the Perceived Impact of Blended Learning

The second analysis conducted was a two-tailed t-test (t) and cross tabulation analysis to determine whether relationships exist between effort expectancy and the perceived impact of BL (see Tables 5 and 6). The study found that effort expectancy is significantly related to BL. The data revealed that 89.2% of respondents felt that interactions with computer systems during BL classes is clear and understandable ($t = 27.556$, $P < .000$). Similarly, 84% are of the view that it is easy for them to become more skilful at using computer systems as a result of the BL classes ($t = 26.597$, $P < .000$). The majority of respondents (73.6%) found computer systems easy to use as a result of BL classes ($t = 25.234$, $P < .000$) and 77.6% of respondents believed that learning to operate computer systems was easy ($t = 26.356$, $P < .000$). Evidence of the impact of BL on students' academic performance in the literature is immense (Ololube, 2011). Thus, Hypothesis 2 is rejected.

Table 3. Cross tabulation analysis of performance expectancy and blended learning

s/n	Variables	Disagree (D)	Agree (A)
1	I find computer systems useful in my studies	12.6%	87.4%
2	Using computer systems enables me to accomplish assignments more quickly	28%	72%
3	Using computer systems increases my learning ability	18.4%	81.6%
4	If I use computer systems, I will increase my chances of getting a good job	9.8%	90.2%
5	Using computer systems is good for my academic growth	14.9%	85.1%

Hypothesis 3: Facilitating Conditions are Not Significantly Related to the Perceived Impact of Blended Learning

Data from the cross tabulation (Table 7) and t-test analysis (Table 8) reveal that facilitating conditions are significantly related to the perceived impact of blended learning. These results show that 84.3% of respondents agree that university administrators believe that the use of computer systems provides significant benefits to BL teaching and learning ($t = 41.291$, $P < .000$). Somewhat lower, 69.9% feel that they receive the necessary assistance from their lecturer in the use of computer systems during BL classes ($t = 25.742$, $P < .000$). Almost three-quarters, 72.5%, agree that they have access to resources that enable them to use computer systems at school ($t = 26.438$, $P < .000$). Just over three-quarters, 77.7%, agree that persons are available to assist them with difficulties arising from computer systems use during BL classes ($t = 27.282$, $P < .000$). As a result of the above analysis, Hypothesis 3 is rejected.

Hypothesis 4: Attitude towards Computer Systems is Not Significantly Related to the Perceived Impact of Blended Learning

Cross tabulation (Table 9) and a t-test analysis (Table 10) were conducted to determine if a significant relationship exists between attitude towards computer and perceived impact on BL. Results showed that 86.2% agree that the using computer systems during BL classes is a good idea at ($t = 49.411$, $P < .000$). Respondents also agree (68.5%) that computer systems make learning more interesting ($t = 25.722$, $P < .000$). Likewise, 88.8% felt that using computer systems to learn and to do assignments is fun ($t = 50.245$, $P < .000$). Results thus revealed that attitude towards computer systems is significantly related to the perceived impact of blended learning and so Hypothesis 4 is rejected.

Table 4. T-test analysis of performance expectancy and the perceived impact on blended learning

PERFORMANCE EXPECTANCY/BL		t	Df	Sig. 2-Tailed	Result
1.	I find computer systems useful in my studies	43.328	225	.000	Impact
2.	Using computer systems enables me to accomplish assignments more quickly	34.506	225	.000	Impact
3.	Using computer systems increases my learning ability	24.930	225	.000	Impact
4.	If I use computer systems, I will increase my chances of getting a good job	26.758	225	.000	Impact
5.	Using computer systems is good for my academic growth	31.224	225	.000	Impact
N: 226 **Df:** N-1. **Sig. level:** 0.05					

Table 5. Cross tabulation analysis of whether effort expectancy impacts blended learning

s/n	Variables	Disagree (D)	Agree (A)
6	My interaction with computer systems is clear and understandable	10.8%	89.2%
7	It would be easy for me to become skilful at using computer systems	16%	84%
8	I would find computer systems easy to use	26.4%	73.6%
9	Learning to operate computer systems is easy for me	22.4%	77.6%

Table 6. T-test analysis of effort expectancy and the perceived impact on blended learning

EFFORT EXPECTANCY/BL		t	df	Sig. 2-Tailed	Result
6.	My interaction with computer systems would be clear and understandable	27.556	225	.000	Impact
7.	It would be easy for me to become skilful at using computer systems	26.597	225	.000	Impact
8.	I would find computer systems easy to use	25.234	225	.000	Impact
9.	Learning to operate computer systems is easy for me	26.356	225	.000	Impact
N: 226 **Df:** N-1. **Sig. level:** 0.05					

Table 7. Cross tabulation analysis of whether facilitating conditions impacts blended learning

s/n	Variables	Disagree (D)	Agree (A)
10.	The university administrators believe that the use of computer systems provides significant benefits to teaching and learning	15.7%	84.3%
11.	I receive necessary assistance from my lecturer in the use of computer systems	30.1%	69.9%
12.	I have access to resources that would enable me use computer systems at school	27.5%	72.5%
13.	Persons are available to assist with difficulties arising from computer systems use	22.3%	77.7%

Table 8. T-test analysis of facilitating conditions and the perceived impact on blended learning

FACILITATING CONDITIONS/BL		t	df	Sig. 2-Tailed	Result
10.	The university administrators believe that the use of computer systems provides significant benefits to teaching and learning	41.291	225	.000	Impact
11.	I receive necessary assistance from my lecturer in the use of computer systems	25.742	225	.000	Impact
12.	I have access to resources that would enable me use computer systems at school	26.438	225	.000	Impact
13.	Persons are available to assist with difficulties arising from computer systems use	27.282	225	.000	Impact
N: 226 **Df:** N-1. **Sig. level:** 0.05					

Table 9. Cross tabulation analysis showing whether attitude towards computer systems impacts on blended learning

s/n	Variables	Disagree (D)	Agree (A)
14.	Using computer systems during BL classes is a good idea	13.8%	86.2%
15.	Computer systems make learning more interesting	31.5%	68.5%
16.	Using computer systems to learn is fun	11.2%	88.8%

Table 10. T-test analysis of attitudes towards computer systems and the perceived impact on blended learning

ATTITUDES TOWARDS COMPUTER SYSTEMS/BL		t	df	Sig. 2-Tailed	Result
14.	Using computer systems during BL classes is a good idea	49.411	225	.000	Impact
15.	Computer systems make learning more interesting	25.722	225	.000	Impact
16.	Using computer systems to learn is fun	50.245	225	.000	Impact
N: 226 **Df:** N-1. **Sig. level:** 0.05					

Table 11. Cross tabulation analysis showing whether behavioural intention impacts on blended learning

s/n	Variables	Disagree (D)	Agree (A)
17.	I intend to use computer systems in my assignments and learning	22.1%	77.9%
18.	I predict I would use computer systems in the coming months	32.8%	67.2%
19.	I plan to use my computer systems whenever I have a need	23.6%	76.4%
20.	I am certain I'll use computer systems effectively in the coming months	18.8%	81.2%

Hypothesis 5: Behavioural Intention is Not Significantly Related to the Perceived Impact of Blended Learning

Data from the cross tabulation and t-test analysis reveal that behavioural intention is significantly related to the perceived impact of blended learning (see Tables 11 and 12). From the data, 77.9% intend to use computer systems in their assignments and learning ($t = 27.989$, $P < .000$). In addition, 67.2% predict the effective use computer systems in the coming months as a result of their exposure to BL classes ($t = 22.659$, $P < .000$). More than three-quarters, 76.4%, plan to use computer systems whenever they have the need ($t = 26.642$, $P < .000$), while 81.2% are certain they will use computer systems effectively in the coming months ($t = 33.086$, $P < .000$). Based on the above results hypothesis 5 is rejected.

Hypothesis 6: Computer Systems use is Not Significantly Related to the Perceived Impact of Blended Learning

In tests to determine if a significant relationship exists between computer systems use and the perceived impact of blended learning (see Tables

Table 12. T-test analysis of behavioural intention and the perceived impact on blended learning

BEHAVIORAL INTENTIONS/BL		t	df	Sig. 2-Tailed	Result
17.	I intend to use computer systems in my assignments and learning	27.989	225	.000	Impact
18.	I predict I would use computer systems in the coming months	22.659	225	.000	Impact
19.	I plan to use my computer systems whenever I have a need	26.642	225	.000	Impact
20.	I am certain I'll use computer systems in the coming months	33.086	225	.000	Impact
N: 226 **Df:** N-1. **Sig. level:** 0.05					

Table 13. Cross tabulation analysis showing whether computer systems use impacts on blended learning

s/n	Variables	Disagree (D)	Agree (A)
21.	I frequently use computer systems to understand a problem	20.1%	79.9%
22.	I often use computer systems in my university	28.9%	71.1%
23.	I frequently use computer systems to find answers to a problem	30.2%	69.8%
24.	I very often use computer systems in my learning	17.8%	82.2%

13 and 14), 79.9% frequently used computer systems to understand problems during blended learning classes and assignments *(t = 48.418, P < .000)*. Nearly as many, 71.1%, agree that the frequent use computer systems in university is significantly related to the perceived impact of blended learning *(t = 43.706, P < .000)*. In addition, most respondents (69.8%) felt that the frequent use computer systems helps them to find answers to problem and that this is significantly related to the perceived impact of blended learning *(t = 49.584, P < .000)*. Finally, 82.2% very often use computer systems in EDU 111 and EDU 222, which is significantly related to their academic performance *(t = 46.145, P < .000)*. The overall results reveal that computer systems use impacts on blended learning and so Hypothesis 6 is rejected.

Hypothesis 7: Respondents' Personal Information is Not Significantly Related to Their Opinion on the Perceived Impact of Blended Learning

In Table 15, the Analysis of Variance (ANOVA) shows that respondent's opinions, based on their personal information, are significantly related to the variables tested. The analysis reveals that respondents, irrespective of department *(F = 4.943, p > .000)*, gender *(F = 4.694, p > .000)*, age *(F =* 2.322, *p > .044)*, year/level of study *(F = 6.808, p > .000)*, type of programme *(F = 6.808, p > .000)*, show a significant relationship in their overall perception of all of the variables tested. Hypothesis 7 was thus rejected.

DISCUSSION AND CONCLUSION

Research suggests that blended learning methods create enhanced opportunities for teacher-student interaction, increased student engagement in learning, added flexibility in the teaching and learning environment, and opportunities for continuous improvement (Vaughan, 2007). The successful

Table 14. T-test analysis of computer system use and the perceived impact on blended learning

COMPUTER SYSTEMS USE/BL		t	df	Sig. 2-Tailed	Result
21.	I frequently use computer systems to understand a problem	48.418	225	.000	Impact
22.	I often use computer systems in my university	43.706	225	.000	Impact
23.	I frequently use computer systems to find answers to a problem	49.584	225	.000	Impact
24.	I very often use computer systems in my learning	46.145	225	.000	Impact
N: 226 **Df:** N-1. **Sig. level:** 0.05					

integration of BL results is an educational environment that contributes significantly to faculty teaching and student learning. Such an environment can be characterized by the balance between innovation in learning and personal exploration on one hand, and systematic instruction and guidance on the other (Newhouse, 2002a, 2002b).

In line with the findings of Bonk, Kim, and Zeng (2005), this study posited that BL has significantly improved student academic achievement. In spite of this very positive outcome, the use of BL is still new and its impact is yet to be widely felt by most students and faculty in Nigerian higher education.

Nigerian universities must provide access to quality education for every student as a means of helping them achieve their full potential. Consequently, universities must follow prevailing global trends by integrating BL strategies into their teaching and learning resources. While universities are indeed struggling to meet the demands of student population growth, in that they often

Table 15. ANOVA analysis showing whether respondents' personal information is significantly related to the perceived impact of blended learning

Respondents' Personal Information		Sum of Squares	df	Mean Square	F	Sig.
Department	Between Groups	11.463	5	2.293	4.943	.000
	Within Groups	102.042	220	.464		
	Total	113.504	225			
Gender	Between Groups	5.857	5	3.171	4.694	.000
	Within Groups	54.364	220	.247		
	Total	55.221	225			
Age	Between Groups	5.056	5	1.011	2.322	.044
	Within Groups	95.811	220	.436		
	Total	100.867	225			
Year of study	Between Groups	5.905	5	1.181	6.808	.000
	Within Groups	38.166	220	.173		
	Total	44.071	225			
Type of Programme	Between Groups	5.905	5	1.181	6.808	.000
	Within Groups	38.166	220	.173		
	Total	44.071	225			

lack the ability to expand educational resources to accommodate new students, effective BL policies are required to foster conducive educational environments that are responsive to valuable teaching and learning and workforce challenges. Electronic learning is one such way to foster these responsive educational environments (Osguthorpe & Graham, 2003). BL provides faculty and students with the opportunity to access the best resources and up-to-date information concerning teaching, learning and curriculum. It is thus not surprising that BL is fast becoming an accepted and indispensable part of mainstream higher education systems especially in the developed world (Akhahowa & Osubor, 2006).

This chapter is a realistic resource for the practical application of BL in higher education, as many colleges and universities across the globe are now investing in more e-learning and BL methods (Graham, 2006; Shivetts, 2011). The BL approach has been proven to both enhance and expand the effectiveness and efficiency of teaching and learning in higher education (Wan, Wang & Haggerty, 2008). This study makes obvious the ways in which BL techniques integrate the benefits of both traditional f2f teaching and e-learning approaches in the teaching of Introduction to Teaching Profession and Sociology of Education. It offers an inclusive view of the benefits and troubles of the applicability of BL in the teaching and learning process.

This study suggests several propositions for future research and practice. These inferences pertain most directly to students, researchers, faculty and higher education institutions. At a management level in higher education, this study calls for policies to ensure balanced investments in, and increased funding for, higher education that will allow for the effective use, integration and diffusion of BL services and methods in the teaching and learning processes (Yang, 2010). Given the somewhat small sample of this study, the researcher recommends larger studies based on a more broadly administered questionnaire. Limitations, such as the small sample size, need to be accounted for when evaluating the result of this study as they raise the likelihood that some dissimilarity in judgment may be more of a function of research design and contextual factors than any real differences in BL studies. As with other studies, the findings should not be regarded as definitive but as offering students, faculty, educators, researchers, planners and administrators a view of the author's reality on the use of BL in a developing economy.

REFERENCES

Akhahowa, A. E., & Osubor, V. I. (2006). E-learning: A technology-based teaching method for providing access to sustainable quality education. *The African Symposium, 6*(3&4), 17-25.

Aladejana, F. (2008). Blended learning and improved biology teaching in the Nigerian secondary schools. In *Proceedings of the World Congress on Engineering and Computer Science 2008 WCECS 2008*. San Francisco, CA: WCECS.

Austin, H., Dwyer, B., & Freebody, P. (2003). *Schooling the child: The making of students in classrooms*. London: Routledge Falmer.

Bonk, C. J., Kim, K., & Zeng, T. (2005). Future directions of blended learning in higher education and workplace learning settings. In C. J. Bonk & C. R. Graham (Eds.), *Handbook of blended learning: Global perspectives, local designs*. San Francisco, CA: Pfeiffer Publishing.

Bowen, G. (2009). Document analysis as a qualitative research method. *Qualitative Research Journal*, *9*(2), 27–40. doi:10.3316/QRJ0902027

Bryman, A., & Cramer, D. (2011). *Quantitative data analysis with IBM SPSS 17, 18 and 19: A guide for social scientists*. Philadelphia: Routledge.

Carrim, N., & Shalem, Y. (1999). Education-South Africa-Johannesburg, school management & organization-South Africa-Johannesburg. *International Journal of Qualitative Studies in Education*, *12*(1), 1–25.

Dillman, D. A., Smyth, J. D., & Christain, L. M. (2008). *Internet, mail, and mixed-mode surveys: The tailored design method* (3rd ed.). New York: Wiley.

Ebrahimi, A. (2012). How does early feedback in an online programming course change problem solving? *Journal of Educational Technology Systems*, *40*(4), 371–379. doi:10.2190/ET.40.4.c

Fink, A. G. (2008). *How to conduct surveys: A step-by-step guide* (4th ed.). London: Sage Publications.

Fisher, M. (2003). Online collaborative learning: Relating theory to practice. *Journal of Educational Technology Systems*, *31*(3), 227–249. doi:10.2190/JK54-YLPR-00R4-LPNA

Fowler, F. J. (2008). *Survey research methods: Applied social research methods*. London: Sage Publications.

Friesen, N. (2011). *The place of the classroom and the space of the screen: Relational pedagogy and Internet technology*. New York: Peter Lang.

Friesen, N. (2012). *Report: Defining blended learning*. Retrieved June 25, 2013, from http://learningspaces.org/papers/Defining_Blended_Learning_NF.pdf

Garrison, D., & Vaughan, N. (2008). *Blended learning in higher education: Framework, principles, and guidelines*. San Francisco, CA: John Wiley & Sons.

Graham, C. R. (2005). Blended learning systems: Definition, current trends, and future directions. In C. J. Bonk & C. R. Graham (Eds.), *Handbook of blended learning: Global perspectives, local designs* (pp. 3–21). San Francisco, CA: Pfeiffer.

Graham, C. R. (2006). Blended learning systems: Definition, current trends, and future directions. In C. J. Bonk & C. R. Graham (Eds.), *The handbook of blended learning: Global perspectives, local designs* (pp. 3–21). San Francisco, CA: JosseyBass/Pfeiffer.

Haßler, B., Hennessy, S., & Lubasi, B. (2011). Changing classroom practice using a school-based professional development approach to introducing digital resources in Zambia. *Itupale Online Journal of African Studies*, *3*(1), 17–31.

Heller, R. (2010). *A cost-benefit analysis of face-to-face and virtual communication: Overcoming the challenges*. Retrieved from http://www.ilr.cornell.edu/cahrs/research/whitepapers/upload/Spring10Mtng_CostBenefitVirtualComm.pdf

Hennessy, S., Harrison, D., & Wamakote, L. (2010). Teacher factors influencing classroom use of ICT in Sub-Saharan Africa. *Itupale Online Journal of African Studies*, *2*(1), 39–54.

Husu, J. (2006). Analyzing teachers' rule-based competencies in practice. In *Proceedings of the European Conference on Educational Research (ECER)*. Geneva, Switzerland: ECER.

Ifinedo, P. (2005). Measuring Africa's e-readiness in the global networked economy: A nine-country data analysis. *International Journal of Education and Development using Information and Communication Technology, 1*(1), 53-71.

Ifinedo, P., & Ololube, N. P. (2007). A discourse on the problems, prospects, and progress of distance education in a developing country. In E. P. Bailey (Ed.), *Focus on distance education developments* (pp. 183–194). New York: Nova Science Publishers.

Iloanusi, N. O., & Osuagwu, C. C. (2009). ICT in education: Achievements so far in Nigeria. In A. Méndez-Vilas, A. Solano Martín, J. A. Mesa González, & J. Mesa González (Eds.), *Research, reflections and innovations in integrating ICT in education* (pp. 1331-1335). Badajoz, Spain: FORMATEX. Retrieved June 17, 2013, from http://www.formatex.org/micte2009/book/1331-1335.pdf

Jackson, S. H. (2005, April). Lost in translations: Translating on-ground courses into effective web-based learning. *Online Classroom*, 5-8.

Lee, E. J. (2008). Mediated social interaction. In *International Encyclopaedia of Communication*. Malden, MA: Blackwell.

Miller, R. P. (2005). *Listen to the students: A qualitative study investigating adult student readiness for online learning*. Retrieved March 21, 2013, from www.agclassroom.org/consortium/pdf/.../2005/online_learning.doc

Mortera-Gutiérrez, F. (2006). Faculty best practices using blended learning in e-learning and face-to-face instruction. *International Journal on E-Learning*, *5*(3), 313–337.

Mulford, B. (2003). *School leaders: Changing roles and impact on teacher and school effectiveness*. Paris: OECD.

Naaj, M. A., Nachouki, M., & Ankit, A. (2012). Evaluating student satisfaction with blended learning in a gender-segregated environment. *Journal of Information Technology Education: Research*, *11*, 185–200.

Nel, E. (2005). *Creating meaningful blended learning experiences in a South African higher education classroom: An action inquiry*. (Doctoral dissertation). The Centre for Higher Education Studies and Development, Faculty of the Humanities, University of the Free State, Bloemfontein, South Africa.

Newhouse, C. P. (2002a). *The impact of ICT on learning and teaching*. Perth, Australia: Special Educational Service.

Newhouse, C. P. (2002b). *A framework to articulate the impact of ICT on learning in schools*. Perth, Australia: Special Educational Service.

Norusis, M. J. (2012). *IBM SPSS statistics 19 statistical procedures companion*. Upper Saddle River, NJ: Prentice Hall.

Ololube, N. P. (2009). *Understanding teachers' professional competencies for education effectiveness*. Owerri, Nigeria: SpringField Publishers.

Ololube, N. P. (2011). Blended learning in Nigeria: Determining students' readiness and faculty role in advancing technology in a globalize educational development. In A. Kitchenham (Ed.), *Blended learning across disciplines: Models for implementation* (pp. 190–207). Hershey, PA: IGI Global. doi:10.4018/978-1-60960-479-0.ch011

Ololube, N. P., Amaele, S., Kpolovie, P. J., & Egbezor, D. E. (2013). The issues of digital natives and tourists: Empirical investigation of the level of IT/IS usage between university students and faculty members in a developing economy. In *Digital literacy: Concepts, methodologies, tools, and applications* (pp. 1384–1401). Hershey, PA: IGI Global.

Ololube, N. P., & Egbezor, D. E. (2009). Educational technology and flexible education in Nigeria: Meeting the need for effective teacher education. In S. Marshall, W. Kinuthia, & W. Taylor (Eds.), *Bridging the knowledge divide: Educational technology for development*. Charlotte, NC: Information Age Publishing.

Ololube, N. P., Eke, P., Uzorka, M. C., Ekpenyong, S. U., & Nte, N. D. (2009). Instructional technology in higher education: A case of selected universities in the Niger Delta. *Asia-Pacific Forum on Science Learning and Teaching*, *10*(2), 1–17.

Osguthorpe, R. T., & Graham, C. R. (2003). Blended learning environments. *Quarterly Review of Distance Education*, *4*(3), 227–233.

Shivetts, C. (2011). E-learning and blended learning: The importance of the learner a research literature review. *International Journal on E-Learning*, *10*(3), 331–337.

UNESCO. (2008). *UNESCO'S ICT competency standards for teachers: Towards ICT skills for teachers*. Retrieved June 15, 2013, from http://cst.unesco-ci.org/sites/projects/cst/default.aspx

U.S. Department of Education. (2012). *Use of technology in teaching and learning*. Retrieved June 21, 2013, from http://www.ed.gov/oii-news/use-technology-teaching-and-learning

Vaughan, N. (2007). Perspectives on blended learning in higher education. *International Journal on E-Learning*, *6*(1), 81–94.

Wan, Z., Wang, Y., & Haggerty, N. (2008). Why people benefit from e-learning differently: The effects of psychological processes on e-learning outcomes. *Information & Management*, *45*(8), 513–521. doi:10.1016/j.im.2008.08.003

Yang, Y. (2010). Roles of administrators in ensuring the quality of online programs. *Knowledge Management & E-learning*. *International Journal (Toronto, Ont.)*, *2*(4), 363–369.

Zhongjun, L., & Lijuan, H. (2009). Research on new MIS teaching and learning methods. In *Proceedings of the Pacific-Asia Conference on Circuits, Communications and Systems* (pp. 745-748). IEEE.

ADDITIONAL READING

Abdous, M., & Yen, C.-J. (2010). A predictive study of learner satisfaction and outcomes in face-to-face, satellite broadcast, and live video-streaming learning environments. *The Internet and Higher Education*, *13*, 248–257. doi:10.1016/j.iheduc.2010.04.005

Abdous, M., & Yoshimura, M. (2010). Learner outcomes and satisfaction: A comparison of live video-streamed instruction, satellite broadcast instruction, and face-to-face instruction. *Computers & Education*, *55*(2), 733–741. doi:10.1016/j.compedu.2010.03.006

Abraham, A. (2009). Blended spaces, different places: Getting the blend of ingredients right in a cross-cultural learning context. In *Proceedings of Ascilite Auckland.* Retrieved July 20, 2013, from http://www.ascilite.org.au/conferences/auckland09/procs/abraham.pdf

Bonk, C. J., & Graham, C. R. (2006). *The handbook of blended learning environments: Global perspectives, local designs*. San Francisco, CA: Jossey-Bass/Pfeiffer.

Cao, Q. D., Bai, X., & Griffin, T. E. (2012). An empirical investigation of factors affecting web-based and face-to-face student satisfactions with course website. *International Journal of Information Systems in the Service Sector*, *4*(2), 19–32. doi:10.4018/jisss.2012040102

Chase, C. (2012). *Blended learning–combining online technology with classroom instruction: 1 of 3 make edtech happen*. Retrieved from http://chip-chase.com/2012/03/21/blended-learning-combining-onlinetechnology-with-classroom-instruction-1-of-3/

Corral, M., Guevara, J., Luquin, P., Pena, H., & Otero, J. (2006). Usefulness of an internet-based thematic learning network: Comparison of effectiveness with traditional teaching. *Medical Informatics and the Internet in Medicine*, *31*(1), 59–66. doi:10.1080/14639230600598026 PMID:16754368

Euzent, P., Martin, T., Moskal, P., & Moskal, P. (2011). Assessing student performance and perceptions in lecture capture vs. face-to-face course delivery. *Journal of Information Technology Education*, *10*, 295–307.

Russell, M., Kleiman, G., Carey, R., & Douglas, J. (2009). Comparing self-paced and cohort-based online courses for teachers. *Journal of Research on Technology in Education*, *41*(4), 443–466.

Stacey, E., & Gerbic, P. (2009). Introduction to blended learning practices. In E. Stacey & P. Gerbic (Eds.), *Effective blended learning practices: Evidence-based perspectives in ICT ffacilitated education* (pp. 1–19). Hershey, PA: IGI Global. doi:10.4018/978-1-60566-296-1.ch001

Stalker, H., & Horn, M. B. (2012). *Classifying K–12 blended learning.* Mountain View, CA: Innosight Institute, Inc. Retrieved from http://www.innosightinstitute.org/innosight/wpcontent/uploads/2012/05/Classifying-K-12-blended-learning2.pdf

Watson, J. (2008). *Blended learning: The convergence of online and face-to-face education.* The North American Council for Online Learning. Retrieved from http://www.inacol.org/research/promisingpractices/NACOL_PP-BlendedLearning-lr.pdf

KEY TERMS AND DEFINITIONS

Blended Learning Methods: Blended learning methods mean the range of possibilities presented by combining Internet and digital media with established f2f classroom instructional processes that require the physical presence of faulty and students.

Computer Systems: These include the computer along with its software and other devices that are necessary to make a computer function.

Faculty: The range of persons adjudged to have the processional skills and knowledge involved in the teaching and learning process.

Introduction to Teaching Profession: Introducing pre-service teachers to the rudiments, techniques, abilities, skill, and knowledge of the job of teaching.

Sociology of Education: A science that introduces pre-service teachers to the traits of the influences of the society on education and education on society.

Technology-Assisted Learning: The application of technology devices in the teaching and learning purposes. It involves the usage, knowledge, skill and competence in the use technology in solving problem or performing specific function during and after academic activities.

This work was previously published in Advancing Technology and Educational Development through Blended Learning in Emerging Economies edited by Nwachukwu Prince Ololube, pages 108-127, copyright year 2014 by Information Science Reference (an imprint of IGI Global).

Chapter 50
Blended Learning Implementation in Accounting Discipline:
A Study in a Malaysian Public University

Erlane K Ghani
Universiti Teknologi MARA, Malaysia

Kamaruzzaman Muhammad
Universiti Teknologi MARA, Malaysia

Salina Salleh
Universiti Teknologi MARA, Malaysia

ABSTRACT

This chapter examines the successful implementation of blended learning in an intermediate financial reporting course in a public university. The results of this study show that there is a significant difference between students completing the course through conventional learning and those completing the course via blended learning, with the later showing unfavourable results. The results in this study provide indication that for the students to perform well there is the need for them to be independent learners when studying using blended learning. However, the students believe that they could complete the course successfully regardless of whether they study the course through conventional learning or blended learning. Finally, the results show that academics are of the opinion that students should change their attitude to succeed. The academics further opined that the course and facilities need to be reviewed and upgraded to assist students in completing the course. The findings in this study provide some understanding of the implementation of blended learning in an intermediate financial reporting course.

DOI: 10.4018/978-1-4666-8246-7.ch050

1. INTRODUCTION

Accounting relates to the process of communicating financial information of a business entity to its users such as the shareholders. The communication of accounting process often in the form of financial statements communicated in monetary value which is prepared based on information selected that is relevant and reliable to the users. Accounting practitioners are expected to be skilful in the preparation of financial statements and well-versed in the understanding of accounting principles in order to ensure that the process of communicating the business entity's performance to the users is smooth, relevant and reliable. Accounting practitioners often get their exposure of this skill during their higher education study where they are taught on the accounting principles and the techniques in preparing financial statements (Davis et al., 2008)

For more than 50 years, the Faculty of Accountancy in a public university have provided effort for teaching to educate generations of accountants. The public university is one of the public universities in Malaysia. It is formed to ensure its graduates are employable in the market of either in the top list of big reputable accounting firms and multinational companies. The faculty aims to equip the students with good academic qualification coupled with other strength comprising of excellent interpersonal skills, possessing professional qualification recognised worldwide, acquiring both soft and hard skills relevant to the field and by being seen of having good attributes and qualities such as being ethical.

With the evolution of Information Communication Technology (ICT) in the higher educational setting, the curriculum and content has significantly altered the methodology of learning from the conventional white board face to face learning to a more sophisticated learning incorporating ICT such blended learning. Blending learning which forms a combination of online and face to face learning is seen as a tool that could assist the university to accommodate the increasing population of accounting students without sacrificing the quality of knowledge. The arguments that proactive and quality methods of educating students is believed to contribute to such belief.

Due to this, one of the institutes of a public university that takes charge of distance learning have started to implement blended learning for its undergraduate students in stages starting from subjects taught in the first semester. The implementation of blended learning for accounting courses began in 2011 and over a year period, academics have provided various comments and feedbacks on the implementation on blended learning on accounting subjects. Particularly, the comments and feedbacks are related to the effectiveness of blended learning on accounting students' performance. Such comments and feedbacks were raised mainly because accounting discipline is unique in nature due to the involvement of transmitting both theoretical and technical knowledge. Due to its unique nature, academics believe that students need to have a large amount of contact hours such as face to face learning in order to get in depth understanding on accounting principles and therefore, it is unlikely that blending learning with number of hours being reduced by more than seventy five percent could be an effective mode of teaching to accounting students (Ghani et al., 2012).

This study examines the success implementation of blended learning in the accounting discipline. Specifically, this study examines the effect of blended learning on students' performance, the accounting students' perception on blended learning and the issues and challenges in blended learning. The results of this study would shed some light on the implementation of blended learning. The remainder of this paper is structured as follows. Section 2 provides a literature review on the blended learning. Section 3 outlines the research method. The results are presented in section 4. Summary and conclusion are provided in the last section.

2. BACKGROUND OF STUDY

2.1. Students' Performance

Many empirical studies in the education literature have researched on factors that could influence students' performance within the accounting discipline. Most of these studies support the hypotheses that students' performance could be affected by sitting location in the class (Topping, 1994), gender (Deboer, 1994; Horne, 2000), attendance (Devadoss & Foltz, 1995; Durden & Ellis, 1995) learning styles between the students and instructors (Borg & Shapiro, 1996) and their previous results (Nordstrom, 1990). Other studies have examined self efficacy (Christensen, Fogarthy & Wallace, 2002, Tho, 2007); motivation (Yamamura, Martin, Campbell, Campbell & Frakes, 2000; Chen, Maksy & Zheng, 2006), study style (Chen et al., 2006), class length (Ewer, Greer, Bridges and Lewis, 2002) and pre-requisite of another subject (Campbell & Glezen, 1989) and teaching and learning method (Sugahara & Boland, 2006; Amare, 2008 Ghani et al., 2012).

There are many teaching and learning method and the effectiveness of the teaching and learning method often falls on the preferences of the students (Bartsch & Cobern, 2003; Blalock & Montgomery, 2005, Sugahara & Boland, 2006). Students may prefer teaching and learning method that could provide them easy understanding on the topic being taught, easy access to content and a method that allow students to have guidance and feedback (Wan Ahmad et al., 2008). The learning theory suggests that students' performance could be further improved when the students are actively involved in the learning, when students are encouraged to do lots of critical thinking and when students are provided with real-life case assignments (Watkins, 2005; Smart & Cappel, 2006). To achieve this, studies have suggested the use of blended learning.

2.2. Blended Learning

Blended learning is a form of teaching and learning method often described as a hybrid learning combining several teaching and delivery methods (Ward & LaBranche, 2003; Smart & Cappel, 2006; Wan Ahmad et al., 2008). Blended learning is said to offer incremental value in learning and encourage appreciation of the concept of the course undertaking by students (Koohang & Durante, 2003; Osguthorpe & Graham, 2003). Often, blended learning is being used in on-campus courses which include hard copy study materials, face-to-face contact and a variety of online resources (Bawaneh, 2011). These include involvement of the use of online interaction in complement to the face to face interactions between the academics and the students (Kerres & Witt, 2003). There have been suggestions that the use of online interaction would allow students to be more prepared and participated more actively in the learning process compared to when they are sitting in the classroom providing passive participation (Johnston et al., 2005).

Within the education literature, numerous studies have examined the link between blended learning and students' performance (such as Johnston et al., 2005 and Iverson et al. 2005). These studies examined a range of issue and the results from these studies are mixed. Some studies found that blended learning could provide better environments that encourage students to be engaged with the material and learn by doing (Pallof & Pratt, 2003; Johnston et al., 2005; Stacy & Gerbich, 2007; Bawaneh, 2011). Other group of studies concluded that using some form of blended learning became least effective as compared to the traditional classroom setting (Terry et al., 2001; Iverson et al., 2005). Other studies do not where these studies found that students who were given in-class opportunities to practice and apply what they have learned, or are encouraged to immediately transfer their learning upon returning to their jobs and tasks performed better (Bryant

& Hunton, 2000; Gagne & Sherperd, 2001; Lim & Johnson, 2002; Love & Fry, 2006). However, most of these studies examined did not examine the effect of blended learning on students' performance in terms of integrating traditional classroom setting and online interaction.

Studies that have examined issues relating to blended learning and students' performance were conducted in various disciplines and in various countries. A large number of these studies were conducted in the business and management discipline (Smart & Cappel, 2006; Arbaugh et al., 2009), sciences (Sancho et al., 2006; Woltering et al., 2009) and mathematics (Javed & Vale, 2007; Wan Ahmad et al., 2008). Other studies were conducted in the accounting discipline (Chen & Jones, 2007; Bawaneh, 2011) and linguistic (Neumann and Hood, 2009; Shih, 2010). These studies were conducted in various countries including Spain (Lopez-Perez et al., 2011), Jordan (Bawaneh, 2011), Turkey (Akkoyunlu & Sonlu, 2008) and Australia (Javed and Vale, 2007; Shih, 2010) although most of these studies were conducted using US context (Smart & Cappel, 2006; Chen & Jones, 2007; Lim & Morris, 2009),

Wang (2003) noted that researchers often provide little interest in addressing students' perception of blended learning. Following this, a group of studies in the education literature have examined the students' perception on blended learning (Smart & Cappel, 2006; Wan Ahmad et al, 2008). The results of these studies are mixed. Few studies conclude that students using face to face and online interaction method provide better performance compared to students who use solely classroom setting (Smart & Cappel, 2005; Lopez-Perez et al., 2011; Wan Ahmad et al., 2008). These studies were mostly conducted in a non-accounting discipline and if they do, the subjects chosen in undertaking their study did not focus on a financial reporting nature.

In summary, studies that have examined various issues relating to the link between blended learning and students' performance. This study aims to extend the education literature to support the effect of blending learning on students' performance and if the results prove otherwise, this study aims to identify the issues and challenges faced by the students and academics in applying blended learning.

3. RESEARCH DESIGN

This study examines the success implementation of blended learning in the accounting discipline related to financial reporting. Specifically, this study examines:

1. The effect of blended learning on students' performance.
2. The accounting students' perception on blended learning.
3. The issues and challenges in blended learning.

The objectives are met by way of questionnaire survey and content analysis.

3.1. Sample

The sample consists of students that have undertaken subject related to financial reporting principles in 2011 and 2012. The students comprise of first year students that have enrolled in full time and blended learning to complete the financial reporting subject. Such selection allows this study to do comparison of students' performance to determine whether students who studied based on blended learning that consists of online and face to face learning does in fact improved compared to the conventional white board face to face.

To achieve the second objective of this study, accounting students who have enrolled in the financial reporting subject via blended learning were approached and requested to complete a questionnaire. The questionnaire consists of questions related to the students' perception on blended learning. Ninety-five students responded and completed the questionnaire. In addition, three academics who have taught the subject of financial reporting are chosen as the sample to provide comments and feedbacks on the issues and challenges of implementation of blended learning in the accounting discipline.

3.2. Research Instrument

The objectives of this study are met by way of primary and secondary data. The primary data involved questionnaire survey. The questionnaire consists of two sections. Section A consists of questions that related to the respondents' perception on blended learning in teaching and learning financial reporting. The questions are adapted from Wan Ahmad et al. (2008) with modification. The questions include requesting the respondents to perceive whether teaching and learning via blended learning makes it easy to learn the topic, learn the topic better using blended learning as opposed to the conventional method, easy to visualise the important concepts, able to analyse better, appreciate the learning process and find the subject interesting among others. The respondents were asked to complete the questionnaire using a 7-point scale ranging from '1' being extremely strongly disagree to '7' being extremely strongly agree.

Section B consists of demographic profile of the respondents which include age, gender, work experience and whether the students who enrolled via blended learning are currently in the accounting department and whether they are currently servicing in the public sector. The respondents were requested to complete the questionnaire and return the questionnaire to the researchers using the self addressed envelope provided.

Interviews were also conducted with three academics that have experienced teaching the subject via blended learning. The academics were approached by the researchers via telephone or email requesting their participation in the study. The academics agreed and meeting time and date were set. The academics were approached using structured interviews and the meeting was held for about an hour. Their response were then analysed by coding according to two themes, namely, students and facilities.

The secondary data is in the form of the students' result for the subject undertaken. The results were obtained from the academics who have taught the students in the intermediate financial reporting course. The results of the analysis determine whether this study support the academics' prediction that blended learning does or does not in fact improves students' performance.

3.3. Course Conduct

The course chosen in this study is a course on intermediate financial reporting. This course consists of 13 topics that are covered in seven seminars of two hours each over a semester. The lecturers meet the students via face to face interaction over the period where the students are expected to be prepared beforehand and to ask questions in class. The students could also communicate among them and with their lecturers via an online blog known as i-class. This blog is accessible only by the academics and the students undertaking the course. In this blog, all materials such as the lesson plan, notes and past year questions pertaining to the course are uploaded by the academics and accessible by the students at any time and place.

3.4. Data Collection

Data collection was conducted between the months of September 2011 to November 2012. The data collection involved three phases. The first phase involved obtaining the students' results for financial reporting subject. The results of the students were obtained from the academics that have taught the subject of financial reporting in the year 2011 and 2012. Where the results could not be provided by the academics, the researchers requested the faculty to obtain the students' results. In total, 207 students' results were taken and analysed.

The second phase involved sending out questionnaires to the students who were enrolled in the financial reporting subject via blended learning. The students were approached and given a set of questionnaire by their teaching academic. The questionnaire was distributed with a formal letter identifying the purpose of such study and requesting the students to complete and return the questionnaire to their teaching academic. One hundred and twelve questionnaires were distributed and returned.

The final phase involved the researchers interviewing the teaching academics. Three teaching academics were approached via telephone or email to set a date for appointment. The researchers then met the teaching academics and interviews were conducted. The interview session lasted about an hour.

4. RESULTS

The primary focus of this study is to examine the success implementation of blended learning in the accounting discipline related to financial reporting. The results of the content analysis and interviews conducted by the study are analysed based on the two specific objectives discussed in the previous section.

4.1. Blended Learning and Students' Performance

This section presents the results of the first objective of this study. The first objective of this study is to examine the effect of blended learning on students' performance. The examination results of the students on financial reporting were keyed-in into *SPSS* version 20 and were analysed.

4.1.1. Demographic Profile

This section presents the demographic profile of the respondents consisting of accounting students who have completed their financial reporting course. The main demographic attributes of respondents are comprised of their years of working experience, whether they are in the accounting department and whether they are a government staff. These have been examined using categorical scales and are presented in Table 1.

Table 1 is divided into 2 panels. Panel A of Table 1 shows that there are 207 students' results of financial reporting subject. Out of the 207, 167 belong to female students while the remaining 40

Table 1. Respondents' demographic attributes

Panel A: Gender		
Gender	**Number of Subjects**	**Percent**
Male	40	19.3
Female	167	80.7
Total	207	100.0
Panel B: Mode of Study		
Study Mode	**Number of Subjects**	**Percent**
Non-blended learning	95	45.8
Blended learning	112	54.2
Total	207	100.0

Table 2. Blended learning and students' performance

Panel A: Descriptive Statistics			
Study Mode	**N**	**Mean**	**Std. Deviation**
Non-blended learning	95	57.73	8.14031
Blended learning	112	44.75	28.81957
Panel B: Levene's Test			
Dependent Variable: Results	F.	Sig	
Equal Variances Assumed	5.981	0.15	
Panel C: Independent Sample T-Test			
Results	Mean Difference	Std Error Difference	Sig (2-Tailed)
Equal variances assumed	12.97632	3.05621	0.000

belong to the male students. Ninety five of the students (45.8 percent) were enrolled in a face to face only mode while 112 students (54.2 percent) enrolled in the financial reporting subject via blended learning as shown in panel B of Table 1.

4.1.2. Effect of Blended Learning on Students' Performance

Table 2 presents the results of Independent Sample T-Test. Panel A of Table 2 shows that the mean score for the students who did their financial reporting subject via non-blended learning is 57.73. On the other hand, those students who did their financial reporting subject via blended learning scored a mean score of 44.75. The results indicate that students enrolled under the conventional classroom mode scored better performance compared to those students who enrolled through blended learning. A t-test shows significant difference (p=0.000) with equal variances based on Levene's test (p=0.15) between these two groups.

4.2. Students' Perception on Blended Learning

This section presents the results for meeting objective two. Objective two examines the accounting students' perception on blended learning in intermediate financial reporting course. The examination results of the students on financial reporting were keyed-in into *SPSS* version 20 and were analysed.

4.2.1. Demographic Profile

This section presents the demographic profile of the respondents consisting of accounting students who have completed their financial reporting course based on blended learning. The main demographic attributes of respondents are comprised of gender, age, years of working experience, whether they are in the accounting department and whether they are a government staff. These have been examined using categorical scales and are presented in Table 3.

Table 3 is divided into 5 panels. Panel A of Table 3 shows that most respondents are female students (86.6 percent) and the remaining 13.4 percent are male students. This is not surprising since it is quite common in Malaysia that female students tend to enrol for accounting courses compared to male students. Most of the respondents are aged between 20 to 30 years old (91.1 percent) whereas only 8.9 percent are above 30 years old as shown in panel B of Table 3. Such results indicate indicating the trend of young adults improving their career development.

Table 3. Demographic profile of blended learners

Panel A: Gender		
Status	**Number of Subjects**	**Percent**
Male	15	13.4
Female	97	86.6
Total	112	100.0
Panel B: Age		
Age	**Number of Subjects**	**Percent**
20 to 24 years old	45	40.2
25 to 30 years old	57	50.9
31 to 35 years old	9	8.0
Above 35 years old	1	0.9
Total	112	100.0
Panel C: Work Experience		
Experience	**Number of Subjects**	**Percent**
Less than 5 years	77	68.8
5 to 10 years	32	28.6
11 to 15 years	3	2.7
16 to 20 years	0	0
Above 20 years	0	0
Total	112	100.0
Panel D: Employment Status		
Status	**Number of Subjects**	**Percent**
Government	49	43.8
Non-governent	63	56.3
Total	112	100.0
Panel E: Job Attachment		
Attachment	**Number of Subjects**	**Percent**
Accounting	82	73.2
Non-accounting	30	26.8
Total	112	100.0

The results in panel C of Table 3 shows that 109 respondents have less than 5 years working experience (97.3 percent). Slightly more than half of the respondents (56.3 percent) are working in the private sector compared to the remaining 43.8 percent working in the public sector (refer panel D of Table 3). As expected, 82 respondents are working in the accounting department representing 73.2 percent. In contrast, 30 respondents are working in a non-accounting department. This is unexpected since often students enrolled in a course related to their working environment. Further analysis shows that these students are either in their own business or other firms such as law firm and engineering firm. There are also students who set up their own business and take

Table 4. Effect of students' perception on blended learning

	Mean	Std. Deviation
I find it easy to learn the topics via blended learning	3.9821	1.31507
I learn the topics better via blended learning compared to conventional learning	4.3750	1.37628
I find it easy to visualise the important concepts of the topics via blended learning	3.9911	1.27693
I analyse better the important concepts of the topics via blended learning	4.0536	1.29336
I appreciate the learning integration of blended learning using face to face interaction and online learning	4.8571	1.21446
I put lots of efforts using online learning	4.7321	1.25907
I still prefer conventional learning compared to blended learning	5.6964	1.08087
I believe the lecturer needs to provide more effort in helping students to learn the topics via blended learning	5.5536	1.39393
I believe I need to put more effort in learning the topics via blended learning	5.8393	1.11947
I believe I could pass this course regardless whether I am using blended learning or conventional learning	5.0536	1.46944

charge of their own business financial accounting records.

4.2.2. Effect of Students' Perception on Blended Learning

This section presents the mean score of the respondents' perception on completing the financial reporting course via blended learning. The respondents were asked to complete the questionnaire using a 7-point scale ranging from '1' being extremely strongly disagree to '7' being extremely strongly agree.

The results in Table 4 show that the respondents provide the highest mean score for statement number 9 that "I believe I need to put more effort in learning the topics via blended learning." Such score provides indication that the students understand and aware that they need to be more independent in learning the topics of the intermediate financial reporting course if they are to complete the course via blended learning. Such results are consistent to the respondents' mean score for statement number 7 that "I still prefer conventional learning compared to blended learning." The results in Table 4 show that despite the effort of the university in introducing blended learning to the students, most of the respondents opined that they prefer the conventional learning compared to blended learning. These respondents provide the second highest mean score of 5.6964 indicating highly agreeable on the preference of using conventional learning as opposed to blended learning.

The respondents however, also opined that the academics teaching the course should provide more effort in helping the students to learn the topics via blended learning. The results showing a mean score of 5.5536 indicating the respondents expect that apart from their side of needing to be independent learners, they also expect the academics to put lots of effort in helping them in the course. Such results are consistent to the respondents' mean score for statement number 9 as discussed earlier. However, the respondents in general agreed that regardless whether they are using blended learning or conventional learning in completing the financial reporting course, they would be able to succeed the course successfully (mean score 5.0536). Such results indicate that the mode of study is not an important determinant to succeeding a course.

Table 4 also provides the results showing whether the students find it easy to learn the topics via blended learning. The results show a mean score of 3.9821 indicating that most of the respondents did not find it easy to learn the topics via blended learning. The respondents also find difficulty in visualising the important concepts of the topics when using blended learning (mean score of 3.9911) despite having putting lots of efforts in completing the course via blended learning (mean score of 4.7321). The respondents however, in general do agree with a mean score of 4.8571 that they appreciate the learning integration of blended learning using face to face interaction and online learning. Finally, the respondents are somewhat in between of agree and disagree (mean score of 4.0536) on whether they find it better in analysing the important concepts of the topics when using blended learning.

4.3. Issues and Challenges in Blended Learning

This section presents the results of interviews conducted in this study. The interviews were conducted in order to meet objective three. Objective three aims to identify the issues and challenges in implementing blended learning. Interviews were conducted with three academics that have experienced teaching the intermediate accounting course via blended learning as well as conventional learning. The academics were approached using structured interviews and the meeting was held for about an hour. Their response were then analysed and were segregated according to two themes, namely, students' attitude and course/facilities.

4.3.1. Students' Attitudes

The course was conducted in the form of blended learning. Blending learning format requires students to be independent where they are supposed to read, understand and attempt exercises before coming to class. The role of the academic assigned to handle the class acts as a facilitator to attend students' doubts based on their reading and attempting questions. However, such scenario did not exist for the past few semesters. The students often came unprepared, often quiet when being asked and did not attempt the exercises. The students expected the facilitator to teach from the beginning and to show them the techniques from the beginning in detail of which in the end, the facilitator has no choice but to meet the students' expectations. In order to make blended learning implementation successfull, the university needs to provide more awareness to the students on the concept of blended learning and its expectations.

Another issue that was raised is the the gap of one meeting to another (about two weeks gap) could also contributes to the high failure rate since students were likely to forget what has been taught and covered before coming to the next class. What is more important, students seem to have lack of understanding and knowledge on pre-requisite financial accounting courses such as introductory accounting that contributed to the high failure rate for the current course. Since each topic in this course links from one topic to another, having strong foundations in accounting is a must.

4.3.2. Course/Facilities

The total topics for the course has to be completed in 14 hours per semester which are considered overwhelming. Students are expected to learn 13 Financial Reporting Standards of which two topics (Topic 12 and 13) represent 50 marks in the final exam. To be able to attempt these two topics, namely publish account and statement of cash flow, students need to understand the concept of the earlier financial reporting standards before they could attempt these two topics successfully.

Although the facilitator could cover the whole syllabus within the semester, the students' level of understanding on these standards is questionable. Further, the learning process has to be done in a fast pace to ensure the syllabus to be fully covered within a limited number of meeting hours.

One of the academics noted that the i-Class facility provided by the university was not fully utilised by the students. Most of the feedbacks and comments received from the students were only "noted" and "thank you" To make it worse, some students do not even know what i-Class is.upon receiving materials or announcement from the facilitator. This is surprising since i-Class briefing was given to the students on registration day and announcement was also made on the Website and students' portal. Obviously, such terms do not provide any meanings to the learning process. Surprisingly, despite the effort provided by the university, there are students who did not have i-Class account. The university needs to provide more awareness to the students on the facilities provided so students could be more aware of the benefits provided to them.

5. CONCLUSION

This study examines the success implementation of blended learning in the accounting discipline related to intermediate financial reporting course. Specifically, this study examines the effect of blended learning on students' performance, the accounting students' perception on blended learning and the issues and challenges in blended learning. The results of the study show that there is significant difference between students completing the course via conventional learning and those completing the course via blended learning. The results also show that the students are aware that they need to become more independent when studying via blended learning and regardless the mode of learning, they believe they could complete the course successfully.

Finally, the results show that the academics opined that students' attitude need to be changed in order to succeed the course and that the course and facilities need to be reviewed and upgraded in order to assist the students in completing the course. The findings of this study implicate that all related parties namely, the university, the academics and the students need to understand their role in the implementation of blended learning in order to make this mode of teaching a success. Such implication is important since the education industry is going towards ICT environment and therefore, serious efforts need to be taken in order to make this mode of learning a success. The findings in this study provide some understanding on the implementation of blended learning in an intermediate financial reporting course.

This study is not without its limitation. First, this study focuses only on intermediate financial reporting course. The results of this study may be different if other financial accounting courses are included. Future research could be done to include other financial accounting courses such as on advanced financial reporting course. This would allow generalisability of the results. Second, the sample taken in this study comprises of students who have enrolled for the course over a four semester period. Students' attitude may be different which could provide a different result if similar study is undertaken. Future research may include a larger sample size.

REFERENCES

Akkoyunlu, B., & Soylu, M. Y. (2008). A study of student's perceptions in a blended learning environment based on different learning styles. *Journal of Educational Technology & Society*, *11*(1).

Amare, N. (2006). To slideware or not to slideware: Students' experiences with PowerPoint vs. lecture. *Journal of Technical Writing and Communication*, *36*, 297–308. doi:10.2190/03GX-F1HW-VW5M-7DAR

Arbaugh, J. B., Godfrey, M. R., Johnson, M., Pollack, B. L., Neindorf, B., & Wresch, W. (2009). Research in online and blended learning in the business disciplines: Key findings and possible future directions. *The Internet and Higher Education*, *12*(2), 71–87. doi:10.1016/j.iheduc.2009.06.006

Bartsch, R. A., & Cobern, K. M. (2003). Effectiveness of PowerPoint presentations in pictures. *Computers & Education*, *41*(1), 77–86. doi:10.1016/S0360-1315(03)00027-7

Bawaneh, S. S. (2011). The effects of blended learning approach on students' performance: Evidence from a computerized accounting course. *International Journal of Humanities and Social Science*, *1*(6), 63–69.

Blalock, M. G., & Montgomery, R. D. (2005). The effect of PowerPoint on student performance in principles of economics: An exploratory study. *Journal for Economics Educators*, *5*(3), 1–7.

Borg, M., & Shapiro, S. (1996). Personality type and student performance in principles of economics. *The Journal of Economic Education*, *27*, 3–25. doi:10.2307/1183005

Bryant, S. M., & Hunton, J. E. (2000). The use of technology in the delivery of instruction: Implication for accounting educators and education researchers. *Issues in Accounting Education*, *15*(1), 129–162. doi:10.2308/iace.2000.15.1.129

Campbell, W. M., & Glezen, G. W. (1989). An investigation of the effect of the accounting information systems course and other variables on student performance in the first auditing course. In *Proceedings of the AAA Meeting*. Honolulu, Hawaii: AAA.

Chen, C., & Jones, K. (2007). Blended learning vs. traditional classroom settings: Assessing effectiveness and student perceptions in an MBA accounting course. *The Journal of Educators Online*, *4*(1), 1–15.

Chen, R., Maksy, M. M., & Zheng, L. (2006). *Factors associated with students' performance in advanced accounting and auditing: An empirical study in a public university*. Paper presented at the AAA Midwest Region Meeting. Chicago, IL.

Christensen, T. E., Fogarthy, T. J., & Wallace, W. A. (2002). The association between the directional accuracy of self-efficacy and accounting course. *Issues in Accounting Education*, *17*(1), 1–26. doi:10.2308/iace.2002.17.1.1

Davis, C., Farrell, R., & Ogilby, S. (2008). Characteristics and skills of the forensic accountant. *AICPA*, 1-34.

Deboer, G. (1984). A studying of gender effects in the science and mathematics course-taking behaviour of a group of students who graduated from college in the late 1970s. *Journal of Research in Science Teaching*, *21*, 95–103. doi:10.1002/tea.3660210111

Devadoss, S., & Foltz, J. (1996). Evaluation of factors influencing student class attendance and performance. *American Journal of Agricultural Economics*, *78*(3), 499–508. doi:10.2307/1243268

Durden, G. C., & Ellis, L. V. (1995). The effects of attendance on student learning in principles of economics. *The American Economic Review*, *85*(5), 343–346.

Ewer, S., Greer, O., Bridges, W., & Lewis, B. (2002). Class length and student performance: An extended study. *International Advances in Economic Research*, *8*(2), 160–169. doi:10.1007/BF02295347

Gagne, M., & Shepherd, M. (2001). Distance learning in accounting. *The E Journal, 28*(9), 58-64.

Ghani, E. K., Said, J., & Muhammad, K. (2012). The effect of teaching format, students' ability and cognitive effort on accounting students' performance. *International Journal of Learning & Development*, *2*(3), 81–98.

Horne, R. (2000). The performance of males and females in school and tertiary education. *The Australian Quarterly*, *72*(5/6), 21–26. doi:10.2307/20637947

Iverson, K., Colky, D., & Cyboran, V. (2005). E-learning takes the lead: An empirical investigation of learner differences in online and classroom delivery. *Performance Improvement Quarterly*, *18*(4), 5–18. doi:10.1111/j.1937-8327.2005.tb00347.x

Javed, S., & Vale, C. (2007). Effects of blended online learning on students' performance in vocational mathematics. *International Journal of Technology Knowledge and Society*, *2*(6), 143–154.

Johnston, J., Killion, J., & Oomen, J. (2005). Student satisfaction in the virtual classroom. *The Internet Journal of Allied Health Sciences and Practice, 3*(2).

Kerres, M., & Witt, C. D. (2003). A didactical framework for the design of blended learning arrangements. *Journal of Educational Media*, *28*(2–3), 101–113. doi:10.1080/1358165032000165653

Koohang, A., & Durante, A. (2003). Learners' perceptions toward the web-based distance learning activities/assignments portion of an undergraduate hybrid instructional model. *Journal of Information Technology Education*, *2*, 105–113.

Lim, D. H., & Johnson, S. (2002). Trainee perceptions of factors that influence learning transfer. *International Journal of Training and Development*, *6*(1), 36–48. doi:10.1111/1468-2419.00148

Lopez-Perez, V., Perez-Lopes, C., & Rodriguez-Ariza, L. (2011). Blended learning in higher education: Students' perceptions and their relation to outcomes. *Computers & Education*, *56*(3), 818–826. doi:10.1016/j.compedu.2010.10.023

Love, N., & Fry, N. (2006). Accounting students' perceptions of a virtual learning environment: Springboard or safety net? *Accounting Education: An International Journal*, *15*(2), 151–166. doi:10.1080/06939280600609201

Neumann, D. L., & Hood, M. (2009). The effects of using a wiki on student engagement and learning of report writing skills in a university statistics course. *Australasian Journal of Educational Technology*, *25*(3), 382–398.

Nordstrom, B.H. (1990). *Predicting performance in freshman chemistry*. ERIC Document Reproduction Service No. ED347065.

Osguthorpe, R. T., & Graham, C. R. (2003). Blended learning environments: Definitions and directions. *The Quarterly Review of Distance Education*, *4*(3), 227–233.

Pallof, R., & Pratt, K. (2003). *The virtual student: A profile and guide to working with online learners*. San Francisco, CA: Josey-Bass Publishers.

Sancho, P., Corral, R., Rivas, T., Gonzales, M. J., Chordi, A., & Tejedor, C. (2006). A blended learning experience for teaching microbiology. *American for Pharmaceutical Education*, *70*(5), 120. doi:10.5688/aj7005120 PMID:17149449

Shih, R. C. (2010). Blended learning using video-based blogs: Public speaking for English as a second language students. *Australasian Journal of Educational Technology*, *26*(6), 883–897.

Smart, K. L., & Cappel, J. J. (2006). Students' perceptions of online learning: A comparative study. *Journal of Information Technology Education*, *5*, 201–219.

Stacey, E., & Gerbic, P. (2007). Teaching for blended learning: Research perspectives from on-campus and distance students. *Education and Information Technologies*, *12*, 165–174. doi:10.1007/s10639-007-9037-5

Sugahara, S., & Boland, G. (2006). The effectiveness of PowerPoint presentation in the accounting classroom. *Accounting Education*, *15*(4), 391–403. doi:10.1080/09639280601011099

Terry, N., Owens, J., & Macy, A. (2001). Student performance in the virtual versus traditional classroom. *Journal of the Academy of Business Education*, *2*(1), 1–4.

Tho, L. M. (2007). Self-efficacy and student performance in an accounting course. *Masalah Pendidikan*, *30*(2), 33–48.

Topping, E. (1994). The effects of absences on performance in principles of macroeconomics. In *Proceedings of the Missouri Academy of Science Annual Meeting*. Cape Girardeau, MO: MAS.

Wan Ahmad, W. F., Shafie, A., & Janier, J. B. (2008). Students' perceptions towards blended learning in teaching and learning mathematics: Application of integration. In *Proceedings of the 13th Asian Technology Conference in Mathematics (ATCM08)*. Bangkok, Thailand: Suan Sunanda Rajabhat University.

Wang, Y. (2003). Assessment of learner satisfaction with asynchronous electronic learning systems. *Information & Management*, *4*(1), 75–86. doi:10.1016/S0378-7206(03)00028-4

Ward, J., & LaBranche, G. (2003). Blended learning: The convergence of e-learning and meetings. *Franchising World*, *35*(4), 22–23.

Watkins, R. (2005). Developing interactive e-learning activities. *Performance Improvement*, *44*, 5–7. doi:10.1002/pfi.4140440504

Woltering, V., Herrler, A., Spitzer, K., & Spreckelsen, C. (2009). Blended learning positively affects students' satisfaction and the role of the tutor in the problem-based learning process: Results of a mixed-method evaluation. *Advances in Health Sciences Education : Theory and Practice*, *14*(5), 725–738. doi:10.1007/s10459-009-9154-6 PMID:19184497

Yamamura, J. H., Martin, R. M., Campbell, W. M., Campbell, S. N., & Frakes, A. (2000). Performance in auditing: The effect of the accounting information systems course. *Journal of Interdisciplinary Studies*, 43-57.

ADDITIONAL READING

Al-Tarmimi, H. A. H., & Al-Shayed, A. R. (2002). Factors affecting student performance in introductory finance course. *Journal of Economics and Administrative Sciences*, *18*(2), 54–65.

Anderson, G., Benjamin, D., & Fuss, M. (1994). The determinants of success in university introductory economics course. *The Journal of Economic Education*, *25*, 99–120. doi:10.2307/1183277

Hijazi, S. T., & Naqvi, S. M. M. (2006). Factors affecting students' performance. *Bangladesh e-. Journal of Sociology (Melbourne, Vic.)*, *3*(10), 1–10.

KEY TERMS AND DEFINITIONS

Accounting Students: Students that have enrolled in an accounting course.

Blended Learning: A formal education program comprising a combination of online delivery of content and instruction with some element of student control.

Financial Reporting: A formal record of financial activities of a business.

Perception: An organisation, identification, and interpretation of information to represent and understand the environment.

This work was previously published in Advancing Technology and Educational Development through Blended Learning in Emerging Economies edited by Nwachukwu Prince Ololube, pages 128-141, copyright year 2014 by Information Science Reference (an imprint of IGI Global).

Chapter 51

21st Century Distance Learning in Sub-Saharan Africa:
Distance and Blended Learning in Ghana

Alex Kumi-Yeboah
Dalton State College, USA

William Young
University of South Florida, USA

Kankam Boadu
University of Cape Coast, Ghana

ABSTRACT

Distance education in Ghana is rapidly gaining recognition as a result of the increasing demand for higher education by qualified applicants, most of whom are denied admission due to the limited space and resources. Distance education promotes cross-national, multi-disciplinary perspectives in educational practice and equips students, faculty, and administrators with resources to compete in the academic world of the 21st century. Universities in Ghana have opted for distance learning as an alternative measure to reduce congestion and help remedy student admissions to the few universities available (Dzisah, 2006). However, little is known about the trend of distance and blended learning education in Ghana. This chapter addresses the trend of distance learning and university education; distance and blended learning in Ghana; information on African Virtual University and distance education, benefits, challenges, recommended strategies of distance and blended learning programs in Ghana; and a conclusion.

INTRODUCTION

In the 21st century, distance learning has become a major medium of instruction between instructors and students especially in the developed countries. However, in the developing countries, most applicants are denied admission due to the limited space and resources. The demand for higher education in sub-Saharan Africa is higher than the few institutions can accommodate. The United Nations Organization (UNO) estimates that 3.8 million teachers will need to be recruited

DOI: 10.4018/978-1-4666-8246-7.ch051

and trained by 2015 to achieve universal primary educational goals (United Nations, 2009). The number of student enrollments in sub-Saharan Africa between 1991 and 2006 increased by 16%, however, the various governments expenditure on high education rose to only 6% (World Bank, 2010). This leads one to conclude that Sub-Saharan African countries will not be able to meet the demands of increasing trend of student population in providing resources such as educational technology, staff, and training facilities (World Bank, 2010). Thus, various governments need to provide equitable access to higher education while considering other options of distance learning. An effective combination of different approaches of distance learning can lead to increased accessibility of students into tertiary institutions in Africa.

Ghana (formerly Gold Coast) is a country situated on the West Coast of Africa in the Gulf of Guinea. It occupies a total land area of 238,539 square kilometres (92,099 square miles). Ghana is a multilingual country with diverse local languages, predominantly Akan, Dagomba, Ewe, and Ga. English is the official and commercial language, and is taught in all schools. The rural population forms about 66% of Ghana's 25 million people. Ghana gained independence in 1957 from Britain, becoming the first country in sub-Saharan Africa to free itself from colonial power. It shares borders with Cote d'lvoire to the west, Togo to the east, and Burkina Faso to the north. Major cities in Ghana are Accra- the National capital, Kumasi, Tema, Sekondi-Takoradi, and Tamale. It has a tropical climate, with an annual mean temperature of 26^0 C and 29^0 C. The majority of the people are employed in agriculture; however, there exists inadequate developed resources such as roads, schools, electricity, and health care (Millennium Development Goals Report, 2011). The country is divided into ten (10) administrative regions and 170 decentralized districts. The government is a presidential democracy with an elected parliament and independent judiciary.

Ghana became the second country in Sub-Saharan Africa to have full Internet connectivity. However, the Internet sector's expansion has been slowed by shortages of functional dial-up phone lines (CIA fact book, 2011; Lundkvist et al., 2004). Internet service is connected to the world's first submarine fibre-optic cable system, SAT-3/WASC/SAFE, linking Africa to Europe and Asia (Research-Africa.net, 2010). In 2002, the National Communication Authority (NCA) licensed 52 Internet service providers (ISPs); however, few of them are currently operating (Lundkvist et al., 2004). In 2005, Ghana was ranked 61st in the World Economic Forum's Global Information Technology Report (World Economic Forum, 2006).

In 2003, there were more than 750 Internet cafes in Ghana, mostly using dial-up connections. About 70% of them are located in Accra, and others in cities such as Kumasi, Tema, and Takoradi (Lundkvist et al., 2004; Opoku, 2004). Most countries in sub-Saharan Africa have taken the advantage of the technological advancement in distance learning to make strides in the advancement of education. These technologies offer tremendous hope towards providing its citizens with access to a higher education (Selinger, 2002; Isaacs et al., 2004; Shrestha, 2000).

The rapid growth of student population and limited space in the universities had called for urgent measures to widen university admission. For example, in 1996, only 6,088 students were admitted to the universities out of 22,477 qualified applicants 27%. Consequently, Universities opted for distance learning programs with blended learning focus as the best alternative (Nichol & Watson, 2003). Considering the high demand for access to tertiary education and decreasing budgetary allocation for educational provisions in Ghana, there has been a growing interest in distance education and open learning (Development of Education in Africa, 2002) as an alternative to efficient means of providing quality education to people. This chapter highlights the trend of distance learning and university education, background knowledge of higher education, distance and blended learning in Ghana, the role African Virtual University and distance education, benefits, challenges, recommended strategies of distance and blended learning programs in Ghana, and conclusion.

BACKGROUND

Higher Education in Ghana

One major function of higher education in Ghana was to train leaders and resource personnel therefore, university education was restricted to carefully selected elites who were become future leaders (Effah, 2001). Higher education in Ghana is composed of eight universities, ten polytechnic institutions and several professional institutes (Manuh, Gariba & Budu, 2007). Enrollments in the public tertiary institutions have increased more than 50% from 13,415 to about 87,929 students in the period of 1990 to 2004 (Manuh, Gariba & Budu, 2007). Since 2000s, a significant number of private universities and institutions have been established mainly by missionary authorities to augment the lack of access to university education by majority of the applicants who have been denied admission to the public universities. Private universities account for only 5 percent of total tertiary enrollments and their establishments have helped to reduce the problems of admission to tertiary institutions in Ghana (Manuh, 2007). As of 2012, Ghana is reported to have had more than 45 private universities accredited by the National Accreditation Board (Ghana National Accreditation Board Website, 2010). Despite the growth experienced in Ghana's tertiary education, the total enrollment ratio for the 18-22 year old age cohort in tertiary education stands at only five percent (UNESCO Institute for Statistics, 2006).

Access to university education in Ghana is limited and categorized by the socio-economic status, region of origin, types and locations of secondary school of the applicant (Manuh, Gariba & Budu, 2007). Less than 35% of the students who apply are admitted due to growing numbers of qualified secondary school leavers and university space and staffing limitations. The majority of students come from a limited number of secondary schools and the more advantaged regions. As a result of these problems, the various universities in Ghana have devised strategies to make university education accessible to all.

Distance and Blended Learning Solutions

According to Roblyer and Edwards (2000), distance learning is defined as "the acquisition of knowledge and skills through mediated information and instruction, encompassing all technologies and other forms of learning at a distance (p. 192)." It is an educational process in which, a significant portion of the teaching, is conducted by someone removed in space and or time from the learners (UNESCO, 2002). Further, Distance learning is an organized instructional program in which teacher and learners are physically separated (Newby, Stepich, Lehman & Russell, 2000). The Association for the Development of Education in Africa (ADEA), 2002 defines distance education as "the process whereby the learner is separated from the instructional base or teacher, either in space or time, for a significant portion of their learning." According to the Association for the Development of Education in Africa (2002), distance education has the following characteristics: (a) institutional accreditation, where learning is accredited or certified by some institution or agency; (b) use of a variety of media, including print, radio and television broad casts, video and audio cassettes, computer-based learning and telecommunications; (c) provision of two-way communication, which allows for tutor-learner interaction; and (d) possibility of face-to-face meetings for tutorials, learner-learner interaction, library study and laboratory or practice sessions.

It is a 20th century invention based on organizational structures and technologies produced by the industrial revolution (Frempong, 2004).

According to Osguthorpe and Graham (2003), blended learning combines face-to-face instruction with distance education delivery systems. Blended learning combine technology based learning with face-to-face learning (Kerres & De Witt, 2002, p.101). Similarly, Driscoll (2002) defines blended learning as mix modes of Web-based technology (for example, live virtual classroom, self-paced instruction, collaborative learning, streaming video, audio, and text) to accomplish an educational goal.

Kerres and De Witt (2003) and Hoffman (2001) identify the following as most used elements in blended learning situations:

1. Traditional classroom or lab settings (face-to-face instruction).
2. Reading assignments (print-based workbooks).
3. CD-ROM (self-paced content).
4. Performance support tools (collaboration software, threaded discussions, online testing.
5. Tele-training such as videoconferencing.
6. Asynchronous Web-based training (email-based communication, e-learning platforms, discussion boards).
7. Synchronous Web-based training (chat rooms, computer conferencing).

Further, McArthur (2001) argues that technology is not the main medium in blended learning but rather much consideration should be focused on blended learning strategy. In support of this plan, Franks (2002) designed blended learning models to include (a) initial mode that provides administrative information on a course; (b) through a communication element; (c) leading to materials delivery; and (d) use of technology to meet learning needs. In the context of distance learning and higher education in Ghana, Fox's (2002) definition of blended learning fits most appropriate as "… the ability to combine elements of classroom training, live and self-paced e-learning, and advanced supportive learning services in a manner that provides a tailored learning…" (p.26). According to Rovai and Jordan (2004), blended learning has the following major types:

- **The Use of Multimedia and Virtual Internet Resources in the Classroom:** Examples include the use of videos, virtual field trips, and interactive Websites.
- **The Use of Classroom Websites in the Classroom.**
- **The Use of Course Management Systems:** Examples include the use of Moodle, WebCT and Blackboard.
- **The Use of Synchronous and Asychronous Discussions in the Classroom:** Examples of resources available include Yahoo Groups, TappedIn, Blogs, and Elluminate (Rovai & Jordan, 2004).

Schmidt (2002) states that blended learning should incorporates the following components:

- **Administration:** Which involves the organization of the syllabus, increase teacher productivity/efficiency, distributing/collecting material, and scheduling duties.
- **Assessment:** Which involves the ability to providing feedback, tracking student progress, and testing opportunities.
- **Content Delivery:** That comprises communicating content through different learning styles, using multimedia, incorporating learning activities, using the Internet for the acquisition of knowledge.
- **Community Component:** That involves building the classroom community through synchronous/threaded chats, providing office/help hours to communicate online.

Provost (2011) asserts that the population of sub-Saharan Africa is expected to grow to by more than 34% over the next 20 years. Therefore, it is incumbent upon the region to institute measures to respond the increasing demand of potentially 77 million new students. Student enrollment in higher education has grown faster than financing capabilities, reaching a critical stage where the lack of resources has led to a severe decline in the quality of instruction and in the capacity to reorient focus and to innovate (World Bank, 2010).

Roberts and Associates (1998), further explains that currently more than 140 public and private institutions provide tertiary distance education services within sub-Saharan Africa and methods of delivery are mainly print media, supplemented by written assignments, and face-to-face tutoring by instructors (Murphy & Zhiri 1992). Most distance learning programs are in the area of teacher education preparation with the sole purpose of providing the upgrading of required skills for teachers and as well as for professional development. Other offered programs include: business management or information technology, science, social sciences, mathematics and peace studies. A recent survey of 143 tertiary distance education programs in Africa found that 52% of anglophone programs and 67% of francophone programs targeted teachers and school administrators (Roberts & Associates 1998). According to Opoku (2004), the development of Information, Communication and Technology (ICT) will provide significant opportunities for developing countries such as Ghana. There is high demand for open and distance learning in Ghana's public and private universities (Opoku, 2004). Universities in Ghana have opted for distance learning as an alternative measure to reduce congestion and help remedy student admissions to the few universities available (Dzisah, 2006). Thus, blended learning that mixes various event-based activities such as face-to-face classrooms, live e-learning, and self-paced learning with the development of new technology systems is highly recommended as the best efficient way to enhance the delivery of quality education to increasing students population in Ghana with the power of ICTs (Unwin, 2005; Valiathan, 2002). There is a need for comprehensive analysis of the instructional design and use of distance and blended learning programs in Ghana.

Distance and Blended Learning in Ghana

The Ministry of Education under the direction of the government developed a comprehensive plan using distance learning to meet the demands for higher education and also to relieve the over population of students on campuses of the public universities (Addah, Kpedu, & Frimpong Kwapong, 2012). The mission of the distance education program in Ghana is to make quality education at all levels accessible and relevant to meet the growing academic needs of Ghanaians with the sole purpose of enhancing their academic performance and improve the quality of their lives (Frimpong Kwapong, 2012, World Bank, 2010). The government of Ghana has issued a statement that identifies major reasons for implementing distance learning. Distance learning will provide Ghanaians with opportunities to manage technological advancements and enhance contributions to national building; as well as provide opportunities for further education. Further goals are to provide an equitable and efficient access to education for all and improve the capacity of Ghanaians to manage technological advancement and the knowledge society and be able to enhance their contribution to nation building (Addah, Kpedu, & Frimpong Kwapong, 2012).

The main public universities in Ghana namely the University of Ghana (UG), Kwame Nkrumah University of Science and Technology (KNUST), the University of Cape Coast (UCC), the University of Education, Winneba (UEW), and the University for Development Studies (UDS) (Oppong-Mensah, 2009) have established open and distance learning centers to train and offer degree programs to the increasingly student population. Due to inadequate infrastructural resources, lack of personnel, and finance, blended learning in Ghana is contextual depending on the program of study and location. However, blended learning programs are focused more on face-t-face instruction with less use of technology. Thus, the mode of delivery is dual mode component of distance learning (80% face-to-face and 20% use of technology- the use of print-based (modules). It was started by UEW in 1996, followed by UCC in 2001, then KNUST in 2004 and in 2007 by the UG. As stated earlier, distance learning has been the best alternative measure to provide access to university to most people in Ghana (Addah, Kpedu, & Frimpong Kwapong, 2012).

The Center for Continuing Education at the University of Cape Coast (CCEUCC) runs two dual distance-learning programs in Diploma and Post Diploma in Basic Education Degrees, for the training and retraining of basic teachers in Ghana. The mode of delivery is blended learning with about 90% face-to-face meeting on campus and 10% off campus through correspondence and minimal use of technology. The Centre for Continuing Education (UCC) has more than 23 study centers for the Basic Education Programs across the country with a regional coordinators responsible for students' and course tutors' affairs, face-to-face sessions, examinations and quizzes, as well as supervise students' project work and off-campus teaching practice, arrange for students to get guidance and counseling services (Addah, Kpedu, & Frimpong Kwapong, 2012). The mode of delivery is highly centered on the use of print-based (modules) infused with traditional face-to-face instruction at the various learning centers. Students and tutors meet monthly on a face-to-face instruction in all the 26 study centers across the country. Regional coordinators from the main campus at UCC and the center representatives visit the study centers every week to monitor the face-to-face sessions, offer counseling to students, and organize assessments. In 2012, about 33,000 students with close to 20,000 offering education and the rest business programs are pursuing higher education through distance learning at the University of Cape Coast (UCC). UCC has the largest distance learning programs with dual mode component in Ghana. It currently has about 13 education and eight business programs with about 2,000 qualified course tutors using blended form of learning wit 80% face-to-face instruction and the use of print-based (modules) (Oppong-Mensah, 2008).

At the University of Ghana, the Institute of Distance and Continuing Education (IDCE) is tasked to design and manage bachelor and post graduate programs to many people who otherwise would not have been able to access higher education. Distance learning program at the university of Ghana entails courses in the social sciences such as Sociology, English, Religious, and Political Science at the bachelor degree level. Further, the Institute of Distance and Continuing Education (IDCE) has centers in all 10 regions. Method of delivery is blended learning with print-media and traditional face-to-face instruction and some form of Internet use. There is collaboration between the University of Ghana and the Indira Gandhi National Open University in various academic programs offered by the Indira Gandhi National Open University via the tele-education mode under the Pan-African e-Network Project that started in 2011 (Addah, Kpedu, & Frimpong Kwapong, 2012).

The Institute of Education Development and Extension (IEDE) is in charge of a distance education program at the University of Education, Winneba (UEW). The IEDE offers certificates, diploma, post-diploma and degree programs for teachers and non-teachers. The IEDEI has centers at all the ten regions in Ghana in addition to the two major branch campuses of the university. Each center has a regional coordinator whose responsibility is student affairs, affairs as well as proctors end of semester examinations. Student population has grown from 7,954 in 2007 to 12,665 in 2008 and 17,169 in 2009 to over 20,000 in 2012. The method of delivery is blended learning with more than 80% in a "Sandwich Program" (a distance learning program where students meet face-to-face with instructors mostly on summer) and 20% use of print-based materials (Oppong-Mensah, 2008).

In 2009, the IEDE lunched a master's degree program in mathematics, music, technology, social studies, and science education through its "Sandwich Program" distance learning and plan on starting a collaborative Doctor of Philosophy PH.D program with the same disciplines using distance learning (Oppong-Mensah, 2008). To increase the percentage of technology use in its distance and blended learning programs, the IEDEI initiated the use of video-conferencing in all 23 centres that host the university's distance programs as a way to introduce an electronic component in the distance education program. To make effective use of technology, the IEDEI started converting print course modules into electronic books (e-books) and the content converted into interactive online learning materials for students on a pilot basis.

The Institute of Distance Learning (IDL) was established at the Kwame Nkrumah University of Science and Technology to increase access to motivated and qualified students using multimedia. The Institute of Distance Learning at the KNUST introduced three top-up undergraduate programs in Computer Science, Electrical and Electronic Engineering and Telecommunications Engineering during the 2009/2010 academic year using blended learning medium. In 2010/2011, KNUST introduced a new distance learning program in Doctor of Optometry. The program uses a wide range of technologies (60%) such as, print, multimedia, TV, and radio broadcast, video conferencing and Web-based technology and (40%) face-to-face instruction of campus or designated learning centres. In 2011/2012, the Institute of Distance Learning (IDL) of KNUST offered two programs namely, Master of Science (M.Sc.) in Information Technology and Master of Philosophy (M.Phil) in Health Informatics. The Institute offers eleven (11) undergraduate, and five (5) post-graduate programs concurrently in eight Regions of the country using blended learning modules.

Additionally, the Institute of Distance learning offers MSc in Information Technology, ICT professional courses and MBA in Finance through ICT usage for the Ghanaian public through e-learning and distance education. The Institute of Distance learning at KNUST has a center in Accra that offers in both undergraduate and graduate programs. Examples of these programs are BSc. Building Technology and BSc. Actuarial Science for undergraduates as well as MSc. Environmental Science and MSc. Industrial Mathematics. Lectures for these programs are facilitated in Accra. Most of the classes are offered on weekends and nights with the use of print-based (modules) and face-to-face instruction (Asabere & Enguah, 2012).

African Virtual University

African Virtual University (AVU) began in 1997 as a pilot study in Africa by the World Bank with its headquarters in Nairobi, Kenya. Its mission is to increase access to educational resources throughout sub-Saharan Africa, and promote quality higher education in the most critical area of economic development. It started with 57 learning centers in 27 African countries working to support economic development and offers many programs leading to certificates, diplomas, and degrees in business administration, biology, chemistry, distance and e-Learning professional development, physics, mathematics, teacher education professional courses, renewable energy, food security, ICT integration in education, ICT basic skills, and computer science (African Virtual University, 2012).

The AVU was established with the following objectives: (a) increase access to tertiary and continuing education in Africa by reaching large numbers of students and professionals in multiple sites simultaneously; (b) increase access to higher quality Open, Distance and e-Learning (ODeL) resources that are relevant to Africa; (c) enhance the capacity of African tertiary educational institutions; (d) enhance and sustain a network of Partner Institutions; (e) build and sustain partnerships with institutions that can support the African Virtual University Mission; (f) carry out research and evaluation activities on the African Continent; (g) build and sustain a committed and effective African Virtual University organization; and (h) develop and implement a fund raising strategy in support of all of the above objectives with focus on African Governments, the Private Sector and International Organizations (AVU, 2012; 2013).

AVU has developed significant experience in the following areas since 1997: (a) delivering programs though information and communication Technologies (Degree Programs, Certificate and Diploma Programs); (b) building and managing large consortia of African Educational Institutions; (c) designing and implementing Multinational e-Learning Projects; (d) developing African-based residential and e-Learning materials for Partner Institutions; (e) establishment of state of art e-learning centers in Partner Institutions; (f) training of Partner Institutions staff in e-Learning methodologies; (g) developing and implementing Open Education Resources (OER) strategy; and (h) managing a digital library (AVU, 2011; 2011b).

In 2003, the AVU introduced the teacher education program as a component of the AVU multinational support project. The aim of the project was to address the challenges of quantity and quality that teacher education profession faces in sub-Saharan Africa. The AVU teacher education program has the benefits of (a) improving the quality of teaching and learning in mathematics and science education through the use of ICTs; (b) increase the number of mathematics, sciences, and basic computer science teachers by expanding access to training through the use of ODeL methodologies; (c) develop and promote research in teacher education in order to encourage evidence-based decision-making in all aspects of teacher development; and (d) promote regional integration and strengthen relevant partnerships with other teacher education initiatives in Africa and globally (AVU, 2009; 2012).

The AVU, through partner institutions, has trained more than 43,000 students since its establishment in 1997. The method of teaching delivery includes asynchronous, synchronous satellite video, videotaped classes, and video conferencing where students have the opportunity interact and ask questions via using telecommunication, email, or fax. Email-interaction between students and instructors is often used and live lectures in a one-way video, two-way audio, and digital satellite broadcast is often used as a teaching method (AVU, 2003; 2004). The AVU has established more than ten (10) e-learning centers, one in each of ten beneficiary countries, between 2007 and 2012. AVU centers act as physical hubs for the creation, organization, and sharing of knowledge as well as the development of local, distance, and e-learning programs. In Ghana, the University of Ghana (UG), University of Cape Coast (UCC), Kwame Nkrumah University of Science and Technology (KNUST), and the Ghana Institute of Management and Public Administration (GIMPA) have AVU centers that offers distance learning in computer science, and business administration for both undergraduate and graduate programs. This has helped many students to gain admission to the above institutions who could have been denied admission due to lack of infrastructures, shortage of faculty, and resources. Overall, the establishment of the AVU has helped to increase access to university education to majority of students in sub-Saharan Africa as a result of mode of delivery through the use of ICT and multimedia considered as the first of its kind in Africa (AVU, 2005).

Benefits and Constraints of Distance Learning in Ghana

To address the challenges of education in Ghana and increase the ratio of teacher-student, the government has reformed the educational systems in the late 1980s, which reduced the duration from 17 years to 12 for basic and secondary education and increased university education from three to four years. The main aim of these educational reforms was to increase student access and enrollment as well as to make vocational and technical education a greater part of the educational system in Ghana (Dzisah, 2006). The Ministry of Education (2002) designed a new program to address the problem of teacher shortages and high attrition rates associated with teacher migration to other sectors of the economy (Oppong-Mensah, 2008).

Benefits of Distance and Blended Learning in Ghana

Distance learning has the potential of equipping teachers with adequate knowledge and skills for lifelong learning. In Ghana, distance learning with blended focus provides the opportunity for professionals especially teachers to have access to university education. Distance learning can be used to provide in-service training of untrained teachers and professional upgrading in basic and secondary education (Perraton, 1993, 2000; Perraton et al., 2002; Robinson & Latchem, 2002; Saint, 1999).

Distance learning will open up new frontiers to learning by enhancing collaborative research opportunities among African universities. It will promote cross-national, multi-disciplinary perspectives in educational practice and equip students, faculty, and administrators with resources to compete in the academic world of the 21st century (Darkwa & Mazibuko, 2000). According to Saint (1999), distance education in sub-Saharan Africa can effectively reach people who have been denied access to university education. For instance, women who are unable to attend traditional educational programs because of household responsibilities or cultural constraints, and teachers in the rural areas who want to receive university degree or update their teaching skills have opportunities to complete their education and become professionals. The establishment of the AVU has enhanced the use of new information technologies to support classroom teaching. For example, lectures can access the latest scientific information, reference resources, effective learning exercises and creative teaching aids through the Internet. Students and lectures can communicate and research with the use of e-mail and Internet facilities that turn to local research activities (AVU, 2012).

Distance learning in the form of e-learning has the potential of reducing cost considering the elimination of costs associated with instructor's salaries, student travel, lodging, and meals are directly quantifiable. The reduction of time spent away from the job by employees may be the most positive offshoot (Asabere & Enguah, 2012). Students have the opportunity to receive consistent delivery of content with asynchronous, self-paced e-Learning. As a result of the modular approach distance learning adopts, course materials can be updated or modified to suit particular types of students without the need to reproduce them in their entirety leading to cost-efficiency (Saint, 1999). Distance and blended learning have created flexibility and opportunity for students to take significant advantage of tertiary education in the 21st century. It confronts the challenges of serving an increasingly diverse pool of students with an expanding range of learning requirements (Saints, 1999).

Additionally, distance and blended learning provides the opportunity for students to work and study simultaneously. It does not require the additional costs of campus residence, and offers an alternative pathway to tertiary training for students with limited financial means. This is contributes to the narrowing of the education gap among different ethnic groups, making a meaningful educational contribution to the country's long-term political stability (Saint, 1999; Darkwa, 2007).

Distance learning promotes cross-national, multi-disciplinary research in education, making students, faculty, and administrators have the requisite resources to engage in meaningful and scholarly work on the 21st century (Darkwa & Mazibuko, 2000). Since 2010, the AVU has been offering joint certificates programs in teacher education, designing, developing and offering e-Learning training, providing consultancy services and the provision of academic services for income generation. This includes content design and development, consultancies in e-Learning, e-conferences, Webinars, as well as organizing fundraising activities (AVU, 2012). According to Oppong-Mensah (2008), distance education promotes quality through the development and provision of learning resources that can be utilized by teachers and learners, regardless of their location. Distance learning has the potential to enhance and promotes access to lifelong learning such as professional development to individuals who have obtained formal qualifications (Oppong-Mensah, 2008). The use of blended learning in higher education in Ghana has opened numerous opportunities for college students to have access to tertiary education. It has also increased growth of student population in the universities thereby generating income for the universities. For example, the university of education, Winneba (UEW) and the University of Cape Coast (UCC) generates more income from distance learning program.

The implementation of distance learning has extended tertiary education opportunities to students in the rural areas, small towns especially teachers in the rural areas of the country who do not have convenient access to tertiary institutions. It saves them travel time, travel expense, and the continuation of work income while studying (Frempong, 2004; Opoku, 2004).

Challenges/Constraints of Distance and Blended Learning in Ghana

Distance learning programs generally require better management skills than traditional tertiary programs (Asabere & Enguah, 2012). The problem of logistics has been a major challenge to distance learning in Ghana as a developing nation. The use of technology is critical to the success of distance-learning programs in Africa (Saint, 1999). In Ghana, there is a technical problem of reliable power supply to institutions that runs distance learning. This hampers the adoption of information and communication technology (ICT) into the distance learning making Internet unreliable for students and faculty. There is a problem of bandwidth capacity in the universities that offer distance education. Most universities pays 50 times more for their bandwidth than their educational counterparts in the rest of the world, and fails to monitor, let alone manage, the existing bandwidth. This hinders useful research and distance education (Steiner, Tirivayi, Jensen & Gakio, 2005).

Few of the tertiary institutions in Ghana are equipped with up to date Internet and wireless broadband, telephone links to rural areas are poor, despite advances in wireless technology. For example, students in the distance learning program have no choice than to use private Internet Cyber Cafes run by private small businesses within and outside campus for additional cost (Opoku, 2004; Dzisah, 2006). Access to information technology and connectivity is generally limited in these institutions and staffs are not trained on how to use ICT facilities, thus hindering the growth of distance learning. The libraries in these universities possess few stand-alone computers equipped with dial-up e-mail (and perhaps a CD-ROM player).

According to Isaacs et al. (2004), there is wide spread low Internet bandwidths, limited telephone connections, and negligible computer ownership as a common problems in Ghana. Thus, posing major challenges to students in the distance learning programs in Ghana. Sagna (2005) further explain that information communication and technology infrastructure is limited to capital cities and major centers. Thus, Internet accessibility is unavailable to the great majority of rural and remote area dwellers, leading to uneven access. Another challenge to distance learning is that of financial constraints. The government of Ghana provides little financial support to universities in the field of distance learning. This makes it difficult for the universities to institute efficient distance learning programs (Asabere & Enguah, 2012). In Ghana, there is a degree of cost-sharing on tuition for tertiary distance education programs between students and government is becoming an established precedent (Saint, 1999). This practice derives from an assumption that distance education students are employed has put financial burden on students who opt for distance learning. Lastly, there is a high degree of brain drain of human resource personnel with skills in ICT. This has resulted in the lack of competent faculty and ICT experts who will undertake implementation of distance and blended learning projects (Intsiful, 2003).

Recommended Strategies

Distance learning with blended focus is changing rapidly in sub-Saharan Africa with no exception to Ghana. The total number of students in distance learning is more than 45,000 students in universities in Ghana. Distance learning has created the possibility of an increased access to tertiary education at more cost- effective levels for students and other adult learners (Saints, 1999).

Universities could revise, and develop a clearly defined strategic policies and plans with specific objectives on the implementation strategies to be outlined for blended learning in the future. The plan and strategies must identify how distance learning could address the needs of students' access to higher education. Universities could increase their effort of expanding distance education programs to include online and blended learning for students in the teacher education program.

More over, funding could be made available to distance learning in the universities to help transform instructional technology to meet the rapid growth of technology in higher education in the 21st century. Equal access to tertiary education could be made available to all students regardless of their location and socio-economic status through distance learning. Thus, universities could mobilize more funding to build distance learning centers to promote equal access to tertiary education for all using blended learning. The government could provide funding financial and logistics support to distance learning programs that will make it possible to ease campus congestion due to increased number of students outpacing facilities. Funding should be available to purchase modern resources such as computers, books, transportation, printing materials, and other technological logistics to support distance and blended learning education. Universities could provide professional development training to faculty, and staff on the best practices of teaching and computer literacy using blended learning modules in their distance learning programs. Human resources are critical to distance education program, thus, effective training will provide steady stream of experienced personnel who will guide future activities on distance learning policies (Saint, 1999).

Finally, universities and polytechnics could collaborate with other universities to establish networks that have the potential to identify the challenges and the implementation of appropriate strategies to help reduce it (Opoku, 2004). To support e-learning implementation in higher education, universities could partner with private Internet service providers or corporate investors to provide Internet and technology support to students off campus. This could enhance reliable power supply, Internet service and efficient bandwidth management for a successful distance learning in Ghana. It is important for the university administrators initiate efficient training programs for faculty, technical staff and students. Effective training will ensure consistent progress of the educated and experienced personnel capable of implementing and guiding future distance education programs.

FUTURE RESEARCH DIRECTIONS

Distance learning has been considered an alternative educational strategy to decongest university campuses and provide an opportunity for equal access to tertiary education. It is a form of education that helps to solve the growing demand for higher education and bridge the gap between those living in the rural areas and in the cities. However, distance learning faces challenges such as financial constraints, inadequate infrastructural facilities, shortage of skilled personnel, and government low level of commitment that stifles efficient distance learning programs to meet the growing demand for student willing to receive higher education.

This chapter contributes to the trend of distance learning and university education in Ghana. This Chapter shows that distance learning has provided opportunities for many people to have access to university education and bridging the gap of human resource development. Additionally, more women have been admitted to the universities in Ghana, as a result of the distance learning programs, for it allows students to work and study with options of class time and convenience (Frimpong Kwapong, 2012). The educational implication of this chapter is that it shares information about the benefits and challenges facing distance learning in Ghana as well as strategies that can be used to solve the problems. This chapter highlights the trend of distance learning in Ghana and how it is delivered to students and the instructional pedagogy involved. The chapter provides information about various distance learning programs undertaken by the various universities and online education, models of instruction, benefits, challenges and future directions of research. Future investigation could be conducted on the possibilities of blended and online learning in the universities and the challenges involved. Additional research could be investigated on effective professional development curriculum for faculty and staff on distance education. Furthermore, future research could investigate the perception of students and students on distance and online learning.

CONCLUSION

It is important for policy makers and the government to recognize the significance of distance and blended learning in the promotion and quality of higher educational opportunities in Ghana. Distance and blended learning will be the best alternative to increase higher education opportunities for people willing to acquire education but who cannot get access because of a variety of inadequacies, infrastructure and space (Ayeh, 2008). Distance and blended learning programs has led to academic and professional competence of majority of people in higher education especially teachers and other professionals. This study will contribute as a secondary source for researchers in the field of distance learning to know the existing trend of distance learning in sub-Saharan Africa with special reference to Ghana. The trend of distance learning with blended focus is encouraging despite numerous challenges. For example, distance learning is now highly utilized in the emerging financial, educational and agricultural sectors in Ghana (Effah, 2001; Oppong-Mensah, 2009). Distance learning with blended elements programs have crossed a new threshold and culturally accepted by the people. The trend seems to be promising with infusion of ICT into all sectors of the economy with education being the first priority.

REFERENCES

Addah, K., Kpebu, D., & Frimpong Kwapong, O. A. T. (2012). Promoting e-learning in distance education programs in an African country. In E. Pontes, A. Silva, A. Guelfi, & S. T. Kofuji (Eds.), *E-learning—Long distance and lifelong perspectives* (pp. 51–63). New York: InTech Publishing. doi:10.5772/29202

African Virtual University. (2003). *RMIT celebrates success in Africa*. Retrieved November 20, 2012, from http://www.international.rmit.edu.au/AVU/news.html

African Virtual University. (2004). *Capacity building with African partner institutions*. Retrieved October 28, 2012, from http://www.international.rmit.edu.au/AVU/partners.html

African Virtual University. (2005). *Addressing the teacher shortage crisis in sub-Saharan Africa*. Retrieved December 28, 2012, from http://www.hewlett.org/NR/rdonlyres/4CA0E28D- CA69-4301-9753-FA56FA14E2E4/0/OnepageAfricanVirtualUniversity.pdf

African Virtual University. (2009). *About the AVU*. Retrieved October 10, 2012, from http://www.avu.org

African Virtual University. (2012). *Open distance and e-learning (ODeL) centres, Nairobi*. Retrieved January 12, 2013, from http://www.avu.org/AVU-Multi-national -support-project/avu-capacity-enhancement-program-acep.html

African Virtual University. (2013). *About the AVU*. Retrieved January 10, 2013, from http://www.avu.org

Asabere, N. Y., & Enguah, S. E. (2012). Development of an information and communication technology business model for electronic learning. *International Journal of Engineering Science & Advanced Technology*, *2*(5), 1178–1191.

Association for the Development of Education in Africa. (2002). *Distance learning in sub-Saharan Africa: A literature survey on policy and practice*. Retrieved October 15, 2012, from http://www.adeanet.org

Ayeh, K. J. (2008). Information communication technology and global education: The challenges of the African virtual university. *Information Development*, *24*(4), 266–274. doi:10.1177/0266666908098070

Boafo-Arthur, K. (2006). *Reflections on the ICT revolution and higher education in Africa*. Retrieved November 20, 2012, from http://www.uneca.org/aisi/docs/academia/KwameBoafo-Arthur.pdf

Center for Continuing Education University of Cape Coast. (2006). *Higher education for all: Program design, diploma in basic education (DBE) and post-diploma in basic education P-DBE*. Cape Coast, Ghana: Author.

CIA. (2011). *World factbook, Ghana*. Retrieved December 10, 2012, from http://www.cia.gov/library/publications/the-world-factbook/printing/gh.html

Darkwa, O. K., & Mazibuko, F. (2000). Creating social work virtual learning communities in Africa. *The International Journal of Continuing Social Work Education*, *3*(1), 15–24.

Driscoll, M. (2002). Blended learning. *E-learning*, *3*(3), 54.

Dzisah, J. (2006). Information and communication technologies and development in Ghana. *Science, Technology & Society*, *11*, 379–396. doi:10.1177/097172180601100205

Effah, P. (2005). *Private higher education: An analysis of its growth and expansion in African countries*. Paris: UNESCO.

Fox, M. (2002). Keeping the blended promise. *E-learning*, *3*(3), 26–29.

Frempong, G. K. (2004). *Restructuring of the telecoms sector in Ghana: Experiences and policy implications*. (PhD thesis). University of Ghana, Cape Coast, Ghana.

Intsiful, J., Okyere, P. F., & Osae, F. (2003). Use of ICT for education, research and development in Ghana: Challenges, opportunities and potentials. In *Round Table Discussion on Developing Countriess Access to Scientific Knowledge, Abdus Salam International Center for Theoretical Physics*. Retrieved October 6, 2012, from www.ejds.org/meetings/2003/ictp/papers

Kerres, M., & De Witt, C. (2003). A didactical framework for the design of blended learning arrangements. *Journal of Educational Media*, *28*(2-3), 101–113. doi:10.1080/1358165032000165653

Lundkvist, P., Habchi, D., Soderberg, B., Jensen, M., Akrof, E. O., & Spintrack, C. D. E. (2004). *Fostering and facilitating access on the SAT-3/WASC/SAFE fibre-optic cable in West Africa: Improving West African internet connectivity using fibre-optic cable*. Stockholm: Spintrack IT advice. Retrieved December 16, 2012, from www.spintrack.com/itadvice

Manuh, T., Gariba, S., & Budu, J. (2007). *Change and transformation in Ghana's publicly funded universities*. Oxford, UK: James Currey.

McArthur, J. (2001). *Blended learning: A multiple training strategy*. Retrieved April 4, 2013, from http://www.connective.com/events/opm

Murphy, P., & Zhiri, A. (1992). *Distance education in anglophone Africa: Experience with secondary education and teacher training*. Washington, DC: World Bank.

Newby, T. J., Stepich, D. A., Lehman, J. D., & Russell, J. D. (2000). *Instruction technology for teaching and learning*. Upper Saddle River, NJ: Merrill.

Nichol, J., & Watson, K. (2003). Rhetoric and reality—The present and future of ICT in education. *British Journal of Educational Technology*, *34*(1).

Opoku, R. A. (2004). *Ghana and ICT strides, challenges and the way forward*. Retrieved January 14, 2013, from www.ghanaWeb.com

Oppong-Mensah, K. (2009). The contribution of distance education in meeting the challenges in teacher education in Africa—The Ghanaian experience. In *Proceedings of the International Conference on Distance Education and Teachers' Training in Africa, Ghana*. Retrieved from http://www.unesco.org

Osguthorpe, R. T., & Graham, C. R. (2003). Blended learning environments: Definitions and directions. *The Quarterly Review of Distance Education*, *4*(3), 227–233.

Provost, C. (2011, April 27). Education in Africa: Where does the money go? *UK Guardian*. Retrieved January 6, 2013, from http://www.guardian.co.uk/news/datablog/2011/apr/27/africa-education-spending-aid-data

Research-Africa.net. (2010). *Ghana science and technology system: A brief profile*. Retrieved November 24, 2012, from www.research-africa.net/media/pdf/Ghana-ST.pdf

Roberts, et al. (1998). *Tertiary distance learning in Sub-Saharan Africa: Overview and directory to programs*. Washington, DC: World Bank.

Robinson, B., & Latchem, C. (2002). *Teacher education through open and distance learning*. London: Routledge.

Roblyer, M. D., & Edwards, J. (2000). *Integrating educational technology into teaching* (2nd ed.). Upper Saddle River, NJ: Merrill.

Rovai, A. P., & Jordan, M. (2004). Blended learning and sense of community: A comparative analysis with traditional and fully online graduate courses. *International Review of Research in Open and Distance Learning, 12*(4), 43-56. Retrieved March 30, 2013, from http://www.irrodl.org/content/v5.2/rovai-jordan.html

Sagna, O. (2005). Lifelong learning in the African context: A practical example from Senegal. In C. McIntosh & Z. Varoglu (Eds.), Perspectives on distance education: Lifelong & distance higher education (pp. 51-62). Paris: Commonwealth of Learning/UNESCO.

Saint, W. (1999). *Tertiary distance education and technology in Sub-Saharan Africa*. Washington, DC: The World Bank.

Schmidt, K. (2002). The web-enhanced classroom. *Journal of Industrial Technology, 18*(2). Retrieved April 6, 2013, from http://www.nait.org/jit/Articles/schmidt011802.pdf

Selinger, M. (2002). *Education and skills development in Sub-Saharan Africa*. Paper presented at the ASET Conference. Melbourne, Australia.

Shrestha, G. (2000). *Utilization of information and communications technology for education in Africa*. Addis Ababa: UNESCO.

Steiner, R., Tirivayi, N., Jensen, M., & Gakio, K. (2005). *African tertiary institution connectivity survey*. Nairobi, Kenya: African Virtual University. Retrieved January 24, 2013, from http://www.avu.org/documents/Partneship%20Connectivity%20Report-%20revised.pdf

UNESCO Institute for Statistics. (2007). *Global education digest 2006: Comparing education statistics across the world*. Retrieved from http://www.uis.unesco.org/ev.php?ID=6827_201&ID2=DO_TOPIC

United Nations. (2011). *Millennium development goals report*. New York: UN. Retrieved January 4, 2013, from http://www.un.org/millenniumgoals

Unwin, T. (2005). Towards a framework for the use of ICT in teacher training in Africa. *Open Learning*, *20*(2), 113–129. doi:10.1080/02680510500094124

Valiathan, P. (2002). *Blended learning models*. Retrieved March 29th, 2013, from http://www.learningcircuits.org/2002/valiathan

World Bank. (2010). *World development indicators*. Washington, DC: World Bank.

World Economic Forum. (2006). *Global information technology report*. Retrieved December 4, 2012, from http://www.weforum.org/en/initiatives/gcp/Global%20Information%20Technology%20Report/index.htm

ADDITIONAL READING

Annan, N. K., Ofori-Dwumfou, G., & Falch, M. (2012). Mobile learning platform: A case study of introducing m-learning in tertiary education. *GSTF International Journal on Computing, 2*(1), 23-28. Retrieved May 16, 2013, from http://www.academia.edu/1577293/Mobile_Learning_Platform_a_case_study_of_introducing_m-learning_in_Tertiary_Education

Ayoo, P. O., & Lubega, J. (2008). Exploring the implementation of blended learning in a developing country: A case study of Uganda. In J. Aisbett, G. Gibbon, A. Rodrigues, M. J. Kizza, R. Nath, & G. R. Renardel (Eds.), *Strengthening the role of ICT in development* (Vol. 4, pp. 133–143). Kampala: Fountain Publishers.

Debande, O., & Ottersten, E. K. (2004). Information and communication technologies: A tool empowering and developing the horizon of the learner. *Higher Education Management and Policy*, *16*(2), 31–61. doi:10.1787/hemp-v16-art15-en

Dodds, T. (1999). *Non-formal and adult basic education through open and distance learning in Africa: Developments in the nineties towards education for all*. Unpublished.

Driscoll, M. (2002). Blended learning. *E-learning*, *3*(3), 26–29.

Garisson, D. R., & Kanuka, H. (2004). Blended learning: Uncovering its transformative potential in higher education. *The Internet and Higher Education*, *7*(2), 95–105. doi:10.1016/j.iheduc.2004.02.001

Gulati, S. (2008). Technology-enhanced learning in developing nations: A review. *International Review of Research in Open and Distance Learning*, *9*(1), 1–16.

Janssens-Bevernage, A., & Stern, R. (2006). Facilitated e-learning in Sub-Saharan Africa. In *Proceedings of the Fourth Pan-Commonwealth Forum on Open Learning (PCF4)*. Retrieved March 10, from http://pcf4.dec.uwi.edu/viewabstract.php?id=325

Leary, J., & Berge, Z. (2007). Successful distance education programs in Sub-Saharan Africa. *Turkish Online Journal of Distance Education*, *8*(2), 12–14.

Mprah, K. (2008). *University of Ghana: Shadow of a collapsing nation*. Retrieved May 4 from http://www.modernghana.com/news/175908/1/university-of-ghana-8211-shadow-of-a-collapsing-na.html

Republic of Ghana. (2002). *Meeting the challenges of education in the twenty-first century: A report of the president's committee on review of education reforms in Ghana*. Accra: Adwinsa Publications.

Selinger, M. (2002). *Education and skills development in Sub-Saharan Africa.* Paper presented at the ASET Conference. Melbourne, Australia.

Shrestha, G. (2000). *Utilization of information and communications technology for education in Africa*. Addis Ababa: UNESCO.

The Development and State of the Art of Adult Learning. (2008). *National report of Ghana by the ministry of education, science and sports*. Retrieved October 12, 2012, from www.unesco.org/fileadmin

UNESCO. (2008). *Education for all by 2015: Will we make it?* Retrieved March. 30, 2013, from http://www.uesco.org/education/gmr2008

United Nations. (2011). *Millennium development goals report*. Retrieved June 6, 2013, from http://www.un.org/millenniumgoals

Utuka, G. (2013). *Distance education quality assurance in Ghana*. Wellington, New Zealand: Victoria University of Wellington.

Valk, J.-H., Rashid, A. T., & Elder, L. (2010). Using mobile phones to improve educational outcomes: An analysis of evidence from Asia. *International Review of Research in Open and Distance Learning*, *11*(1), 117–140.

World Bank. (1999). *Implementation completion report: Republic of Ghana: Literacy and functional skills project*. Washington, DC: The World Bank.

World Bank. (2004). *World development indicators*. Washington, DC: The World Bank.

World Vision. (2006). *Annual report on Ghana*. Retrieved May 28, 2013, from www.worldvision.org

KEY TERMS AND DEFINITIONS

African Virtual University (AVU): Established in 1997 as the first online university in sub-Saharan Africa by the World Bank with its headquarters in Nairobi, Kenya.

Asynchronous: Means students can learn the same content (pre-recorded lecture, notes posted online, Web-based simulation) at different times. It could be an existing or occurring at the same time.

Blended Learning: Combines forms of instructional technology (e.g., videotape, CD-ROM, Web-based training, film) with face-to-face instructor-led instruction depending on availability and resources in the context of location.

Distance Learning: It is an educational process in which, a large portion of the teaching, is conducted by someone not in the classroom or in space and or time from the learners. In distance learning the instructor is either most of the time out of class or minimal presence in the classroom or place of instruction.

E-Learning: Comprise all forms of electronically supported learning and teaching.

Ghana: (Formerly Gold Coast) is a country situated on the West Coast of Africa in the Gulf of Guinea.

Higher Education: Education beyond secondary education that is provided by college or university in Ghana.

Open and Distance Learning: Way of providing learning opportunities that is characterized by the separation of teacher and learner in time or place, or both time and place; learning that is certified in some way by an institution or agency; the use of a variety of media, including print and electronic; two-way communications that allow learners and tutors to interact; the possibility of occasional face-to-face meetings; and a specialized division of labour in the production and delivery of courses (Common Wealth of Learning).

Synchronous: Means events that happen at the same time for everyone, but can be online using Web conferencing or IM chats or offline. Not going at the same rate or exactly together with something else.

This work was previously published in Advancing Technology and Educational Development through Blended Learning in Emerging Economies edited by Nwachukwu Prince Ololube, pages 142-158, copyright year 2014 by Information Science Reference (an imprint of IGI Global).

Chapter 52
Adoption of Blended Learning Technologies in Selected Secondary Schools in Cameroon and Nigeria:
Challenges in Disability Inclusion

Julius T. Nganji
University of Hull, UK

Shawulu H. Nggada
Polytechnic of Namibia, Namibia

ABSTRACT

Blended learning could be seen as the solution to learning resource accessibility, especially when the indicators of measure are limited to distance and time. Distance and time could be said to be the generic indicators for the measure of blended learning. However, these do not solve the problem for everyone in society. For Inclusive Blended Learning (IBL), different types of users in society should be considered in its design. This is exactly what has provoked the focus of this chapter, to investigate the position of blended learning with respect to people with disabilities. The chapter's investigation is centered on selected secondary schools in Cameroon and Nigeria.

INTRODUCTION

Due to increasing development and employment of Information and Communication Technologies (ICTs) in various sectors of society, this age could be described as that of an information revolution. This age has facilitated teaching and learning, and with the development of e-learning means students can access learning materials from anywhere and at anytime when they have access to the required technologies. This, by design should improve the learning ability of students since accessibility of learning resources is high. In its much wider implementation, access to such resources could

DOI: 10.4018/978-1-4666-8246-7.ch052

also be made available on mobile devices. This does not necessarily have to come in the form of a mobile app (application) which may be restricted to a particular device but in the form of mobile Web pages since most popular mobile devices have browsers.

Also, the perpetual development and integration of ICT in various facets of society has meant individuals and organizations are forced to continually adjust to newer approaches of teaching and learning. It is expected that such newer approaches will also be found in institutions of learning. Africa, and in particular Sub-Saharan Africa, has been found to be among the least digital (Heeks, 2009) due to the effects of the digital divide (ITU, 2005). This implies less use of such technologies even in the educational sector. In such societies, the rural areas tend to be most disadvantaged.

However, Africa was identified as one of the fastest growing continents in terms of adoption and use of mobile phones (ITU, 2004). There is great potential therefore to utilize such technologies in education. In fact, it has been reported that farmers and those in the healthcare sector are positively using these technologies for their benefits (Mutume, 2009). Such use of technology could be emulated in the education sector to improve teaching and learning. However, the increasing uptake of technology by sub-Saharan African countries, and their eventual utilization in education (Nganji, Kwemain & Taku, 2010), has been discriminatory in that students with disabilities are often excluded (Nganji, 2008). This might be due to the fact that such technology has not been designed for accessibility (Brophy & Craven, 2007; Sheldon, 2001). Also, in most sub-Saharan African societies, there is the tendency to neglect the needs of people with disabilities. This includes education as the society has not adapted to including the needs of disabled students within mainstream education. This calls for measures to improve accessibility to blended learning technology for disabled students.

Aims and Objectives of Chapter

This chapter will investigate the integration and level of blended learning in some selected secondary schools in Cameroon and Nigeria particularly focusing on how blended learning is employed for the benefit of students with disabilities. A brief review of the adoption of blended learning technologies in Africa will be discussed, including the effects of the digital divide.

Thus, this chapter will assess the level of disability inclusion in the adoption of blended learning technology (mainly computers and associated technologies) in the selected secondary schools. The results of a survey in these schools will be presented, analyzed and discussed, and some recommendations will be made on improving access to blended learning technologies for everyone, particularly those with disabilities who are often neglected in the society. The chapter will also present the challenges of adopting blended learning technologies in Cameroon and Nigeria.

By examining these issues, this chapter will be going a step further to address an issue that is not normally the focus of researchers in the region. Addressing such issue will help stimulate thought and discussion on inclusion of disabled students in the use of blended learning technology in resource poor areas.

BLENDED LEARNING

According to Cohere (2011), blended learning (BL) has emerged in response to the increasing need and demand to respond to diverse students' needs, to provide engaging and meaningful learning experiences, and to optimize increasingly scarce resources. Hence it appeared that BL's scope of implementation is user inclusive. Blended learning simply refers to the combination of the traditional face-to-face approach and the use of technology in learning (Graham et al, 2012). The traditional face-to-face aspect of learning is the

Table 1. Continuum of blended learning models

Model 1	Model 2	Model 3	Model 4	Model 5
Fully online curriculum with options for face-to-face instruction.	Mostly or fully online curriculum with some time required in either the classroom or computer lab.	Mostly online curriculum with students meeting daily in the classroom or computer lab.	Classroom instruction with substantial required online components that extend beyond the classroom.	Classroom instruction that includes online resources, with limited or no requirements for students to be online.

type which most societies are familiar with as it has been around for a long time. However, the mode of delivery of this type of learning is constantly being modified to improve student understanding relative to learning outcomes. According to Sider (nd), public schools in the United States have embraced the teacher-manager model or the traditional face-to-face learning model of education for at least 200 years; where the teacher in a given classroom acts as the primary manager of conduct, assessment and instruction. These responsibilities are demanding and often limit instructional time and the ability of teachers to provide differentiated instruction for diverse groups of students. With blended learning where technology is included, a teacher could be relieved from such demanding task and therefore have the required time to focus on other pressing needs among students (e.g. students with special needs) and also to providing quality instruction.

However, the technology aspect of blended learning is fairly new and its implementation varies greatly from country to country and from school to school. This chapter is concerned with the level of technology used in teaching in selected secondary schools. At the elementary level of BL, implementation technology consists of basic computing devices (such as PCs, laptops, etc.) for the purpose of lesson delivery or teaching. At its advanced level, BL is implemented to support access to learning resources at any time and from anywhere provided the user has the required technology for accessibility.

As mentioned earlier, BL comes in different implementations and the models for this variation are shown in Table 1. Table 1 provides a summary of the continuum of models used in schools throughout the United States, giving educators a working picture of the many ways in which online learning blends with and supports traditional instruction (Blackboard, 2009).

Model 1 and 5 are both extremes. Model 1 is a full implementation of BL while Model 5 is a minor implementation. Our survey data is provided to classify selected secondary schools in Cameroon and Nigeria within these models. However a full BL system may not necessarily be accessible and usable for certain user groups in society. This infers that BL should be inclusive.

Inclusive ICT

Inclusive ICT, whether in the form of hardware (e.g., keyboards, mouse, etc), software (e.g., word processors, virtual learning environment, etc) or management, (e.g., ICT policies) is one which incorporates the needs of various identified user groups. Such user groups include people with disability, people without disability, various generations of learners, etc. When inclusive ICT is used only within a given context (user group), then its meaning is confined within that context. Inclusive ICT in education refers to the accessibility and usability of ICT infrastructures within a given educational setup.

In the context of secondary/high schools, the quest for inclusive ICT is a quest for the following.

- Existence of students with disability.
- Existence of staffs with disability.

- Availability of ICT facilities (or infrastructures).
- Use of ICT in teaching.
- Accessibility to ICT facilities.
- Usability of the ICT facilities.

To successfully implement inclusive ICT in schools, teachers specialized in disability will need to be trained and recruited. Teacher training curriculum needs to include specialized training in disability support in an academic role such that specific qualified teachers could specialize in inclusive education and act as support to students, providing guidance through the learning process. Once these specialized teachers graduate and take up their role, it is also important for institutions to consider having a support unit for students and teachers with disability. By doing this, disabled students will be equipped to compete in the job market when they graduate.

The existence of people with disability will reveal whether existing systems are accessible and usable to them. One factor which could affect inclusive ICT is the digital divide. For instance the needs of people with disabilities may not be considered if the ICT skills or awareness of decision makers (management) is low, or there is very limited number of infrastructures. Disability and the digital divide in Africa are related directly to this chapter and will thus be considered.

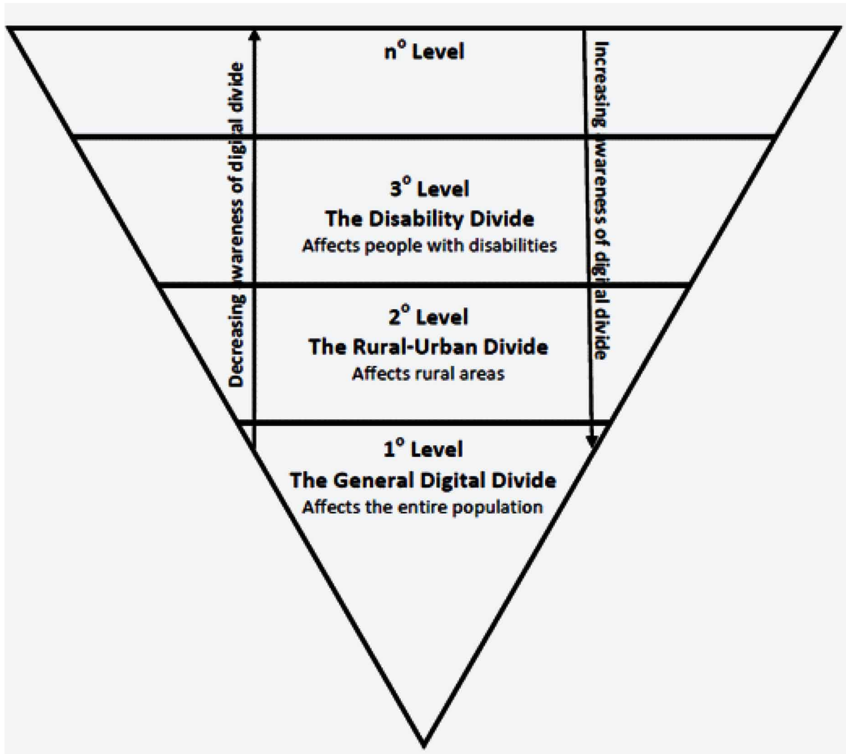
The Digital Divide in Sub-Saharan Africa

The term digital divide has several variants of definition and metamorphoses relative to contemporary technology. Initial definitions concentrated on the possession of computers, and later the inclusion of access to Internet which also categorizes whether the access is broadband or not. Mehra, Merkel & Bishop (2004) in their own terms defined digital divide as the troubling gap between those who use computers and the Internet and those who do not. In our context we define digital divide as the gap existing between people or groups with effective use and access to ICT and those with ineffective use, limited access or no access at all. The term 'groups' refer to organizations, governments, schools, etc, while the term 'effective use' means that having the state of the art infrastructure is not sufficient, but maximizing the use through appropriate skills is necessary. The term 'access,' refers to the reach, affordability or possession of the appropriate infrastructure. Access to ICT will also include various sub groups of users including people with disabilities.

In a specific country, the digital divide could have different levels (1st…nth level), beginning with the "general digital divide" which affects the entire population as shown in Figure 1. This is the case where in a particular country for instance there could be a general low access to ICT. At a secondary level, this divide then extends to a divide between the urban and rural areas known as the "rural-urban divide." When a country has moved from the general digital divide and has closed the gap through improved accessibility of ICT, the secondary level could become more evident in the case where urban areas are prioritized. This is a common case in many sub-Saharan African countries where schools in urban areas have more access to ICT equipment than those in rural areas due to poor or no access to electricity Aduwa-Ogiegbaen and Iyamu (2005). The tertiary level of the digital divide involves the "disability divide" where people with disabilities have less access to ICT than those without disabilities. This is particularly evident in circumstances where people with disabilities have been given ICT but without any assistive technologies to help compensate for their inability to use the equipment due to specific impairments. People with visual impairments for instance might need to use screen readers to access Websites, without which they might be excluded from accessing the information on the Web.

As could be seen from Figure 1, the divide widens with decreasing awareness of such divide by the population and vice versa. At the primary

Figure 1. Various levels of the digital divide



level for instance, more people are aware of the lack of technology as it affects everyone and hence action is taken to procure the appropriate technology, thus reducing the gap. However, at the tertiary level which affects mostly people with disabilities, the digital divide is wider given the fewer number of people with disabilities in the society, leading to a neglect of their needs to use technology given that it does not affect the majority of the population. The figure allows for the inclusion of other levels of digital divide, which of course gets wider.

With today's technological advancement, many services are increasingly being offered online and it is becoming more difficult for people to carry out daily activities without interfacing with computing devices and the Internet. Such is the case with blended learning. The World Wide Web (WWW) segment of the Internet is a huge repository of educational resources that can enhance learning. According to Aduwa-Ogiegbaen and Iyamu (2005), modern life is dominated by technology and there is universal recognition of the need to use ICT in education as we enter the era of globalization where the free flow of information via satellite and the Internet hold sway in global information dissemination of knowledge. Advertisement for jobs and products, purchases, meetings, learning, etc are some of the numerous activities dominating the Internet. This simply means that an individual or group will find it hard to compete against others without effective access and use of the Internet. Our definition is thus an embodiment of the components contributing to the digital divide. Mehra, Merkel and Bishop (2004) identified four major components contributing to the digital divide: socioeconomic status, income, educational level and race. From our definition, the term digital divide is context specific, and two targets referred to as individuals and groups are identified. The components contributing to the digital divide are dependent on the context being referenced.

Individuals form the nucleus of any given society and when empowered, the society benefits from it through efficient delivery of services. Digital empowerment will result in high productivity and hence economic growth as the Internet is expected to have a positive impact in this area, and its adoption rate will determine the extent of this impact (Huang, Keser, Leland & Shachat, 2003). Closing the individual gap will empower people to admit and embrace new blended learning technologies without fear and thus the confidence to network with peers worldwide. Dijk and Hacker (2003) identified four general barriers: lack of elementary digital experience, no possession of computers and network connections, lack of digital skills, and lack of significant usage opportunities. We also identify with these barriers, especially the first three which fall in the context of individuals. Elementary digital experience is the expected minimal experience in ICT that will jump-start an individual into embracing ICT as a tool. Some of the barriers to obtaining such experience include lack of interest to embracing ICT, unattractiveness of technology and lack of personal computers.

Groups play an important role in promoting the economy of a nation and the world at large. Groups may likely interact with each other and where there is gap in digital divide, transactions become difficult, and in the same manner an individual to group transaction also suffers. Some of the barriers of the digital divide as it relates to a group are:

- **Lack of Policy that Enforces Effective Use of ICT in Schools:** Policy will force educational institutions to adopt inclusive blended learning technologies.
- **Lack of ICT Training:** Training imparts the knowledge required to developing skills for the effective use of ICT.
- **Non Sustainability of Training through Refresher Courses:** It is necessary to constantly update skills.
- **Poor Individual ICT Skills:** It is likely that individual ICT skills in an educational institution will differ as a result of individual difference, educational level, or both. This creates a gap within and among groups.

Disability and the Digital Divide in Sub-Saharan Africa

For several years now, sub-Saharan Africa has been the continent with the smallest percentage of access to ICT. Although this gap is closing, it will still take an ample amount of time to significantly close the gap. A number of advances in closing the digital gap include the following. In rural Togo, a farmer can now obtain real-time market prices from the capital Lomé through cellular phone, while in Accra, Ghana, an entrepreneur who experienced no dial tone on his landline in the past, now has connection to the Internet (Mutume, 2009). In Rwanda, there is wireless Internet access service throughout the country (Mwangi, 2006), and Africa has the highest rate of mobile phone subscription (Momo, 2005). These are few scenarios in Africa that suggest the gap has the potential of closing at a reasonable rate. One of Africa's problems in reducing the gap is the erratic supply of electricity. This also makes ICT access and ownership cost relatively expensive as one has to rely on petrol/diesel power generators.

Despite these hindrances, Africans seem to be putting much effort into gradually closing the digital gap. Unfortunately, as the gap appears to gradually reduce, certain members of the African society are given little or no consideration on access to ICT. This class of people are those who have some form of disability or impairment. Disability is defined as the physical or mental impairment which has a substantial and long-term effect on a person's ability to carry out normal day-to-day activities (Equality Commission for Northern Ireland, 2007). The mental aspect of disability is what is mostly referred to as "learning disability." Different models of disability exist, including mental and social. Disability as a social problem needs to be eradicated by societal change (Goodley, 2001). The societal attitude and treatment of disabled people need to take a positive course. In the United Kingdom for instance, there is legislation in place that protects disabled people and prevents disability discrimination; the Equality Act 2010 (DirectGov, 2010). Where such legislation is lacking, disabled people are left without protection.

It is evident in most countries in sub-Saharan Africa that emphasis is not laid on the needs of people with disabilities. From the inaccessible architectural structures to the lack of disability legislation, it could be seen that disabled people are being left behind in a competitive society where each one fights for survival. As most of these countries are poor, the focus of most governments has been towards poverty alleviation, but this has often been hampered by corruption. However, technology could be a powerful tool in fighting poverty and promoting inclusion. Education is also a good tool in fighting corruption and discrimination and blended learning technologies will facilitate such education.

Within the educational setting, knowledge on disability inclusion needs to be inculcated and the virtual learning environment is a good platform for such knowledge to be transmitted. However, Tompsett (2008) reveals that research still needs to be done to include people with disabilities in education as the current learning environments are sometimes incompatible with assistive technologies. Identifying the reasons why disabled people in Africa are left out of access to ICT is a step towards addressing inclusive ICT access in education for people with disabilities in Africa. These reasons are briefly discussed below.

Absence of Legislation: The absence of legislation in place to promote the civil rights for disabled people and to protect them from discrimination is a major reason why they have little or no place in African society. On a positive note, a number of countries in Africa have started passing disability legislation to promote inclusion of disabled people. Whilst in South Africa, the Promotion of Equality and Prevention of Unfair Discrimination Act (PEPUDA) was promulgated in 2000, Ghana only passed its disability bill to discourage discrimination and promote inclusion of disabled or physically challenged people in 2006. Recently, Nigeria's Senate passed the Discrimination Against Persons with Disabilities Bill (Ogala, 2009). Nevertheless, whilst some countries in Africa have considered this legislation, many more countries have not yet done this. Therefore, the concern of discrimination against people with disabilities will continue.

Superstitious Belief: Disability could result from accident, disease, or from birth. The ideology that nothing happens naturally still exists among some Africans and this is a set-back in the acceptance of disabled people. For instance, disability from birth may be viewed by some as a repercussion of iniquity that existed somewhere within the family lineage. Without societal acceptance of disabled people, there will be reluctance in providing them access to ICT. The societal change in attitude towards people with disability is vital in the sense that disabled people in Africa will begin to see themselves not as a burden but productive members of the society.

Ability Perception: There is a common belief in Africa that disabled people may not be able to perform well in workplaces, hence the notion of "no ability in disability." In Cameroon for instance, a ministerial decree prohibited some disabled people from applying for a place in a teacher training college (Opio, 2008). Thus, the government that should pass legislation and encourage the society to accept disabled people, appear to be directly and publicly discriminating against them. If Africans begin to see that there is ability in disability, then the provision of tools and accessible technologies necessary for them to carry-out functions at work will begin to be a reality and a stepping stone to disabled people reaching their full potential.

State of Blended Learning in Sub-Saharan Africa

Although blended learning is rapidly being adopted in Sub-Saharan Africa, many implementations or studies are not being documented. Much of the literature that exists online is for blended learning in South Africa. This study will thus contribute to literature on blended learning in West Africa by looking at Cameroon and Nigeria. A study on blended learning in Nigerian secondary schools has shown the benefits of blended learning over traditional approaches. Aladejana (2008) found a significant difference in learner performance when blended learning was used, compared to traditional learning. In Cameroon, the incorporation of computers and the Internet in learning in some secondary schools has been a significant factor in encouraging enrolment in secondary schools (Nganji, Kwemain & Taku, 2010). The government of Cameroon and some non-governmental organizations are involved in promoting the use of ICTs in secondary schools although the projects have not yet progressed to the adoption of virtual learning environments where courses could be uploaded for students to study in their own time.

Similar projects are widespread in sub-Saharan Africa where students are introduced to computers in a school environment and have gone a long way to help reduce the digital gap. This could be considered the building blocks for implementing blended learning as the basic infrastructures are being provided. What remains therefore is to drive this vision forward through a full implementation of blended learning with an online environment customized for each school and including the needs of students with various disabilities.

Blended learning at the undergraduate level in most South African higher education institutions involves online learning with common Learning Management Systems (LMS) such as Blackboard and Moodle (Nel, 2010). The benefits of blended learning in sub-Saharan Africa is not only limited to classrooms but could be utilized by other non-educational institutions. In educational institutions however, blended learning does not only benefit students but teachers as well. For instance, blended learning has been employed for the professional development of teachers in Botswana (Boitshwarelo, 2009).

Although there is some progress made in adopting and implementing blended learning in Africa, it is sad to say that blended learning in this part of the world has bypassed students with disabilities and focused on students and teachers without disability. The lack of adequate financial resources, the struggle to bridge the digital divide and general negligent attitude of the population towards people with disabilities amongst other factors could account for this setback.

It is worth mentioning that the case of implementing ICTs in schools in Cameroon has shown that enrolment increases in schools adopting ICTs. The main reason is that most students want to acquire technological skills while at school so that upon graduation, they will be employable as most employers will certainly need employees with technological skills rather than spending much money on training them to acquire these skills after they have been employed. Also, ICT implementation in schools would cost the students less money in acquiring the necessary skills compared to enrolling in a computer training institute after graduation. Whilst this is economically viable, the advantage in implementing ICTs and blended learning in secondary schools is also that it enables students to reach their full potential. Computers could serve as assistive technologies for some students with disabilities. The use of Word processing applications for formatting text and correcting spelling is a great assistive tool which could also help students in their spellings. When blended learning makes use of additional assistive technologies such as screen magnifiers, screen readers, etc, it gets even better as it facilitates learning and helps not only students, but teachers reach their full potential. Disability is not only restricted to students, so, staff with disabilities will also need to be considered when thinking of implementing blended learning.

BLENDED LEARNING IN CAMEROON AND NIGERIA

The study of BL in Cameroon and Nigeria was carried out through the use of an online survey questionnaire. A survey on disability awareness with focus on ICT accessibility and the availability and accessibility of learning resources was made available to secondary/high schools in Cameroon and Nigeria from 2010 to 2012. The principals of different secondary/high schools were solicited by email, for participation of their staff and students in the survey while volunteers at the target countries assisted in the campaign for participation. The survey questionnaire targeted two types of groups each with a separate questionnaire. These groups were *students* and *staff*. In total, students and staff from 12 schools located in urban (8) and rural (4) cities participated in the survey.

The perception of disability and blended learning may depend on its definition or description. Therefore in our survey, we simplified the description of disability and blended learning to the participants as follows.

"Disability refers to some physical or mental impairment to an individual which prevents them from carrying out their normal activities. Examples include blindness or partial sight, deafness or difficulties in hearing, mobility difficulties (e.g., 'lameness'), epilepsy, dyslexia (known by some as 'slow learners'), speech impairments (e.g., dumbness, stuttering, etc), mental health difficulties, etc."

"Blended learning is a form of learning where a teacher would physically be in the presence of students teaching and that necessary resources for the class is made available and accessible at anytime to students in electronic form. The resources could be audiovisual format of the teaching, notes, forums, etc."

Results and Discussions

The results are presented in two categories. First, students' responses are presented, followed by an analysis of the results. Second, staff responses are presented also followed by an analysis of the results.

Student Response

Among a total of 433 students who responded, 34.3% were in schools located in urban cities, while 65.7% are in rural cities. However, it would be premature to say that location is indicative of the results which follow in Table 2 since this is out of the scope of this chapter. Infrastructure could be independent of location. Most of the responses require a closed form of response which was restricted to "yes" and "no."

The results in Table 2 suggest most secondary/high schools have a computer laboratory, however, only a few use it in teaching. A vast majority of students acknowledge the existence of students with disability among them. Although the data indicates students with disabilities are able to use computers; they use it without assistive technologies and other accessibility facilities. This may suggest that they struggle in the use of computers. The vast majority of students believe that assistive technologies and accessibility facilities will improve the performance of students with disabilities. The data also reveals most of the selected schools do not have Internet access, and of those that do, many of them have a Website. However, none have learning resources available on their respective Websites and very few schools have

Table 2. Students' response

Indicator	Responses	
	Yes	No
Existence of a computer laboratory.	416	17
School has students with disability.	332	101
Use of computer in teaching.	119	314
School has Internet access.	55	378
School has a Website.	149	284
Teaching resources available in electronic form.	43	390
Teaching resources available on school's Website.	0	433
Do teaching resources in electronic form target people with disabilities.	0	433
Disabled students able to use computer.	310	123
Availability of ICT assistive technologies and accessibility facilities disabled students.	59	374
Disability facilities can improve the performance of students with disability.	416	17
School has disability officer (staff) who is in charge of disabled students.	54	379
School management strives to meet the needs of disabled students.	92	341

learning resources in electronic form. There is no virtual learning environment dedicated for teaching and learning, thus full adoption of blended learning is still a dream. The learning resources if available in electronic form exclude the needs of people with disability as they are not accessible. Additionally, most of the schools involved in the survey do not have a disability officer (a staff member who is in charge of disability issues) and the school is not striving to improve the standards of students with disability. The presence of a disability officer and a unit to cater for the needs of disabled students in most schools is a necessity if schools would help disabled students reach their full potential as earlier discussed.

Staff Response

Among a total of 28 staff members who responded, 37.0% of them are from schools that are located in urban cities while 63.0% are in rural cities. The categories of staffs with their respective participation in the survey are shown in Table 3. The majority of the participants were teachers.

Staff were also asked to report on the number of students with disabilities in their institution. The percentage numbers in series-intervals of students with disability was reported by staff members. The interval groups set for the survey ranged from 1-10, 11-20 .. 90-100, >100. However the highest range obtained in the entire survey was 51-60, specifically in staff response. This range limit is therefore adopted for both responses (staff and students). The survey revealed that the vast majority of schools have minimum range of about 1 – 10 students with disability. An evaluation of the statistical mean *m* for the survey's source data of the survey using equation 1 gives $m = 11.28767123$. This implies that for each of the schools which participated in the survey there are approximately 11 students with disability. Most staff reported that there are 1 to 10 students with disability in their schools while the least reported that 21 – 30 students have disability. Therefore the use of the *mean* gives an indication of the number of students with disability in each of the schools.

$$m = \frac{\sum_{i=1}^{n}\left(\left(\frac{L_i + U_i}{2}\right) * f_i\right)}{\sum_{i=1}^{n} f_i} \quad (1)$$

where: m is the mean

n is the number of ranges (or intervals)

f_i is the frequency of the *i-th* range

L_i is the lower limit of the *i-th* range

U_i is the upper limit of the *i-th* range

Table 3. Staff categories with number of participants

Staff Category	Number of Staff
Principal	1
Vice principal	1
Bursar	1
Discipline master	2
P.T.A. staff	2
Teacher	21

The survey also revealed that there is considerable numbers of staffs who are with disability and only 51% are without disability. The statistical mean *m* from the survey's source data of the number of staff without disability and using equation 1 gives $m = 2.951388889$. This means that in every school there are approximately 3 staffs with disability.

Table 4 shows other responses obtained from the staff members. As in the case of students' response, the results in Table 4 suggest that most of the schools involved in the survey do not have a disability officer and have no ICT assistive technologies and other accessibility facilities for individuals (staff and students) with disabilities. It also suggests only few schools use computers in teaching and that where learning resources exist in electronic form it does not target students with disability. Interestingly, most staff are aware that anyone can become disabled at any given time. The vast majority of staff involved in the survey believe that ICT assistive technologies and other accessibility facilities will improve the performance of students and staff with disabilities.

Both results from staff and students point to the fact that educational institutions have staff and students with disabilities and hence these institutions need to act towards including them in teaching and learning through the adoption and implementation of inclusive technology. The adoption of assistive technology in BL will not only benefit students but will also be beneficial to teachers with disabilities. If secondary schools expect an increase in performance through BL and hence a greater chance of attracting more students, they must then focus on including everyone. Inclusion is a step towards helping each staff and student to reach their full potential in education.

Table 4. Other responses from staff

Indicator	Staff Response	
	Yes	No
School has disability officer (staff) who is in charge of disabled student.	4	24
Can non-physically challenged be physically challenged as a result of certain circumstance that may befall them?	26	2
Availability of assistive ICT technologies and other accessibility facilities for students with disabilities.	3	25
Learning resources if available in electronic form is inclusive of students with disabilities.	0	28
Disability facilities can improve the performance of students with disabilities.	27	1
Disability facilities can improve the performance of staff with disabilities.	27	1
Use of computer in teaching.	11	17

Challenges

Given the results of Table 2 and Table 4, it is observable that none of the secondary/high schools considered matches any of the continuums of BL models. Hence challenges to BL in the schools considered are Internet access and the inclusion of online resources. In addition to these are student personalization of online materials and hardware assistive technologies. When users have personalized profile then this would mean that when they log into the system, the system will load the specific configuration that matches or addresses their disability needs.

Most secondary schools also face the challenges of procuring the technology needed for inclusive BL as the economies in most of these areas are resource poor and institutions are not financially equipped to get the state of the art technologies for higher quality education. The lack of disability experts in schools also means the needs of disabled people such as assistive technology, wheel chairs, assistive furniture, etc are not considered.

Government policy in most of the countries is not favorable towards inclusion as other things are prioritized. If the Ministry of Education could emphasize the need for inclusion in all aspects of education, including laying down appropriate measures for its implementation, then the situation would change drastically in a positive direction.

Recommendations for Adopting Inclusive Blended Learning

In order for institutions of learning to successfully implement BL, this should be inclusive of all learners regardless of their disabilities. To accomplish this, institutions of learning could do the following:

- Appoint a disability officer to oversee the assessment of the students in order to determine the type and degree of disability and match them to required assistive technology or support needs.
- Create a fully staffed student support service providing support to students with disabilities and assessing the assistive technology needs of students.
- Provide support to students in using assistive technology in blended learning and continuously assess their needs as students' needs could change over time.
- Consult with disabled students on their inherent technological needs.
- Source adequate funding for inclusive BL prior to commencing its implementation.
- Review how existing blended learning meets the needs of disabled students and staff and made appropriate and timely adjustments as required.

FUTURE RESEARCH DIRECTIONS

This chapter has only considered two countries in Sub-Saharan Africa. Therefore as an extension study in the future it would be helpful to consider other Sub-Saharan African countries. It will also be useful to investigate the statistics of students who have access to computers at home, access to mobile devices and access to Internet. This will inform the potential of blended learning implementation and target platforms. Additionally it will also be useful to carry out the study with respect to specific disabilities so that specific problems are addressed.

CONCLUSION

Although BL is increasingly being adopted in Sub-Saharan Africa, much of the implementation has not been targeted towards students with disabilities as could be seen in the type of technology being employed in schools. Most secondary schools are not equipped with assistive or adaptive technologies to accommodate the needs of students with disabilities. There is great need therefore to incorporate assistive technologies into BL to include students with various impairments. Although this could be expensive, mainly because of the needed hardware, software, amendments to buildings to allow for accessibility, furniture, etc, institutions could implement inclusive blended learning by gradually including the cost in their budget. Also, normally there should be a disability officer whose job is to cater and represent people with disability. It is important that there is someone whom people with disability can share their problems or complaints, and knowing that their voices will be heard at management meetings. This gives the student with disability a sense of belonging and boosts to their confidence. Most secondary schools in both Cameroon and Nigeria lack a disability officer who would cater for the needs of disabled students. Hence students with disability find it difficult to voice out their problems. Although the digital divide is a factor in blended learning, the significant extent to which mobile technology has been embraced in Sub-Saharan Africa could be utilized to also implement blended learning on such platforms. However, the implementation should consider using an inclusive approach. That inclusion means not leaving people with disabilities behind.

ACKNOWLEDGMENT

We thank Ms. Kfukfu Nsangong and Ms. Sandra Ozah who were the volunteers in Cameroon and Nigeria, respectively, and assisted in the campaign for survey participation.

REFERENCES

Aduwa-Ogiegbaen, S. E., & Iyamu, E. O. S. (2005). Using information and communication technology in secondary schools in Nigeria: Problems and prospects. *Journal of Educational Technology & Society*, *8*(1), 104–112.

Aladejana, F. (2008). Blended learning and improved biology teaching in the Nigerian secondary schools. In *Proceedings of the World Congress on Engineering and Computer Science (WCECS)*. San Francisco, CA: WCECS.

Blackboard. (2009). *Blended learning: Where online and face-to-face instruction intersect for 21st century teaching and learning: A K-12 leadership series*. Retrieved from http://www.blackboard.com/search.aspx?q=blended%20learning

Boitshwarelo, B. (2009). Exploring blended learning for science teacher professional development in an African context. *International Review of Research in Open and Distance Learning*, *10*(4), 1–19.

Brophy, P., & Craven, J. (2007). Web accessibility. *Library Trends*, *55*(4), 950–972. doi:10.1353/lib.2007.0029

Cohere. (2011). *Innovative practices research project*. Retrieved from http://cohere.ca/wp-content/uploads/2011/11/REPORT-ON-BLENDED-LEARNING-FINAL1.pdf

Dijk, V. J., & Hacker, K. (2003). The digital divide as a complex and dynamic phenomenon. *The Information Society*, *19*, 315–326. doi:10.1080/01972240309487

DirectGov. (2010). *The disability discrimination act (DDA)*. Retrieved from http://www.direct.gov.uk/en/DisabledPeople/RightsAndObligations/DisabilityRights/DG_4001068

Equality Commission for Northern Ireland. (2007). *Definition of disability*. Retrieved from http://www.equalityni.org/archive/pdf/DefinitionofDisability07.pdf

Goodley, D. (2001). Learning difficulties' the social model of disability and impairment: Challenging epistemologies. *Disability & Society*, *16*(2), 207–231. doi:10.1080/09687590120035816

Graham, C. R., Woodfield, W., & Harrison, J. B. (2012). A framework for institutional adoption and implementation of blended learning in higher education. *The Internet and Higher Education*. Retrieved from http://www.sciencedirect.com/science/article/pii/S1096751612000607?v=s5. ISSN 1096-7516

Heeks, R. (2009). IT and the world's 'bottom billion'. *Communications of the ACM*, *52*(4), 22–24. doi:10.1145/1498765.1498776

Huang, H., Keser, C., Leland, J., & Shachat, J. (2003). Trust, the internet and the digital divide. *IBM Systems Journal*, *42*(3), 507–518. doi:10.1147/sj.423.0507

International Telecommunication Union. (2004). *Africa's booming mobile markets: Can the growth curve continue?* Retrieved from http://www.itu.int/AFRICA2004/media/mobile.html

International Telecommunication Union. (2005). *The digital divide at a glance*. Retrieved from http://www.itu.int/wsis/tunis/newsroom/stats/

Mehra, B., Merkel, C., & Bishop, A. P. (2004). The Internet for empowerment of minority and marginalized users. *New Media & Society*, *6*, 781–802. doi:10.1177/146144804047513

Momo, C. (2005). Wireless in Africa: Insights into mobile markets. *IT Professional*, 34–38. doi:10.1109/MITP.2005.74

Mutume, G. (2009). *Africa takes on the digital divide*. Retrieved from http://www.un.org/ecosocdev/geninfo/afrec/vol17no3/173tech.htm

Mwangi, W. (2006). The social relations of e-government diffusion in developing countries: The case of Rwanda. In *Proceedings of the 2006 International Conference on Digital Government Research* (pp. 199-208). New York: ACM. doi:http://doi.acm.org/10.1145/1146598.1146658

Nel, L. (2010). Blended learning in South African undergraduate classrooms: Directives for the effective use of a learning management system. In A. Koch & P. A. van Brakel (Eds.), *Proceedings of the 12th Annual Conference on World Wide Web Applications* (pp. 21-23). Durban, South Africa: IEEE.

Nganji, J. T. (2008). ICTs and disability: Towards an inclusive implementation in Africa. In *Proceedings of the First International Conference on ICT for Africa*. Yaounde, Cameroon: IEEE.

Nganji, J. T., Kwemain, R., & Taku, C. A. (2010). Closing the digital gap in Cameroonian secondary schools with the CIAC project. *International Journal of Education and Development Using Information and Communication Technology*, *6*, 104–114.

Ogala, E. (2009). *Nigeria's senate passes disability bill*. Retrieved from http://www.234next.com/csp/cms/sites/Next/News/National/5388085-147/story.csp# Opio, A. (2008). *Decrees creating ENS Maroua prohibits disabled*. Retrieved from http://www.postnewsline.com/2008/09/decrees-creatin.html

Sheldon, A. (2001). *Disabled people and communication systems in the twenty first century*. Retrieved from http://www.leeds.ac.uk/disability-studies/archiveuk/Sheldon/thesis2viv2.pdf

Sider, D. M. (n.d.). *Blended learning in the ESL classroom*. Retrieved from http://pearson.hu/pub/angielski/uploadimages/Nyelviskola/blended-learning.pdf

Tompsett, B. C. (2008). Experiencias de ensenaza a estudiantes de informatica con discapacidad en Universidades del Reino Unido Technologias de la informacion y las comunicaciones en la autonomia personal, dependencia y accesibilidad. *Fundacion Alfredo Branas Coleccion Informatica*, *16*, 371–398.

ADDITIONAL READING

Avoseh, M. B., Fayomi, O. A., & Simeon-Fayomi, B. C. (2013). A traditional African perspective of blended learning. In E. J. Francois (Ed.), *Transcultural blended learning and teaching in postsecondary education* (pp. 15–28). Hershey, PA: IGI Global.

Ayoo, P. O., & Lubega, J. (2008). Exploring the implementation of blended learning in a developing country: A case study of Uganda. In J. Aisbett, G. Gibbon, A. Rodrigues, M. J. Kizza, R. Nath, & G. R. Renardel (Eds.), *Strengthening the role of ICT in development* (Vol. 4, pp. 133–143). Kampala: Fountain Publishers.

Littlejohn, A., & Pegler, C. (2007). *Preparing for blended e-learning: Understanding blended and online learning*. London: Routledge.

Paterson, A. (2005). Changing the 'landscape' of learning: The future of blended learning provision in newly merged South African higher education institutions. *International Journal of Education and Development using Information and Communication Technology, 1*(2), 25-41.

Prinsloo, P., & van Rooyen, A. A. (2007). Exploring a blended learning approach to improving student success in the teaching of second year accounting. *Meditari Accountancy Research*, *15*(1), 51–69. doi:10.1108/10222529200700004

Sharma, P., & Barrett, B. (2007). *Blended learning: Using technology in and beyond the language classroom*. New York: Macmillan Education.

KEY TERMS AND DEFINITIONS

Assistive Technology: Any hardware or software product or service that helps compensate for a loss in function for individuals with disability, enabling them to function independently.

Blended Learning (BL): The combination in use of technology, usually online learning and traditional methods of teaching to deliver educational programs.

Digital Divide: This is the inequality that exists between groups regarding the access to and use of Information and Communication Technology (ICT).

Disability: A physical or mental condition that affects an individual's ability to perform certain functions and hence affects equal participation in the society. Lower limbs mobility difficulty for instance affects the way an individual could move and hence may require a wheelchair for mobility.

Dyslexia: This is a specific language-based learning difficulty that manifests in difficulty in spelling, writing, and pronouncing words.

Inclusive Blended Learning (IBL): This is blended learning that includes the needs of all learners including those with disabilities and older learners with varying needs.

Information and Communication Technology (ICT): Refers to all technology that could be used for such purpose such as telecommunication devices, computers, and all electronic devices that are used for storing and manipulating information.

Learning Management System: This is a software system for administering e-learning.

Screen Reader: A software application that enables people with visual impairments to read information on an electronic device.

This work was previously published in Advancing Technology and Educational Development through Blended Learning in Emerging Economies edited by Nwachukwu Prince Ololube, pages 159-173, copyright year 2014 by Information Science Reference (an imprint of IGI Global).

Chapter 53
A Comparative Study of Business and Engineering Students' Attitude to Mobile Technologies in Distance Learning

Andreas Ahrens
Hochschule Wismar, Germany

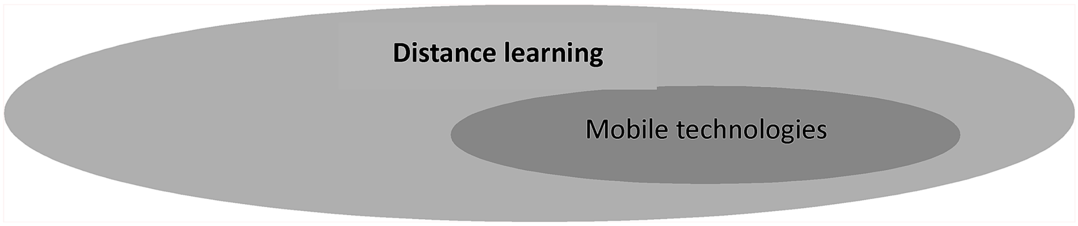
Jeļena Zaščerinska
Centre for Education and Innovation Research, Latvia

ABSTRACT

Mobile technologies are widely employed in distance learning in higher education to provide students with an opportunity to learn regardless of time and place in order to obtain a higher education degree. However, little attention has been paid to a comparative study of business and engineering students' attitudes toward mobile technologies. The aim of the chapter is to compare business and engineering students' attitudes toward mobile technologies in distance learning, underpinning elaboration of a hypothesis. The meanings of the key concepts of distance learning, blended learning, and attitude are studied. Moreover, the study demonstrates how the key concepts are related to the idea of mobile technologies and shows how the steps of the process are related: students' attitudes toward mobile technologies in distance learning→ empirical study within multicultural environments → conclusions. The results of the present research show that both business and engineering students' attitudes toward mobile technologies are positive.

DOI: 10.4018/978-1-4666-8246-7.ch053

Figure 1. The relationship between distance learning and mobile technologies



INTRODUCTION

Many universities throughout the world have already adopted or are planning to adopt mobile technologies in many of their courses as a better way to connect students with the subjects they are studying (Ferreira, Klein, Freitas & Schlemmer, 2013). Particularly, mobile technologies in distance learning of higher education have already become an indispensable tool in both university staff and students' daily life. Mobile technologies are widely employed in distance learning of higher education to provide students with an opportunity to learn regardless of time and place in order to obtain a higher education degree. In distance learning, mobile technologies allow students to access content anywhere/anytime to immerse himself/herself into that content (alone or interacting with educators or colleagues via web communication forms) and to interact with that content in ways that were not previously possible (via touch and voice recognition technologies, for instance) (Ferreira et al., 2013). Therein, mobile technologies and distance learning are closely inter-related as depicted in Figure 1.

Evaluation of the educator/student acceptance and adoption of mobile technologies has been carried out (Ferreira et al., 2013). Against this background, students' attitude to mobile technologies in distance learning plays a two-fold role within the institutionalized blended educational process of higher education as shown in Figure 2.

- On the one hand, students' attitude to mobile technologies influences students' distance learning, and,
- On the other hand, students' attitude to distance learning shapes students' application of mobile technologies.

Thus, application of mobile technologies in distance learning is driven by students' attitude to mobile technologies in distance learning.

Figure 2. The relationship between students' attitude, mobile technologies and distance learning

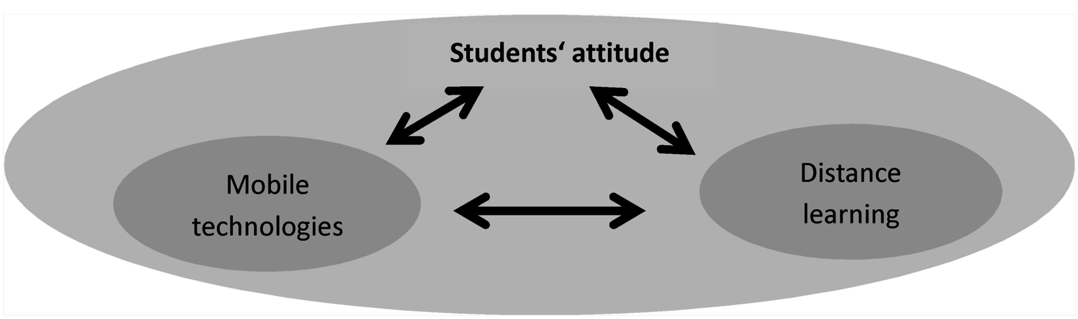
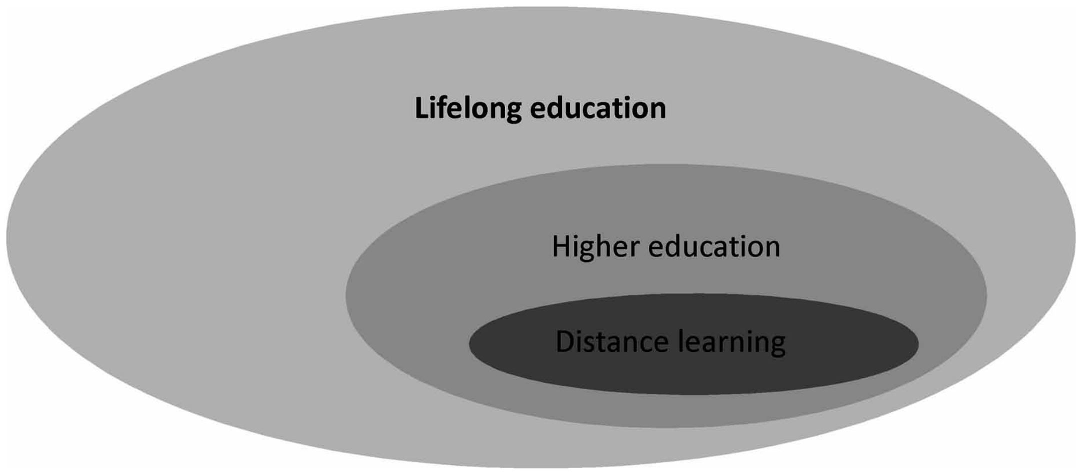


Figure 3. The relationship between lifelong education, higher education and distance learning



However, little attention has been paid to a comparative study of business and engineering students' attitude to mobile technologies in distance learning within the institutionalized blended educational process of higher education.

The aim of the paper is to compare business and engineering students' attitude to mobile technologies in distance learning within the institutionalized blended educational process of higher education underpinning elaboration of a hypothesis. The meaning of the key concepts of *distance learning, blended learning* and *attitude* is studied. Moreover, the study demonstrates how the key concepts are related to the idea of *mobile technologies* and shows how the steps of the process are related: students' attitude to mobile technologies in distance learning within the institutionalized blended educational process of higher education → empirical study within multicultural environments → conclusions.

In the present contribution, distance learning is considered as part of higher education, and higher education as part of lifelong education as demonstrated in Figure 3.

Efforts of modern research on lifelong education reveal that higher education in general and distance learning in particular is currently generated by the transition from opportunity to choose towards qualities and purposes in the context of higher education globalization and internationalization (Bassus & Zaščerinska, 2012). This shift changes the nature of higher education as well as distance learning. For the advancement of higher education as well as distance learning, social nature of change has become dominant (Bassus & Zaščerinska, 2012). Social nature of change in higher education as well as distance learning is mediated via the System-Constructivist Theory. The System-Constructivist Theory is introduced as the New or Social Constructivism Pedagogical Theory. The System-Constructivist Theory serves as the basis of the methodological background of the present contribution. The System-Constructivist Theory is formed by:

- Parsons's System Theory (Parsons, 1976) on any activity as a system,
- Luhmann's Theory (Luhmann, 1988) on communication as a system,
- The Theory of Symbolic Interactionalism (Mead, 1973),
- The Theory of Subjectivism (Groeben, 1986).

The System-Constructivist Theory implies the dialectical principle of the unity of opposites that contributes to the understanding of the relationship between external (social, social interaction, teaching, etc) and internal (individual, cognitive activity, learning, etc) perspectives as the synthesis of external and internal perspectives (Bassus & Zaščerinska, 2012). In comparison, the Constructivism Theory focuses on learning and, consequently, the internal perspective, the Social Constructivist theory – on teaching and, consequently, external perspective as well as on the balance between teaching and learning and, consequently, the balance between the external and internal perspectives (Bassus & Zaščerinska, 2012).

The System-Constructivist Theory and, consequently, the System-Constructivist Approach to learning introduced by Reich (Reich, 2005) emphasizes that human being's point of view depends on the subjective aspect:

- Everyone has his/her own system of external and internal perspectives (Ahrens & Zaščerinska, 2010) that is a complex open system (Rudzinska, 2008), and
- Experience plays the central role in the knowledge construction process (Maslo, 2007).

Therein, the subjective aspect of human being's point of view is applicable to the present research on this comparative study of business and engineering students' attitude to mobile technologies in distance learning within the institutionalized blended educational process of higher education.

The methodological background of the present contribution, namely the System-Constructivist Theory, contributes to the application of such a methodological approach of the present research as the outcome based approach. The outcome-based approach is opposed to input-based approach. The outcome-based approach is result-oriented. In comparison, input-based approach is focused on the process. Application of the methodological approach, namely the outcome based approach, to the present research determines students' attitude as an outcome of application of mobile technologies in distance learning within the institutionalized blended educational process of higher education.

The novel contribution of this paper is the definition of attitude and attitude's indicators and constructs newly identified by the contributions' authors as well as the educational model of application of mobile technologies in distance learning within the institutionalized blended educational process of higher education. The educational model of application of mobile technologies in distance learning within the institutionalized blended educational process of higher education represents the inter-connections between distance learning as part of blended learning and mobile technologies as a means of distance learning.

Our target population to generalize the educational model of students' attitude to mobile technologies in distance learning within the blended educational process of higher education is students in formal higher education.

The remaining part of this paper is organized as follows: the next section introduces theoretical framework on students' attitude to mobile technologies in distance learning within the institutionalized blended educational process of higher education. The associated results of an empirical study will be presented in the following section. Finally, some concluding remarks are provided followed by a short outlook on interesting topics for further work.

THEORETICAL FRAMEWORK

The present part of the contribution demonstrates the definitions of:

- Attitude,
- Mobile technologies,
- Distance learning, and

Figure 4. The relationship between outcome and learning outcome

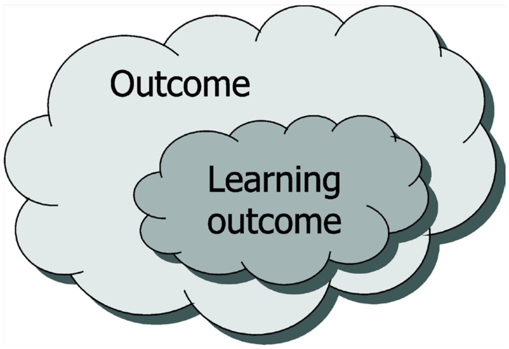
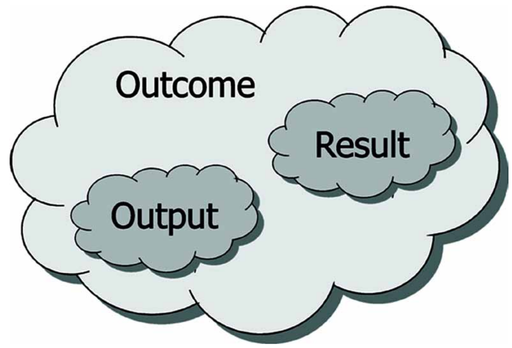


Figure 5. The relationship between outcome, result and output



- The institutionalized blended educational process of higher education.

As the outcome based approach is used as the methodological approach in the present contribution, the present research is result-oriented. Therein, the present research identifies *outcome* on the pedagogical discourse as the direct results of the instructional programme, planned in terms of student/learner growth in all areas (Vlãsceanu, Grünberg & Pârlea, 2004). Outcome includes learning outcome as demonstarted in Figure 4.

Furthermore, in many publications the terms *outcome*, *result* and *output* are used synonymously as shown in Figure 5.

The synonymous use of the terms *outcome, result* and *output* determines three criteria of learning results (Huber, 2004) as depicted in Figure 6.

Learning outcome is defined as direct results of learning, planned in terms of student growth in all areas. Criteria of learning outcome are determined as students' learning achievements, social competence and individual development.

The present contribution focuses on students' social competence as a criterion of students' learning outcome. It should be noted that the notion of social competence has been constantly changed and accompanied by a change in the originally used terms such as social competencies, communicative competence, etc (Zaščerinska, 2013). Despite the changes in the notion of social competence and its terms, social competence remains the overall concept as shown in Figure 7.

Thus, in the further text of the present contribution, the term *competence* is used. Students' attitude is part of competence as competence includes knowledge, skills and attitudes (European Commission, 2004) as shown in Figure 8.

The elements of competence, namely knowledge, skills and attitude, are inter-related. Students' negative attitude fails to promote the increase in the level of students' knowledge and skills as well as competence, in general. In contrast, students' positive attitude ensures the enrichment of the level of students' knowledge and skills as well as competence, in general.

As students' attitude is an outcome of application of mobile technologies in distance learning within the institutionalized blended educational process of higher education, application of mobile technologies in distance learning within the institutionalized blended educational process in higher education is able to enrich students' digital competence. Students' digital competence is of great importance as it serves as

- One of eight key competences outlined by the European Commission for lifelong learning (European Commission, 2004), and

Figure 6. Three criteria of learning results

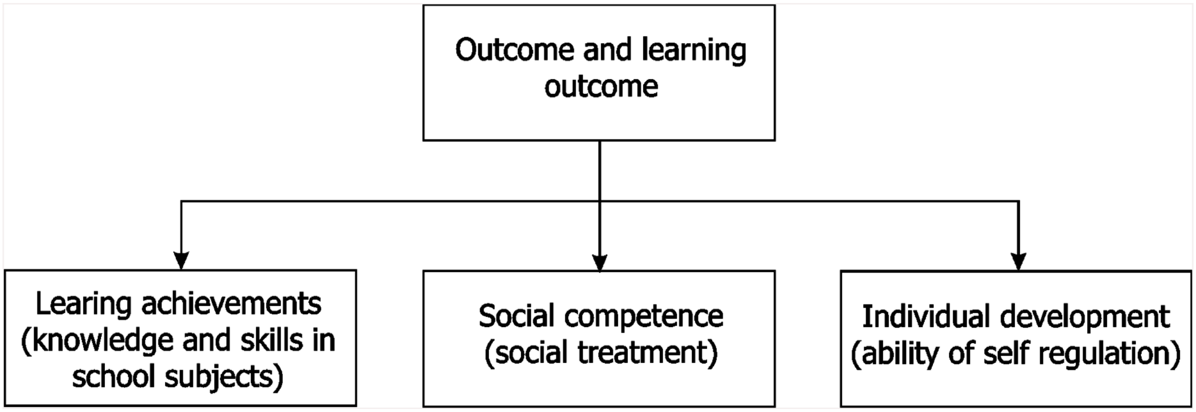


Figure 7. Inter-relationships between terms of social competence

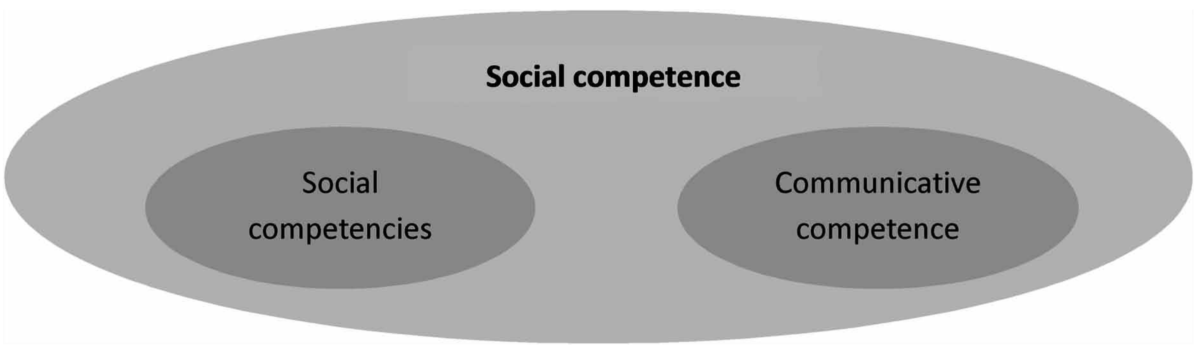
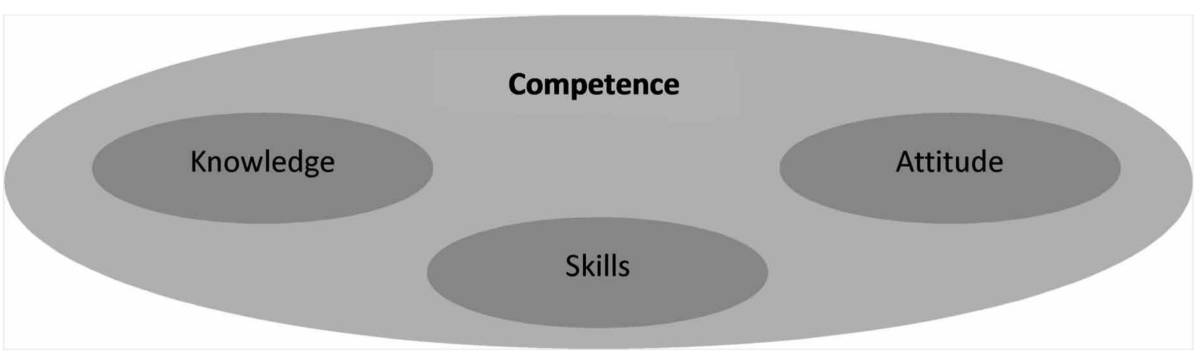


Figure 8. Elements of competence



- A condition, factor and evaluation criterion of application of mobile technologies in distance learning (Surikova, 2007).

Hence, students' attitude serves not only as an outcome but also as a criterion of application of mobile technologies in distance learning within the institutionalized blended educational process of higher education. It should be noted that criteria serve to structure, assess and evaluate while indicators determine developmental dynamics (Lasmanis, 2003; Špona & Čehlova, 2004), and constructs differentiate a variable which is not directly observable. Criteria, indicators and constructs are identified via analysis of (Špona & Čehlova, 2004).

- Definition of the research object,
- Structure of the research object, and
- Factors.

Attitude has been defined by a number of researchers. Palmer and Holt define attitude as an individual's positive or negative feelings about performing the target behavior (Palmer & Holt, 2009). This implies that learners' positive or negative feelings about their use of mobile technologies in distance learning would directly influence their behavior to use mobile technologies in distance learning. Consequently, attitude comprises positive as well as negative feelings as shown in Figure 9.

Another definition of attitude that is of the interest of the contribution's authors is attitude identified as a combination of evaluative judgements about a phenomenon (Crites, Fabrigar & Petty, 1994).

Analysis of these definitions of attitude by the contribution's authors and complementing the attitude definition formulated by Crites, Fabrigar and Petty (Crites et al., 1994) with the word *individual* leads to such a newly determined definition of student's attitude as an individual combination of evaluative judgements about a phenomenon. As well as, in comparison to attitude's positive or negative feelings determined by Palmer and Holt (Palmer & Holt, 2009), the contribution's authors differentiate attitude into positive, neutral or negative as illustrated in Figure 10.

Understanding students' attitudes towards mobile technologies in distance learning can help to determine the extent to which students utilize mobile technologies in distance learning (Ong & Lai, 2006).

Attitude differentiation is considered as levels of attitude shown in Table 1.

A positive attitude is associated with the evidence of motivated behaviour, while a negative change is linked to a less motivated behavior (Berg, 2005; Movahedzadeh, 2011).

Figure 9. Feelings of attitude

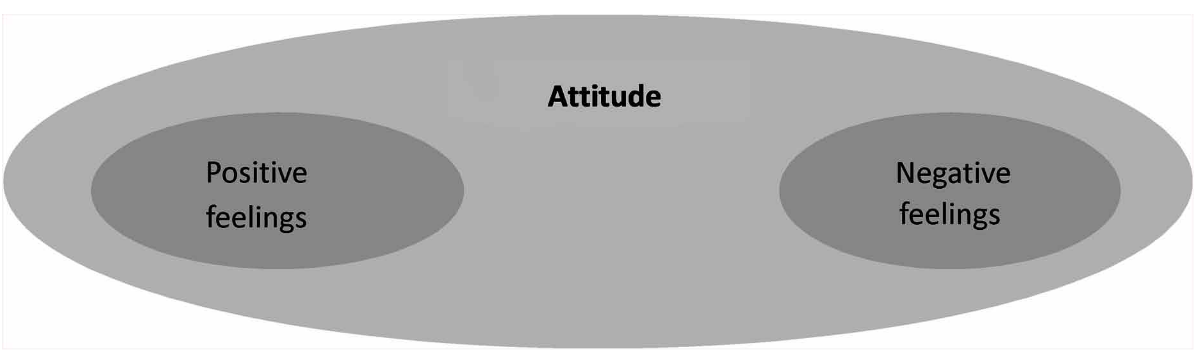


Figure 10. Differentiation of attitude

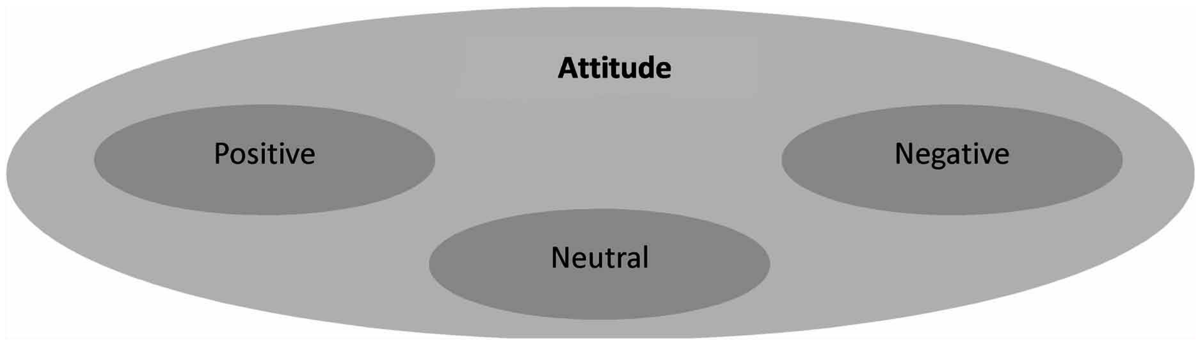
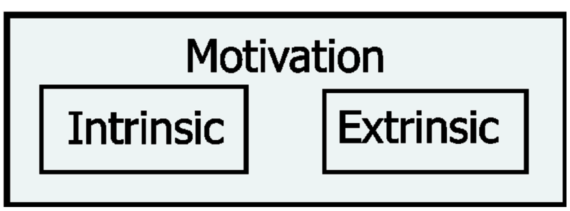


Table 1. Attitude as a criterion of application of mobile technologies in distance learning and levels of attitude

Criterion	Levels		
	Level 1	Level 2	Level 3
	Low	Optimal	High
	1	2	3
Students' attitude to mobile technologies in distance learning	Negative	Neutral	Positive

Figure 11. Components of motivation



It should be noted that motivation comprises (Harmer, 2001) as shown in Figure 11:

- Extrinsic motivation caused by a number of outside factors, and
- Intrinsic motivation that comes from the individual and is especially important for encouraging.

Intrinsic motivation is formed by internal factors of three groups (Pintrich, 1994) as demonstrated in Figure 12.

Expectancy components include (Pintrich, 1994):

- Control beliefs,
- Attributions,
- Learned helplessness, and
- Self-efficacy.

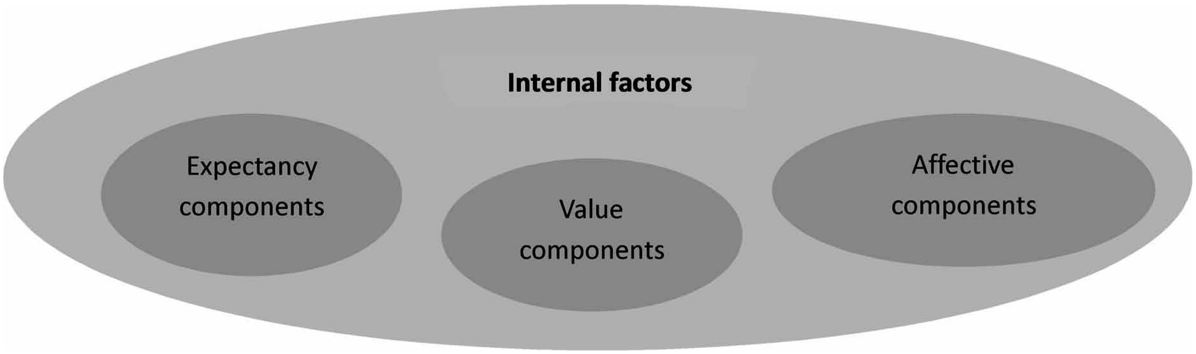
Value components comprise (Pintrich, 1994):

- Intrinsic/extrinsic goals,
- Task value, and
- Personal interest.

Affective components involve (Pintrich, 1994):

- Test anxiety,
- Self-worth, and
- Other emotions (pride, shame).

Figure 12. Components of internal factors that form intrinsic motivation



For the attitude change from negative to positive, such methods are proposed to motivate students extrinsically as:

- Educators' adapting teaching styles (Movahedzadeh, 2011) to the students' needs,
- Showing students the relevance of the learning topics to their everyday lives (Movahedzadeh, 2011),
- Creation of learning environment that helps motivate students not only to participate in distance learning but also wish to learn and enjoy learning (Movahedzadeh, 2011),
- Asking students to consider the preconceptions about subject-related topics that they bring to distance learning (Etkina & Mestre, 2004).

For the measurement of students' attitude, three domains are identified (Al-Musawi, Al-Bustan & Al-Mezel, 2013) as shown in Figure 13.

For the determination of indicators and constructs of students' attitude to mobile technologies in distance learning within the institutionalized blended educational process of higher education, the contribution's authors propose to analyse the nature of attitude. The nature of attitude is rooted in emotions. Thus, emotions and attitude are interrelated as depicted in Figure 14.

Figure 13. Domains of attitude

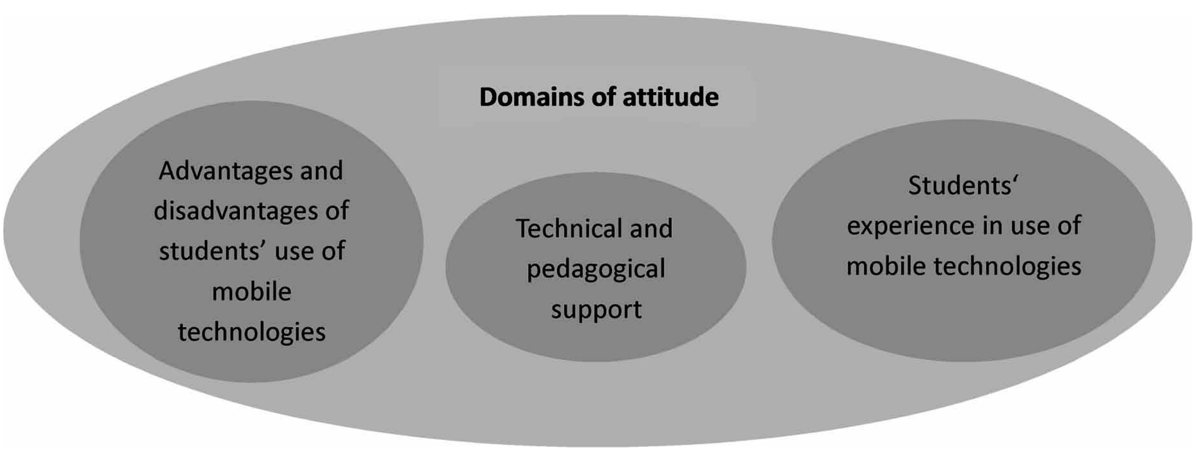
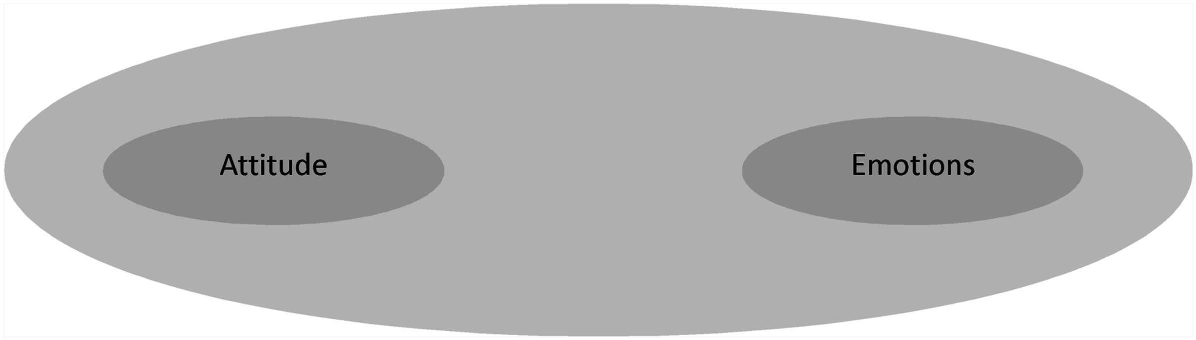


Figure 14. The relationship between attitude and emotions

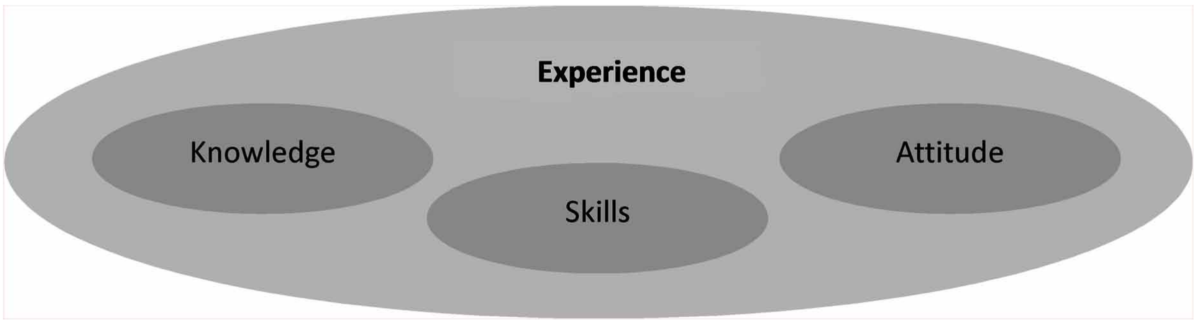


However, emotions refer to psychology, and attitude – to pedagogy. Therein, psychological processes provide the basis for pedagogical developments.

Emotions defined as nerve impulses ensure this faster reaction to a problem situation as emotions encourage for acting by use of an immediate plan of action (Kriumane, 2013). The main thing is that emotional processes and states have their own special positive development in man (Leont'ev, 1978). Therein, it is widely believed that men and women differ in their emotional responding (McRae, Ochsner, Mauss, Gabrieli & Gross, 2008). The positive development of emotional processes and states must be especially emphasized in as much as the classical conceptions of human emotions as "rudiments" coming from Darwin, consider their transformation in man as their involution, which generates a false ideal of education, leading to the requirement to "subordinate feelings to cold reason" (Leont'ev, 1978). Consequently, the relationship between human emotions and age has to be further analysed. Emotions are not only feelings, but also other elements, such as expressions in the face or the voice, physiological changes, and changes in action tendencies or action readiness (De Vierville, 2002). Emotions fulfill the functions of internal signals, internal in the sense that they do not appear directly as psychic reflection of objective activity itself (Leont'ev, 1978). The special feature of emotions identified by Leont'ev (Leont'ev, 1978) is that they reflect relationships between motives (needs) and success, or the possibility of success, of realizing the action of the subject that responds to particular motives. Therein, emotions do not reflect those relationships but reveal a direct sensory reflection of emotions, about experiencing (Leont'ev, 1978). In pedagogy, experience includes knowledge, skills and attitude (Zaščerinska, 2013) as shown in Figure 15.

Consequently, the terms *experience* and *competence* are used synonymously in pedagogy in general and in the present contribution in particular. Further on, emotions are relevant to the social activity and not to individual actions or operations that realize it (Leont'ev, 1978). As a result emotions are not subordinated to activity but appear to be its result and the "mechanism" of its movement (Leont'ev, 1978). For the cultural dimension of the process of application of mobile technologies in distance learning within the institutionalized blended educational process in higher education, it is important that the experience and expression of emotions is dependent on learned convictions or rules and, to the extent that cultures differ in the way they talk about and conceptualize emotions, how they are experienced and expressed will differ in different cultures as well (Cornelius, 1996). Consequently, taking into consideration the discipline culture, as emotional practitioners, students can make the process of application of

Figure 15. Elements of experience in pedagogy



mobile technologies in distance learning within the institutionalized blended educational process in higher education exciting or dull (Hargreaves, 2000). Moreover, students' interactions can be crucial in developing students' academic self-concept and enhancing their motivation and achievement (Komarraju, Musulkin & Bhattacharya, 2010). Thereby, on the one hand, emotion reflects the culture trait of a person (Harré, 1986), and, on the other hand, the emotions are social constructions (Averill, 1980).

Analysis of the inter-relationship between attitude and emotions contributes to the identification of attitude's indicators and constructs presented in Table 2.

Such constructs of verbal expression as a word or sentence may express a positive or negative meaning. For example, "excellent" is considered as a construct that demonstrates a positive attitude, "moderate" – neutral, and "bad" - negative.

Regarding non-verbal expression, smiling face means positive attitude, a neutral voice tone – neutral attitude, crossing one's arms – negative attitude.

Such constructs of cultural expression as applauding demonstrates positive attitude, listening without a comment – neutral, and turning one's back to a colleague – negative.

In distance learning within the institutionalized blended educational process of higher education, students' attitude is mediated via application of mobile technologies. By mobile technologies, smart phones, laptops, tablet personal computers, ultra compact computers, hybrid devices, etc. are meant as shown in Figure 16.

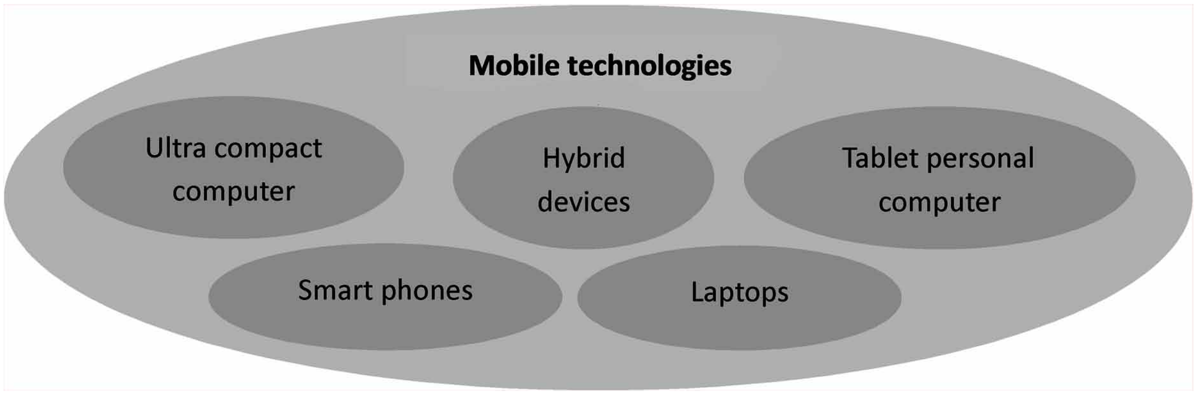
Mobile technologies are connected to the Internet via wireless access that ensures mobility in distance learning.

A couple of educational models of distance learning described by the Association to Advance Collegiate Schools of Business (AACSB) (AACSB International, 2007) exist in higher education such as:

Table 2. Attitude's indicators and constructs

Criterion	Indicators	Constructs
Students' evaluative judgements on mobile technologies in distance learning	Verbal expression	A word, sentence, etc
	Non-verbal expression	Face expression, body language, mimicry, etc
	Cultural expression	Cultural habits

Figure 16. Elements of mobile technologies



- Distance learning means any learning system where teaching behaviors are separated from learning behaviors. The learner works alone, guided by study material arranged by the instructor in a location apart from students. Students have the opportunity to communicate with an instructor with the aid of a range of media (such as text, telephone, audio, video, computing and Internet technology, etc).
- Distance learning may be combined with various forms of face-to-face meetings.
- Remote access to learning materials, databases and libraries, electronic communication, computer-connected workgroups, archived lectures, and other features of distance learning increasingly are used in campus-based instruction.

Analysis of these educational models of distance learning reveals that despite that fact that all the students' focus is put on distance learning, distance learning is not activated till teaching is provided. Thereby, distance learning is part of the institutionalized educational process in higher education as demonstrated in Figure 17.

Further on, analysis of these educational models of distance learning allows concluding that distance learning is inter-connected with teaching as well as blended teaching (archived lectures, databases, libraries, etc.). Moreover, the relationship between teaching and distance learning, in other words, the educational process of higher education have been transformed into the institutionalized blended educational process (Zaščerinska & Ahrens, 2013) that demands on the re-design of educational models of distance learning in higher education.

In the present research, educational process, training, instruction and educational act are employed synonymously. Consequently, educational process, training, instruction and educational act in formal higher education are considered as the institutionalized processes. Therein, by formal higher education, an organized higher education model (university, institution, college, academy, summer school, etc), systematic, structured and administered according to a given set of laws and norms is meant. Thereby, the institutionalized educational process has to be relevant to the university's (institution, college, academy, summer school, etc) requirements such as lecture or seminar framework. Thus, the institutionalized educational process is organized, systematized, structured and administered within formal higher education according to a given set of laws and norms. The institutionalized blended educational process includes blended teaching, blended peer-learning and blended learning as depicted in Figure 18.

Figure 17. The relationship between higher education, institutionalized educational process and distance learning

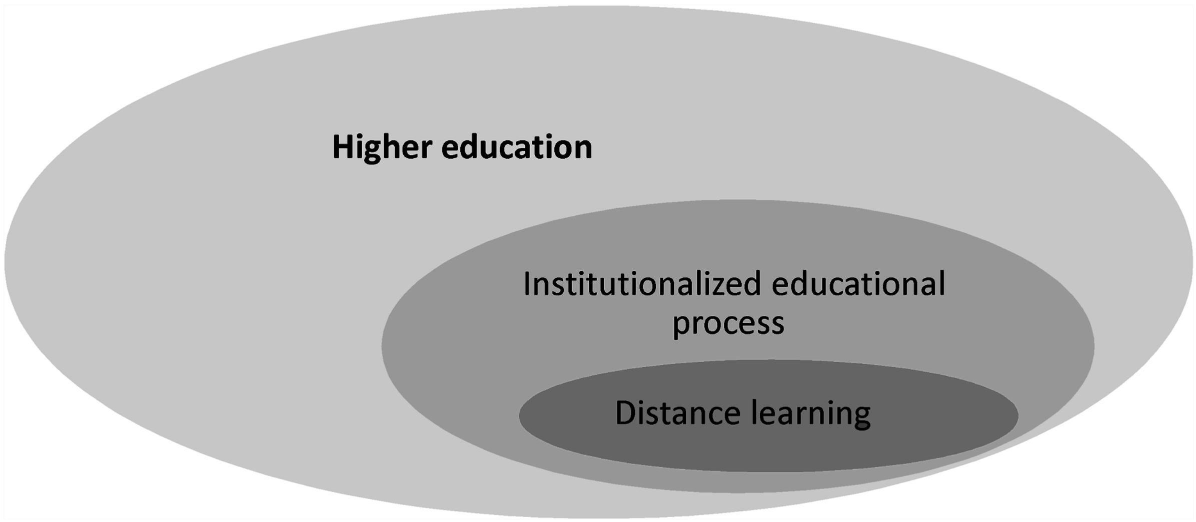
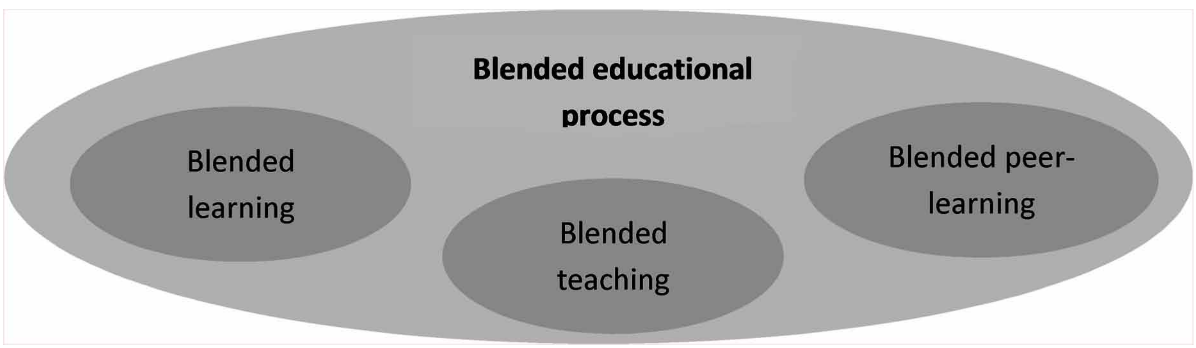


Figure 18. Elements of the institutionalized blended educational process

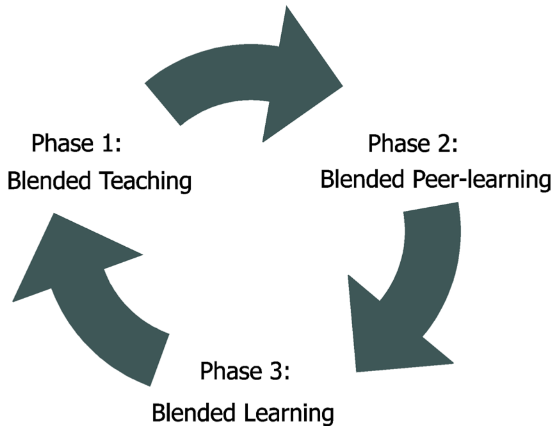


The institutionalized blended educational process proceeds as demonstrated in Figure 19.

- From blended teaching in Phase 1.
- Through blended peer-learning in Phase 2.
- To blended learning in Phase 3.

Blended teaching means a purposefully organized joint process of educator's sharing experience (knowledge, skills and attitudes) with students (Ahrens, Zaščerinska & Andreeva, 2013) via use of mobile technologies. Blended peer-learning is the sub-phase between blended teaching and blended learning in the institutionalized blended educational process. Blended peer-learning is aimed at students' interacting with each other via mobile technologies to learn something new. Therein, the blended teaching phase of the implementation of the institutionalized blended educational process is aimed at promoting students' motivation and their readiness to implement joint process. The blended peer-learning and blended learning phases of the implementation of the institutionalized blended educational process increase the level of difficulty in contents, students' autonomy, type of the institutionalized blended educational process, etc.

Figure 19. The phases of the institutionalized blended educational process



Further on, each phase of the implementation of the institutionalized blended educational process is differentiated into two sub-levels as illustrated in Table 3, thereby providing opportunities for the development of students' competence (Maslo, 2006).

These phases and sub-phases of the implementation of the institutionalized blended educational process and corresponding six levels of students' competence determine the essence and sequence of the implementation of the institutionalized blended educational process. The implementation of the institutionalized blended educational process is described as following:

Phase 1 *Blended Teaching* is aimed at a safe environment for all the students. In order to provide a safe environment, the essence of constructive social interaction and its organizational regulations are considered by both the educator and students. The present phase of the institutionalized blended educational process is organized in a frontal way involving the students to participate. Blended teaching process is under educator's guidance.

- Educator makes previous experience rational. The institutionalized blended teaching process includes choice of forms and use of resources that motivates the students.
- Peers do not participate in guidance of the institutionalized blended educational process. This phase of the institutionalized blended educational process is carried out

Table 3. Levels of implementation of the institutionalized blended educational process

Phase of the Institutionalized Blended Educational Process	Sub-Phase of the Institutionalized Blended Educational Process	Level of Student's Competence
Phase 1 Blended Teaching	Sub-Phase 1 - Beginning of Phase 1	Level 1 - very low
	Sub-Phase 2 - End of Phase 1	Level 2 - low
Phase 2 Blended Peer-Learning	Sub-Phase 1 - Beginning of Phase 2	Level 3 - critical
	Sub-Phase 2 - End of Phase 2	Level 4 - average
Phase 3 Blended Learning	Sub-Phase 1 - Beginning of Phase 3	Level 5 - optimal
	Sub-Phase 2 - End of Phase 3	Level 6 - high

qualitatively only with the help of the educator. Dependence on the educator is observed. The students study alongside but not together.
- Students create the system of the aim and objectives, search for a variety of information source and obtain techniques of information compiling. Students fulfil the present phase of the institutionalized blended educational process qualitatively only with the educator's help. Dependence on the educator is observed, not dependent on peers.

Phase 2 *Blended Peer-learning* is designed for the students' analysis of an open academic problem situation and their search for a solution. The same educational materials can be prepared for all of the group students. But these educational materials are different whereas learning styles and opportunities are different. This phase of the institutionalized blended educational process involves the students to act in peers.

- Educator functions as a resource and moderator. Educator delegates his/her duties to the students.
- Peers regulate each other: it is typical for students to regulate each other. The students study together, study from others and teach others. The present phase of the institutionalized blended educational process is under peer's guidance. Forms and methods of the institutionalized blended educational process are exchanged.
- The students fullfil the present phase of the institutionalized blended educational process qualitatively with the peers' help. Partial independence is observed. The relevant process is performed jointly with other students and with shared responsibility. It is typical for students to regulate each other.

Phase 3 *Blended Learning* emphasizes the students' self-regulation with use of assessment of the process and self-evaluation of the results.

- Educator functions as a consultant and an assistant. Educator delegates his/her duties to the students.
- Peers have consultative and advisory functions.
- Students' self-regulation is typical. The students learn independently. The students fulfil the present phase of the institutionalized blended educational process qualitatively on their own, and their independence is observed. The participants' self-regulation on the basis of the process assessment and the result of self-evaluation is used. The relevant activity is performed with a high sense of responsibility. Self-regulation is typical, and a student does not depend on peers.

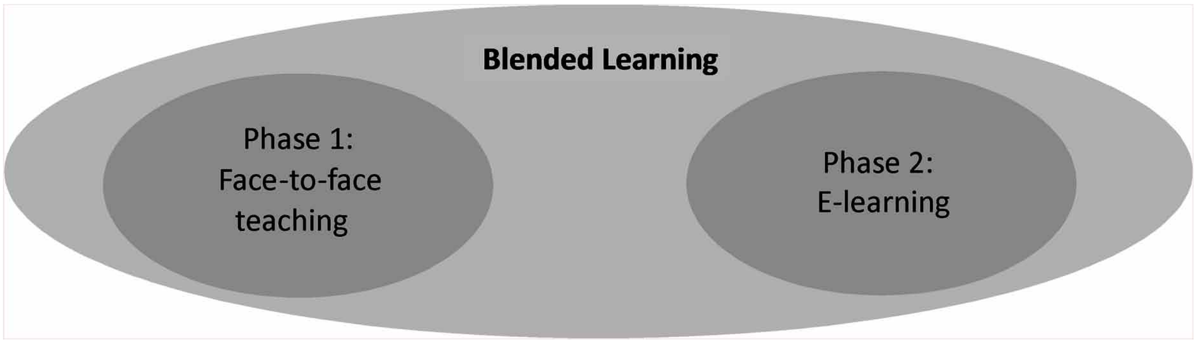
The advantages of the blended educational process and, consequently, the institutionalized blended educational process are identified as follows:

- Widening opportunities for each student in order to construct the experience in social interaction and cognitive activity, and
- Promoting opportunities for self-realization.

Many researchers define blended learning as a combination of face-to-face (traditional classroom) and online instruction (Grgurovic, 2011; Qiu & Chen, 2011). Some authors suggest that blended learning proceeds in the educational act of two main phases (Porumb, Orza, Vlaicu, Porumb & Hoza, 2011) as shown in Figure 20:

- Regular teaching in Phase 1 and
- Internet-based learning in Phase 2.

Figure 20. The educational act of blended learning



However, learning is learning, and instruction (teaching, training) is instruction. Hence, learning is neither teaching or instruction, or training. This differentiation between blended instruction and blended learning is highly significant as blended instruction (teaching, training) does not provide positive results in the improvement of students' individual experience and, consequently, competence (knowledge, skills and attitudes) till blended learning is engaged (Ahrens et al, 2013). Blended (hybrid) learning is one of the approaches that is utilized to help students for meaningful learning via information and communication technologies (Gecer & Dag, 2012). In the present research, the process of blended learning proceeds as a cycle. The cycle of the process of blended learning of three phases is proposed, namely preparation in Phase 1, implementation in Phase 2 and analysis in Phase 3 as demonstrated in Figure 21.

Phase 1 *Preparation* is aimed at planning the implementation of blended learning, choosing forms of information compilation and using resources for the implementation of blended learning. Phase 2 *Implementation* is focused on analysis of an open problem situation and search for a solution. Phase 3 *Analysis* includes evaluation of the blended learning results and elaboration of further perspectives.

Blended learning is differentiated into learning and distance learning as depicted in Figure 22.

Moreover, the terms "distance learning" and "e-learning' are used synonymously in the present contribution. Distance learning is defined as a purposefully organized or spontaneous process of students' improvement of his/her individual experience and, consequently, competence (knowledge, skills and attitudes) based on cognition via use of mobile technologies. Hence, distance learning differs from learning by use of mobile technologies in the process of cognition. As higher education is centred on research, and research is a kind learning, distance learning in higher education via use of mobile technologies as demonstrated in Figure 23 focuses on use of:

- University e-Libraries,
- Patent databases such as European Patent Office (EPO), US Patent and Trademark Office (PTO),
- Bibliographic databases such as SciVerse Scopus (SCOPUS), Thomson Reuters, Education Resources Information Center (ERIC),
- Research communities' networks such as www.researchgate.com, www.ResearcherID.com, etc.

University e-Libraries provide access to eResources such as electronic resources, i.e., online journals, indexes, databases, and books that is restricted by licenses with vendors to university's

Figure 21. The cycle of the process of blended learning

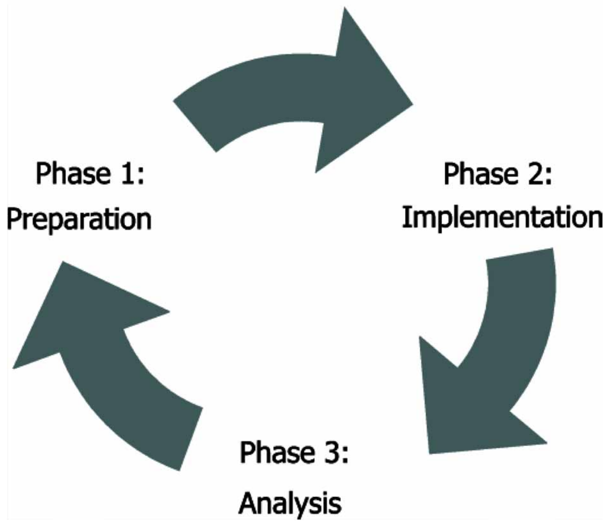


Figure 22. The relationship between blended learning, learning and distance learning

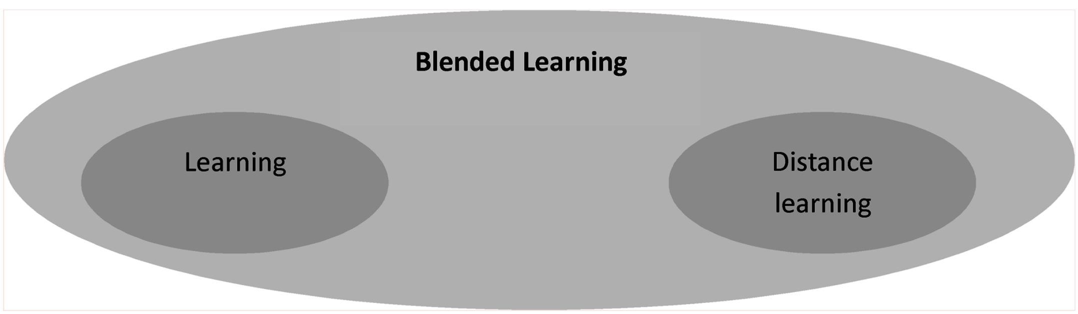
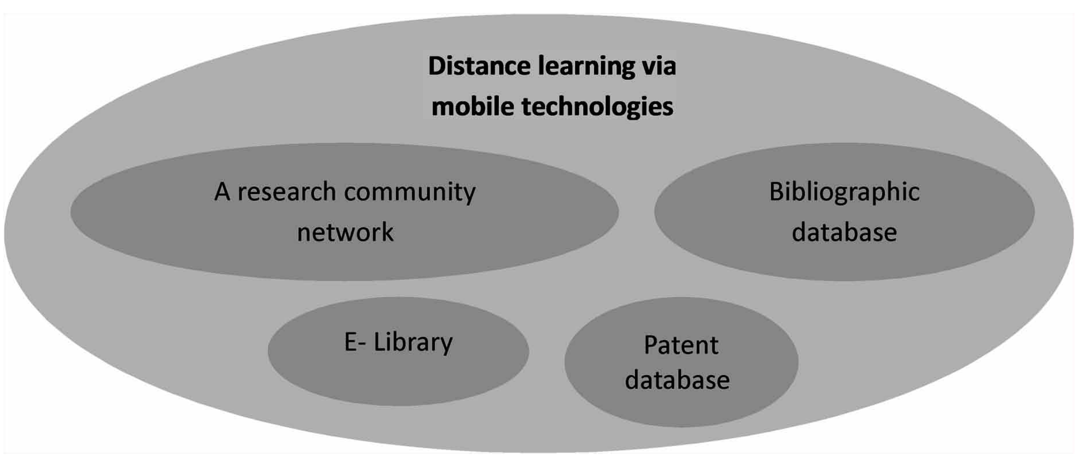


Figure 23. Distance learning via mobile technologies within the institutionalized blended educational process in higher education



students, faculty, and staff. A particular university's students, faculty, and staff have off-campus access that is only ensured to these licensed eResources.

Patent database enables users to search the full text of multiple international patent collections. Users can search published applications, granted patents and utility models mostly from 1985 to the present time. The data available includes full text patents, English machine translations and full document images. These collections are periodically updated to include additional years of coverage.

A bibliographic database is a database of bibliographic records, an organized digital collection of references to published literature, including journal and newspaper articles, conference proceedings, reports, government and legal publications, patents, books, etc. In contrast to library catalogue entries, a large proportion of the bibliographic records in bibliographic databases describe articles, conference papers, etc., rather than complete monographs, and they generally contain very rich subject descriptions in the form of keywords, subject classification terms, or abstracts (Feather & Sturges, 2003). A bibliographic database may be general in scope or cover a specific academic discipline. A significant number of bibliographic databases are still proprietary, available by licensing agreement from vendors, or directly from the indexing and abstracting services that create them (Reitz, 2004). Many bibliographic databases evolve into digital libraries, providing the full-text of the indexed contents. Others converge with non-bibliographic scholarly databases to create more complete disciplinary search engine systems, such as Chemical Abstracts or Entrez.

Research community networks in the present contribution mean use of web-based tools to discover and use research and scholarly information about people and resources (Clinical and Translational Science Award, 2012). Research community networking tools serve as knowledge management systems for the research enterprise. Research community networking tools connect institution-level/enterprise systems, national research networks, publicly available research data (e.g., grants and publications), and restricted/proprietary data by harvesting information from disparate sources into compiled expertise profiles for faculty, investigators, scholars, clinicians, community partners, and facilities. Research community networks are designed for such target groups as (Barnett & Jardines, 2012):

- Investigators
  - To discover potential collaborators,
  - More rapidly and competitively to form teams,
  - To identify targeted grant opportunities and
  - To create digital vitae,
- Administrators
  - To work with better data for institutional business intelligence,
  - To better assess performance for annual reviews,
  - To recruit new faculty and attract students,
- Researchers
  - To study networks of science teams to improve research effectiveness.

Research community networks (Barnett & Jardines, 2012) include four technology components such as:

- A controlled vocabulary (eg., the VIVO Ontology) for data interoperability,
- An architecture for data integration and sharing (Linked Open Data),
- Applications for collaboration, funding, business intelligence, or administration, and
- Rich faculty profile data of publications, grants, classes, affiliations, interests, etc.

Further on, repositories of profile data need to talk to institutional systems like faculty directories (Barnett & Jardines, 2012).

Research community networks' tools facilitate the development of new collaborations and team science to address new or existing research challenges through the rapid discovery and recommendation of researchers, expertise, and resources (Carey, 2011; Fazel-Zarandi, Devlin, Huang & Contractor, 2011).

Research community networks' tools differ from search engines such as Google in that they access information in databases and other data not limited to web pages. They also differ from social networking systems such as LinkedIn or Facebook in that they represent a compendium of data ingested from authoritative and verifiable sources rather than predominantly individually asserted information, making research community networks' tools more reliable (Gewin, 2010). Yet, research community networks' tools have sufficient flexibility to allow for profile editing. Research community networks' tools also provide resources to bolster human connector systems: they can make non-intuitive matches, they do not depend on serendipity, and they do not have a propensity to return only to previously identified collaborations/collaborators (Contractor & Monge, 2002). Research community networks' tools also generally have associated analytical capabilities that enable evaluation of collaboration and cross-disciplinary research/scholarly activity, especially over time.

Importantly, data harvested into robust research community networks' tools is accessible for broad repurposing, especially if available as linked open data (RDF triples). Thus, research community networks' tools enhance research support activities by providing:

- Data for customized,
- Up-to-date web pages,
- CV/biosketch generation, and
- Data tables for grant proposals.

A short description of a research community network such as *ResearchGate* gives a short overview of functions of a research community network: ResearchGate is a social networking site for scientists and researchers to share papers, ask and answer questions, and find collaborators (Lin, 2012). The site has been described as a mashup of "Facebook, Twitter and LinkedIn" that includes "profile pages, comments, groups, job listings, and 'like' and 'follow' buttons" (Lin, 2012). Members are encouraged to share raw data and failed experiment results as well as successes, in order to avoid repeating their peers' scientific research mistakes (Dolan, 2012). Microsoft co-founder Bill Gates is among the company's investors (Levy, 2013). ResearchGate announced in 2013 that the site had two million members.

Research community networks demonstrate such opportunities as (Barnett & Jardines, 2012):

- Support to innovative team building approaches,
- Provision of richer data for comparative institutional studies, and
- Potential for national networks of collaborative research.

Research community networks reveal the existence of such threats as (Barnett & Jardines, 2012):

- Some desired data are private (eg., award amounts) or restricted (eg., FERPA),
- Negotiation between research and administrative efforts is required, and
- Efforts threaten established networks of research influence.

For the success of research community networks, such issues are to be considered as (Barnett & Jardines, 2012):

- Leveraging existing institutional efforts for research networking and annual faculty review,

- Understanding institutional culture and policy for faculty information sharing,
- Making the technology investments to develop the required new capabilities, and
- Identifying sources of available high quality profile data (institutional, corporate, federal, Linked Open Data cloud),
- Use of existing research or administrative initiatives and workflows that manage profile data,
- Overcome of institutional cultures that may not prevent data use for research networking, and
- Bringing together (typically) multiple initiatives that manage faculty profile data in a sustainable institutional strategy.

EMPIRICAL STUDY

The present part of the contribution demonstrates:

- The design of the empirical research,
- Survey results, and
- Findings of the comparative study.

The design of the present empirical research comprised the purpose and question, sample and methodology of the present empirical study as demonstrated in Figure 24.

The question of the empirical study was as follows: are there any similarities and differences between business and engineering students' attitude to mobile technologies in distance learning?

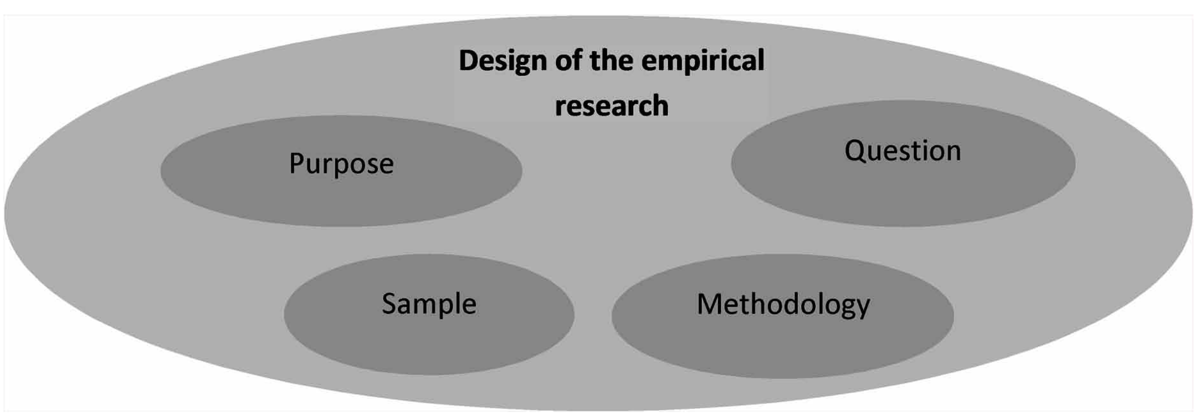
The purpose of the empirical study was to compare business and engineering students' attitude to mobile technologies in distance learning underpinning elaboration of a hypothesis.

The present empirical study involved:

- 13 second-year bachelor part-time students of the *Business Management* programme of the Northern Business School, Neumuenster, Germany, in January 2014, and
- 23 engineering students of Baltic Summer School *Technical Informatics and Information Technology* held at Vilnius Gediminas Technical University, Vilnius, Lithuania, July 20 - August 4, 2013.

It should be noted that the *Business Management* part-time programme of the Northern Business School, Neumuenster, Germany, as well as Baltic Summer School *Technical Informatics and Information Technology* held at Vilnius Gediminas Technical University, Vilnius, Lithuania, are organised as formal higher education institutions, thereby they are based on the institutionalized blended educational process of higher education.

Figure 24. Elements of the design of the present empirical research



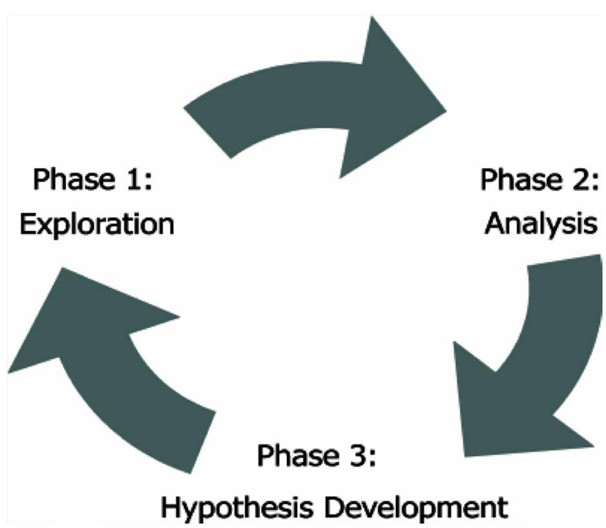
The respondents of 13 second-year bachelor part-time students of the *Business Management* programme of the Northern Business School, Neumuenster, Germany, in January 2014 included seven male and six female students. The age of students ranged between 20 and 50. All the students obtained working experience in different fields of business. Although the students studied in the same group, they represented different cultures, namely, German, Polish and Russian.

The respondents of 23 engineering students of Baltic Summer School *Technical Informatics and Information Technology* held at Vilnius Gediminas Technical University, Vilnius, Lithuania, July 20 - August 4, 2013 involved four female and 19 males. The age of the respondents differentiated from 22 to 35. All 23 students had got Bachelor Degree in different fields of engineering and computing. Working experience of the students was different, too. The students represented the cultures of Lithuania, Russia, Poland, Pakistan, France, Estonia, Serbia, Czech Republic, Finland, Ireland, Germany, Mexico, Georgia and Ethiopia.

Therefore, the sample is multicultural as the respondents with different cultural backgrounds and diverse educational approaches were chosen. Students' different cultural and educational experience emphasized the significance of each student's contribution to the analysis of their attitude to mobile technologies in distance learning within the institutionalized blended educational process of higher education. Thus, the groups' socio-cultural context (age, cultural and educational experience, mother tongue, etc.) is heterogeneous.

The interpretive paradigm was used in the empirical study. The interpretive paradigm aims to understand other cultures, from the inside through the use of ethnographic methods such as informal interviewing and participant observation, etc (Taylor & Medina, 2013). Interpretive research paradigm corresponds to the nature of humanistic pedagogy (Luka, 2008). The interpretive paradigm creates an environment for the development of any individual and helps them to develop their potential (Luka, 2008). The core of this paradigm is human experience, people's mutual everyday interaction that tends to understand the subjectivity of human experience (Luka, 2008). The paradigm is aimed at understanding people's activity, how a certain activity is exposed in a certain environment, time,

Figure 25. Methodology of the explorative research



conditions, i.e., how it is exposed in a certain socio-cultural context (Luka, 2008). Thus, the interpretive paradigm is oriented towards one's conscious activity, and it is future-oriented (Luka, 2008). Interpretive paradigm is characterized by the researcher's practical interest in the research question (Cohen, Manion & Morrison, 2003). Researcher is the interpreter.

Explorative research was used in the empirical study (Mayring, 2007). Explorative research is aimed at developing hypotheses, which can be tested for generality in following empirical studies (Mayring, 2007). The explorative methodology proceeds as demonstrated in Figure 25 (Ahrens, Bassus & Zaščerinska, 2013):

- From exploration in Phase 1.
- Through analysis in Phase 2.
- To hypothesis development in Phase 3.

Phase 1 *Exploration* is aimed at data collection. Phase 2 *Analysis* focuses on data processing, analysis and data interpretation. Phase 3 *Hypothesis Development* ensures analysis of results of the empirical study and elaboration of conclusions and hypotheses for further research.

In order to analyse the students' feedback regarding their attitude to mobile technologies in distance learning within the institutionalized blended educational process of higher education, the informal structured interviews were based on the following question: Do you use mobile technologies in distance learning? Only verbal expression of business and engineering students' attitude to mobile technologies in distance learning was taken into consideration. The evaluation scale of five levels for the question was given, namely, strongly disagree "1", disagree "2", neither disagree nor agree „3", agree "4", and strongly agree "5". The evaluation scale was transformed into the level system as illustrated in Table 4.

The business students' results of the question (students' attitude to mobile technologies in distance learning) used in the informal structured interviews are demonstrated in Figure 26 where:

- The vertical numbers show five levels to measure students' attitude to mobile technologies in distance learning, and
- The horizontal numbers present the code number of the business student who participated in the survey.

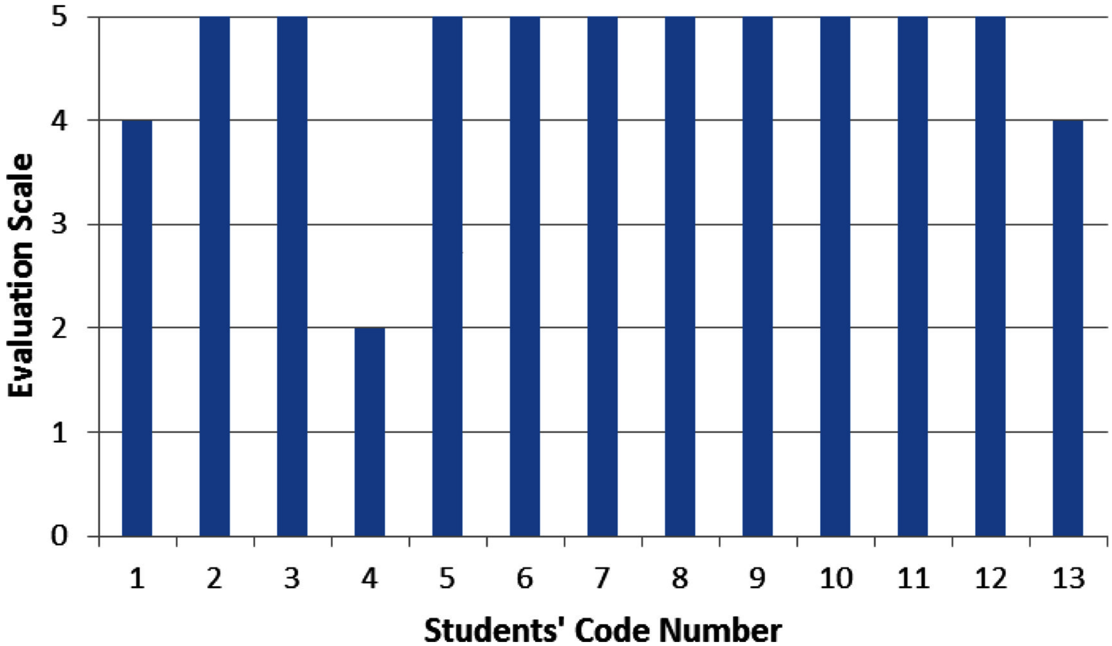
The business students' results of the question (students' attitude to mobile technologies in distance learning) reveal that:

- One business student's evaluation of his/her attitude to mobile technologies in distance learning refers to the low level,
- Two business students' evaluation of their attitude to mobile technologies in distance learning refers to the optimal level,
- 10 business students' evaluation of their attitude to mobile technologies in distance learning refers to the high level.

Table 4. Indicator and levels of students' attitude to mobile technologies in distance learning

Indicator	Levels				
	Level 1	Level 2	Level 3	Level 4	Level 5
	Very Low	Low	Average	Optimal	High
	1	2	3	4	5
Verbal expression	Strongly disagree Very negative	Disagree Negative	Neither disagree nor agree Neither negative nor positive	Agree Positive	Strongly agree Very positive

Figure 26. The business students' results of the question (students' attitude to mobile technologies in distance learning)



In comparison, the engineering students' results of the question (students' attitude to mobile technologies in distance learning) in the informal structured interviews are shown in Figure 27.

The engineering students' results of the question (students' attitude to mobile technologies in distance learning) reveal that:

- One engineering student's evaluation of his/her attitude to mobile technologies in distance learning refers to the low level,
- Three engineering students' evaluation of their attitude to mobile technologies in distance learning refers to the average level,
- Three engineering students' evaluation of their attitude to mobile technologies in distance learning refers to the optimal level,
- 16 engineering students' evaluation of their attitude to mobile technologies in distance learning refers to the high level.

The comparison of the results of the question (students' attitude to mobile technologies in distance learning) shows that the majority of both business and engineering students' evaluate their attitude to mobile technologies in distance learning to be of the high level.

The data were processed applying *Excel* software.

Frequencies of the business and engineering students' answers were determined in order to reveal students' attitude to mobile technologies in distance learning as shown in Table 5.

The comparison of the frequencies of business and engineering students' answers to the question (students' attitude to mobile technologies in distance learning) shows that the majority of both business and engineering students evaluate their attitude to mobile technologies in distance evaluates learning to be of the high level (77% and 70% respectively).

Further on, the mean results determine the high level of both business and engineering students'

Figure 27. The engineering students' results of the question (students' attitude to mobile technologies in distance learning)

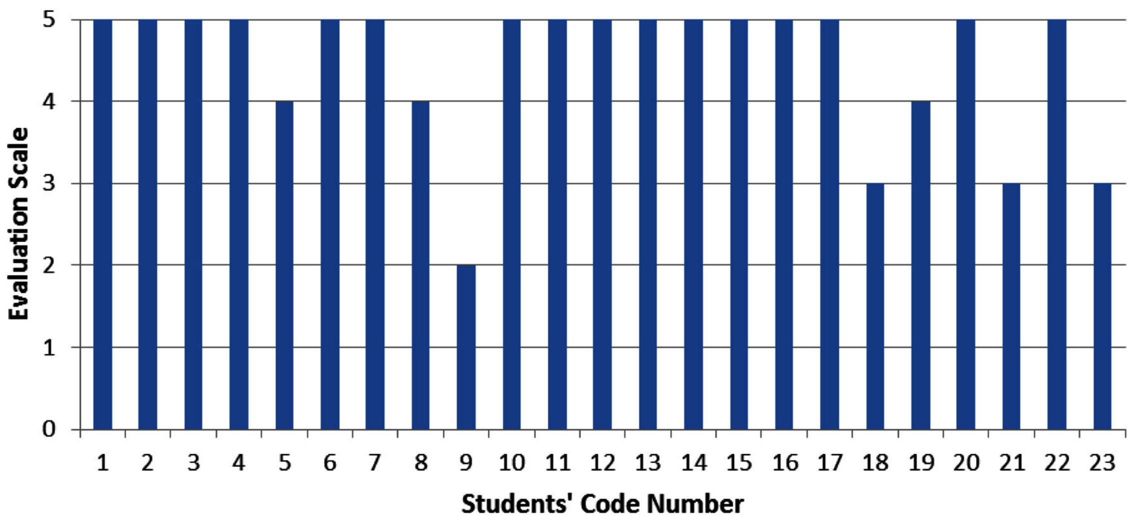


Table 5. Frequency of the students' answers

Question	Levels	Students' Group	Number of Answers	Percentage
Do you use mobile technologies in distance learning?	Very Low	business	0	0%
		engineering	0	0%
	Low	business	1	8%
		engineering	1	4%
	Average	business	0	0%
		engineering	3	13%
	Optimal	business	2	15%
		engineering	3	13%
	High	business	10	77%
		engineering	16	70%

attitude to mobile technologies in distance learning (4.6 and 4.5 respectively) as shown in Table 6.

The findings of the empirical study allow concluding that both business and engineering students demonstrated the high level of attitude to mobile technologies in distance learning (4.6 and 4.5 respectively). The summarizing content analysis (Mayring, 2004) of the data reveals that both business and engineering students' attitude to mobile technologies in distance learning within the institutionalized blended educational process of higher education is homogeneous.

CONCLUSION

The theoretical findings on the inter-relationship between students' attitude, mobile technologies and distance learning within the institutionalized blended educational process of higher education in

Table 6. Mean results

Question	Levels	Students' Group	Number of Answers	Percentage
Do you use mobile technologies in distance learning?	Very Low	business	0	Business students 4.6
		engineering	0	
	Low	business	1	
		engineering	1	
	Average	business	0	
		engineering	3	Engineering students 4.5
	Optimal	business	2	
		engineering	3	
	High	business	10	
		engineering	16	

the present research allow determining such outcome and criterion of use of mobile technologies in distance learning within the institutionalized blended educational process of higher education as students' attitude.

The findings of the present empirical study allow drawing conclusions that both business and engineering students' attitude to mobile technologies in distance learning within the institutionalized blended educational process of higher education is positive. Students' positive attitude to mobile technologies in distance learning is considered as a favourable opportunity for the increase of the level of students' knowledge and skills as well as competence, in general.

Further on, validity and reliability of the research results have been provided by involving other researchers into several stages of the conducted research. External validity has been revealed by international co-operation as following:

- Working out the present contribution in co-operation with international colleagues and
- Assessment of the present research by international colleagues on the basis of co-operation between universities,
- Participation in workshops given by the international colleagues,
- Presentations of the research at international conferences and
- Use of individual consultations given by the Western researchers.

Therein, the researchers' positive external evaluation of the research of the present contribution validates the findings of the present research.

The following hypothesis has been formulated: students' positive attitude to mobile technologies in distance learning within the institutionalized blended educational process of higher education promotes the increase of the level of students' knowledge and skills as well as competence in general if:

- A favourable blended educational (blended teaching, blended peer-learning and blended learning) environment focused on use of mobile technologies in distance learning is organized within the institutionalized blended educational process of higher education,
- Students are externally motivated to use mobile technologies in distance learning

within the institutionalized blended educational process of higher education by

- ◦ Asking students to consider the preconceptions about subject-related topics that they bring to the distance learning (Etkina & Mestre, 2004),
- ◦ Educators' adapting teaching styles (Movahedzadeh, 2011) to the student while use of mobile technologies in distance learning within the institutionalized blended educational process of higher education,
- ◦ Showing students the relevance of the learning topics to their everyday lives (Movahedzadeh, 2011),

- Students as well as educators are provided with technical support in use of mobile technologies in distance learning within the institutionalized blended educational process of higher education,
- Educators are ensured training courses focused on use of mobile technologies in distance learning within the institutionalized blended educational process of higher education.

The present research has limitations. The interconnections between students' attitude, emotions, mobile technologies, distance learning and the institutionalized blended educational process of higher education have been set. Another limitation is the empirical study conducted by involving only the business and engineering students. Therein, the results of the study cannot be representative for the whole area. Nevertheless, the results of the research, namely an outcome, indicators, constructs and levels of students' attitude to mobile technologies in distance learning within the institutionalized blended educational process of higher education, may be used as a basis of analysis of students' attitude to mobile technologies in distance learning in other institutions. If the results of other institutions had been available for analysis, different results could have been attained. There is a possibility to continue the study.

Further research tends to analyse students' attitude to mobile technologies in distance learning within the institutionalized blended educational process in higher education on the basis of the methodological background different from the methodological background of the present contribution, namely the System-Constructivist Theory introduced as the New or Social Constructivism Pedagogical Theory. Further on, application of another methodological approach different from the methodological approach of the present contribution, namely the outcome based approach, to the analysis of students' attitude to mobile technologies in distance learning within the institutionalized blended educational process in higher education is proposed. Future research intends to re-shape applications of mobile technologies in distance learning within the institutionalized blended educational process in higher education. Students' extrinsic motivation on a positive attitude to mobile technologies in distance learning has to be further investigated. The relationship between human emotions and age has to be further analysed, too. An educational model that comprises five phases of the institutionalized blended educational process in higher education to be implemented for the improvement of students' distance learning via mobile technologies is of great research interest:

- Blended teaching,
- Blended teaching with the elements of blended peer-learning,
- Blended peer-learning,
- Blended peer-learning with the elements of blended learning, and
- Blended learning.

Teaching methods of use of mobile technologies in distance learning that increase students' positive attitude to mobile technologies in distance learning are of great interest for a scientific discussion. Efficiency of use of mobile technologies in distance learning within the institutionalized blended educational process of higher education could be analysed in future. The search for relevant methods, tools and techniques for evaluation of students' attitude to mobile technologies in distance learning is proposed. Further research tends to implement empirical studies in other students' groups. Further empirical studies could be focused on the analysis of other indicators of attitude, namely, non-verbal and cultural expression. Constructs of students' attitude to mobile technologies in distance learning are to be further polished. A comparative study of students' groups of other university's programmes is to be proposed. Particularly, a study of student teachers' attitude to use of mobile technologies in distance learning is to be ensured as teachers have a two-fold role:

- In society, teachers are the agents of change and,
- In education and training, teachers are the key actors for the development of learners' use of mobile technologies in distance learning.

A comparative research as well as studies of other countries could be carried out, too.

REFERENCES

Ahrens, A., Bassus, O., & Zaščerinska, J. (2013). Engineering Students' Direct Experience in Entrepreneurship. In *Proceedings of 6th ICEBE International Conference on Engineeirng and Business Education Innovation, Entrepreneurship and Sustainability*, (pp. 93-100). Wismar, Germany: University of Wismar.

Ahrens, A., & Zaščerinska, J. (2010). Social Dimension of Web 2.0 in Student Teacher Professional Development. In *Proceedings of Association for Teacher Education in Europe Spring Conference 2010: Teacher of the 21st Century: Quality Education for Quality Teaching,* (pp. 179-186). Riga, Latvia: University of Latvia.

Ahrens, A., Zaščerinska, J., & Andreeva, N. (2013). Engineering Students' Blended Learning in Higher Education. In *Proceedings of International Scientifical Conference Society, Integration, Education of Rezekne Higher Education Institution Faculty of Education and Design Personality Socialization Research Institute in collaboration with Department of Civil Engineering and Architecture*, (vol. 1, pp. 34-44). Rēzekne, Latvia: Rēzeknes Augstskolas Izdevniecība 2013.

Al-Musawi, N., Al-Bustan, A. A., & Al-Mezel, S. M. (2013). Developing a Scale to Measure Attitudes of University Students towards E-learning. In *Proceedings of Association for Teacher Education in Europe (ATEE) Winter Conference "Learning & Teaching with Media & Technology"* (pp. 13-20). Brussels: Association for Teacher Education in Europe (ATEE).

Association to Advance Collegiate Schools of Business (AACSB) International. (2007). *Quality Issues in Distance Learning*. Tampa, FL: The Association to Advance Collegiate Schools of Business. Retrieved from http://www.aacsb.edu/publications/whitepapers/quality-issues-distance-learning.pdf

Averill, J. R. (1980). A constructivist view of emotion. *Emotion: Theory, Research and Experience, 1*, 305-339.

Barnett, W., & Jardines, J. (2012). *Technology now: Research Networking*. Washington, DC: The Clinical and Translational Science Award (CTSA) Research Networking Affinity Group. Retrieved from https://www.aamc.org/download/278098/data/technologynowresearchnetworking.pdf

Bassus, O., & Zaščerinska, J. (2012). *Innovation and Higher Education*. Berlin: Mensch & Buch.

Berg, A. (2005). Factors related to observed attitude change toward learning chemistry among university students. *Chemistry Education Research and Practice*, *6*(1), 1–18. doi:10.1039/b4rp90001d

Carey, J. (2011). Faculty of 1000 and VIVO: Invisible colleges and team science. *Issues in Science and Technology Librarianship, 65*.

Clinical and Translational Science Award (CTSA) Research Networking Affinity Group. (2012). *Clinical and Translational Science Award (CTSA) Research Networking Evaluation Guide*. Retrieved from https://www.ctsacentral.org/documents/CTSA-RN-Guide.pdf

Cohen, L., Manion, L., & Morrsion, K. (2003). *Research Methods in Education*. London: Routledge/Falmer Taylor & Francis Group.

Contractor, N. S., & Monge, P. R. (2002, November). Managing knowledge networks. *Management Communication Quarterly*, *16*(2), 249–258. doi:10.1177/089331802237238

Cornelius, R. R. (1996). *The science of emotion: Research and tradition in the psychology of emotion*. New York: Prentice Hall.

Crites, S., Fabrigar, L. R., & Petty, R. E. (1994). Measuring the affective and cognitive properties of attitudes: Conceptual and methodological issues. *Personality and Social Psychology Bulletin*, *20*(6), 619–634. doi:10.1177/0146167294206001

De Vierville, J. P. (1999). Emotion. *Electronic library of Waikato University*. Retrieved from http://72.14.253.104/search?q=cache:lqr5mSpe6MQJ: ww.accd.edu/spc/mitchell/powerpoint3d/emotion.ppt+definition+of+emotion&hl=zh-CN&ct=clnk&cd=6

Dolan, K. A. How Ijad Madisch Aims To Disrupt Science Research With A Social Network. *Forbes*. Retrieved from http://www.forbes.com/sites/kerryadolan/2012/07/19/how-ijad-madisch-aims-to-disrupt-science-research-with-a-social-network/

Etkina, E., & Mestre, J. P. (2004). *Implications of Learning Research for Teaching Science to Non-Science Majors.* Washington, DC: SENCER. Retrieved from http://www.sencer.net/Resources/pdfs/Backgrounders/ImplicationsofLearningResearchforTeachingScience.pdf

European Commission Directorate-General for Education and Culture. (2004). *Implementation of "Education and Training 2010" Work Programme: Working Group B "Key Competences" Key Competences for Lifelong Learning*. a European Reference Framework. Retrieved from http://europa.eu/legislation_summaries/education_training_youth/lifelong_learning/c11090_en.htm

Fazel-Zarandi, M., Devlin, H. J., Huang, Y., & Contractor, N. (2011). Expert recommendation based on social drivers, social network analysis, and semantic data representation. In *Proceedings of 2nd International Workshop on Information Heterogeneity and Fusion in Recommender Systems* (pp. 41-48). New York: Association for Computing Machinery. doi:10.1145/2039320.2039326

Feather, J., & Sturges, P. (Eds.). (2003). *International Encyclopedia of Information and Library Science* (2nd ed.). London: Routledge.

Ferreira, J. B., Klein, A. Z., Freitas, A., & Schlemmer, E. (2013). Mobile Learning: Definition, Uses and Challenges. In L. A. Wankel & P. Blessinger (Ed.), Increasing Student Engagement and Retention Using Mobile Applications: Smartphones, Skype and Texting Technologies (Cutting-edge Technologies in Higher Education, Volume 6) (pp. 47-82). Bingley, UK: Emerald Group Publishing Limited.

Gecer, A., & Dag, F. (2012). A Blended Learning Experience. *Educational Sciences: Theory and Practice*, *12*(1), 438–442.

Gewin, V. (2010, December 15). Collaboration: Social networking seeks critical mass. *Nature*, *468*(7326), 993–994. doi:10.1038/nj7326-993a

Grgurovic, M. (2011). Blended Learning in an ESL Class: A Case Study. *CALICO Journal*, *29*(1), 100–117. doi:10.11139/cj.29.1.100-117

Groeben, N. (1986). *Handeln, Tun, Verhalten als Einheiten einer verstehend-erklärenden Psychologie*. Tübingen: Francke.

Hargreaves, A. (1998). The emotional practice of teaching. *Teaching and Teacher Education*, *14*(8), 835–854. doi:10.1016/S0742-051X(98)00025-0

Harmer, J. (2001). *The Practice of English Language Teaching*. London: Longman.

Harré, R. (1986). *The social construction of emotion*. New York: Basil Blackwell.

Huber, G. (2004). *Cooperative learning*. Riga, Latvia: RaKa.

Komarraju, M., Musulkin, S., & Bhattacharya, G. (2010). Role of Student-Faculty Interactions in Developing College Students' Academic Self-Concept, Motivation, and Achievement. *Journal of College Student Development*, *51*(3), 332–342. doi:10.1353/csd.0.0137

Kriumane, L. (2013). *Mūzikas skolotāja emocionālās kompetences pilnveide augstskolas studiju procesā.* (Unpublished doctoral dissertation). University of Latvia, Riga, Latvia.

Lasmanis, A. (2003). *Māksla apstrādāt datus: pirmie soļi*. Riga, Latvia: "P&K". (in Latvian).

Leont'ev, A. N. (1978). *Activity, Consciousness, and Personality*. Prentice-Hall.

Levy, A. (2013). Bill Gates Joins $35 Million Funding in Startup ResearchGate. *Bloomberg*. Retrieved from http://www.bloomberg.com/news/2013-06-04/bill-gates-joins-35-million-investment-in-startup-researchgate.html

Lin, T. (2012). Cracking Open the Scientific Process. *The New York Times*. Retrieved from http://www.nytimes.com/2012/01/17/science/open-science-challenges-journal-tradition-with-web-collaboration.html?ref=thomaslin&_r=0

Luhmann, N. (1988). *Erkenntnis als Konstruktion*. Bern: Benteli.

Lūka, I. (2008). Development of Students' ESP Competence and Educator's Professional Activity in Tertiary Level Tourism Studies. In *Proceedings of ATEE Spring University Conference Teacher of the 21st Century: Quality Education for Quality Teaching* (pp. 689-697). Riga, Latvia: University of Latvia.

Maslo, E. (2007). Transformative Learning Space for Life-Long Foreign Languages Learning. In *Proceedings of International Nordic-Baltic Region Conference of FIPLV Innovations in Language Teaching and Learning in the Multicultural Context* (pp. 38-46). Rīga: SIA "Izglītības soļi".

Maslo, I. (2006). Kompetences jēdziena izpratnes daudzveidība un ar to saistītas problēmas Latvijas izglītības organizācijas sistēmas izveidē. In I. Maslo (Ed), No zināšanām uz kompetentu darbību, (pp. 46.-56). Riga, Latvia: Latvijas Universitātes Akadēmiskais apgāds. (in Latvian).

Mayring, P. (2004). Qualitative Content Analysis. In U. Flick, E. Von Kardoff, & I. Steinke (Eds.), *A Companion to Qualitative Research* (pp. 266–269). Glasgow, UK: SAGE.

Mayring, P. (2007). On Generalization in Qualitatively Oriented Research. *Forum Qualitative Sozialforschung / Forum: Qualitative. Social Research*, *8*(3), 1–8.

McRae, K., Ochsner, K. N., Mauss, I. B., Gabrieli, J. J. D., & Gross, J. J. (2008). Gender Differences in Emotion Regulation: An fMRI Study of Cognitive Reappraisal. *Group Processes & Intergroup Relations*, *11*(2), 143–162. doi:10.1177/1368430207088035

Mead, G. H. (1973). *Geist, Identitat, und Gesselschaft*. Frankfurt: A. M.

Movahedzadeh, F. (2011). Improving Students' Attitude Toward Science Through Blended Learning. *International Journal Science Education and Civic Engagement, 3*(2).

Ong, C. H., & Lai, J. Y. (2006). Gender differences in perceptions and relationships among dominants of elearning acceptance. *Computers in Human Behavior*, *22*(5), 816–829. doi:10.1016/j.chb.2004.03.006

Palmer, S. A., & Holt, D. M. (2009). Students' perceptions of the value of the elements of an online learning environment: Looking back in moving forward. *Interactive Learning Environments*, *18*(2), 135–151. doi:10.1080/09539960802364592

Parsons, T. (1976). *Theorie sozialer Systeme*. Opladen: Westdeutscher Verlag. doi:10.1007/978-3-322-83798-1

Pintrich, P. R. (1994). Student motivation in the college classroom. In K. W. Prichard & R. M. Sawyer (Eds.), *Handbook of college teaching theory and applications* (pp. 23–43). Westport, CT: Greenwood.

Porumb, S., Orza, B., Vlaicu, A., Porumb, C., & Hoza, I. (2011). Cloud Computing and its Application to Blended Learning in Engineering. In *Proceedings of Cloud Computing 2011: The Second International Conference on Cloud Computing, GRIDs, and Virtualization.* Red Hook, NJ: Curran Associates.

Qiu, M., & Chen, L. (2011). A Problem-based Learning Approach to Teaching an Advanced Software Engineering Course.In *Proceedings of 2nd International Workshop on Education Technology and Computer Science* (pp. 252-255). Los Alamitos, CA: The Printing House.

Reich, K. (2005). *Systemisch-konstruktivistische Pädagogik*. Beltz: Weinheim u.a.

Reitz, J. M. (2004). Bibliographic database. In *Dictionary for Library and Information Science*. Westport, CT: Libraries Unlimited.

Rudzinska, I. (2008). The Quality of Aim Setting and Achieved Results in English for Specific Purposes-Study Course in Lecturers and Students' Opinion. In *Proceedings of the ATEE Spring University Conference Teacher of the 21st Century: Quality Education for Quality Teaching* (pp. 366-373). Riga, Latvia: University of Latvia.

Špona, A., & Čehlova, Z. (2004). *Pētniecība pedagoģijā*. Riga, Latvia: RaKa. (in Latvian)

Surikova, S. (2007). *Organisation of Micro-group Activity for the Improvement of Pupils' Social Competence*. (Unpublished Dissertation). University of Latvia, Riga, Latvia.

Taylor, P. C., & Medina, M. N. D. (2013). Educational Research Paradigms: From Positivism to Multiparadigmatic. *The Journal of Meaning-Centered Education, 1*.

Vlăsceanu, L., Grünberg, L., & Pârlea, D. (2004). *Quality Assurance and Accreditation: A Glossary of Basic Terms and Definitions*. Bucharest: UNESCO.

Zaščerinska, J. (2013). *Development of Students' Communicative Competence within English for Academic Purposes Studies*. Berlin: Mensch & Buch.

Zaščerinska, J., & Ahrens, A. (2013). E-business Applications to Students' Blended Learning in Higher Education. In *Proceedings of the 4th International Conference on Data Communication Networking (DC NET 2013), 10th International Conference on e-Business (ICE-B 2013) and 4th International Conference on Optical Communication Systems (OPTICS 2013),* (pp. 290-297). Lisboa, Portugal: SciTePress - Science and Technology Publications.

KEY TERMS AND DEFINITIONS

Attitude: A combination of evaluative judgments about a phenomenon (Crites, Fabrigar, Petty, 1994).

Blended (Hybrid) Learning: One of the approaches that is utilized to help students for meaningful learning via information and communication technologies (Gecer, Dag, 2004).

Blended Teaching: A purposefully organized joint process of educator's sharing experience (knowledge, skills and attitudes) with students (Ahrens, Zaščerinska, Andreeva, 2013) with use of mobile technologies.

Distance Learning: A purposefully organized or spontaneous process of students' improvement of his/her individual experience (knowledge, skills and attitudes) based on cognition with use of mobile technologies.

Institutionalized Educational Process: A process organized, systematized, structured and administered within formal higher education according to a given set of laws and norms.

Mobile Technologies: Smart phones, laptops, tablet personal computers, ultra compact computers, hybrid devices, etc.

Students' Attitude: A part of competence as competence includes knowledge, skills and attitudes.

This work was previously published in Assessing the Role of Mobile Technologies and Distance Learning in Higher Education edited by Patricia Ordóñez de Pablos, Robert D. Tennyson, and Miltiadis D. Lytras, pages 29-59, copyright year 2015 by Information Science Reference (an imprint of IGI Global).

Chapter 54
Blended Learning at Ajman University of Science and Technology: A Case Study

Ahmed Ankit
Ajman University of Science and Technology, UAE

Mirna Nachouki
Ajman University of Science and Technology, UAE

Mahmoud Abou Naaj
Ajman University of Science and Technology, UAE

ABSTRACT

Over the past few years, there has been a rapid increase in the development of technology-based learning and teaching. Professors have become more pragmatic in their approach to technology-based media by using it to supplement or to replace traditional face-to-face teaching. Blended learning, which combines both electronic and face-to-face interaction, has gained more ground as midway between distance and face-to-face teaching approaches. Thus, opportunities for both educators and learners have been created. The teaching and learning approach adopted at Ajman University of Science and Technology (AUST) combines an equal balance of traditional face-to-face and videoconference learning, complemented with the use of a learning management system (Moodle). Student and instructor satisfaction is considered the most important factor in measuring the quality of blended learning. The purpose of this chapter is, therefore, to examine student and instructor satisfaction of blended learning at AUST. The chapter demonstrates that the majority of students and instructors hold positive views but are still attached to the traditional face-to-face learning and teaching. They also show that the level of satisfaction may depend on individual experience as well as on the major studied/taught.

DOI: 10.4018/978-1-4666-8246-7.ch054

INTRODUCTION

Ajman University of Science and Technology (AUST) was founded in 1988 as the first private institution of higher education in the United Arab Emirates and Gulf Cooperation Council States. The university has two campuses, at Ajman and Fujairah. It offers 26 accredited undergraduate programs and six accredited master's programs. In observance of social norms for certain communities, AUST has from its inception adopted an education system of segregation by gender. Each course is taught in two separate sections, one for male and the other for female students. Traditionally, the instructor in charge teaches both sections and thus the same lecture is delivered twice.

Like businesses, universities face pressure to do more and better with less. As a consequence, videoconferencing becomes a way to reduce unnecessary duplication of effort. Drawing on the experience of AUST, this chapter presents a new approach to course delivery that combines traditional face-to-face methods with modern technology. The goal of this blended delivery approach is to provide a virtual environment as close to the face-to-face approach as possible.

In order to assess the effectiveness of the blended learning approach adopted in AUST, students and instructors from different colleges at AUST were asked to complete surveys conceived to gauge whether the nature of courses being delivered using the blended learning model affects the student learning process. The respondents' feedback was used to introduce further improvement.

In other words, the purpose of this chapter is to evaluate the level of student and instructor satisfaction with blended learning, and to explore whether satisfaction differs according to time-related and/or college-related factors.

This study is essential to ensure that high quality learning is achieved when instructors and students are physically separated. The results obtained reveal that even though the majority of students and instructors make positive observations regarding blended learning at AUST, they still prefer the traditional face-to-face model. Results also show that the level of student satisfaction depends on the major being studied, while the level of instructor satisfaction depends on teaching experience.

BLENDED LEARNING AT AUST

Blended learning, also called hybrid learning, is a flexible term which lacks a unified definition. A variety of definitions thus exist, addressing different aspects of instruction:

- A combination of teaching strategies,
- A combination of delivery media,
- A combination of online and face-to-face instruction.

Due to gender segregation at AUST, course instructors have to deliver each lecture at least twice. Instructor office hours are also divided according to gender. The blended learning at AUST combines an equal balance of traditional face-to-face and videoconference learning, complemented with the use of a Learning Management System (LMS), namely Moodle. In this blended delivery approach, the two sections of the course are scheduled to be offered in separate classrooms at the same time. The classrooms are connected using videoconferencing equipment which allows interactive real time video and audio communication between the two rooms. Students may also communicate with their instructor as well as with their classmates at any time using the LMS adopted at AUST.

A videoconferencing classroom features the following:

- Cameras fixed to the ceiling allowing the transmission of a live color video of the instructor in the other classroom and simultaneously transmitting a video of the remote students to a TV screen which may be viewed by the instructor.

- Data Show devices installed in each classroom. These allow the display of video and the instructor's course materials on a smart board and a projection screen. There is one projection screen in each classroom.
- Presentations are displayed in both classrooms.
- Flat TV screens available in each classroom, allowing the instructor to see and interact with all students.
- A control panel enabling the adjustment of the audio system, mixer, amplifier, microphones and speakers that produce high quality audio delivery in classrooms.
- An interactive board (smart board) allowing the instructor to display videos and course materials interactively. The instructor may also use an interactive pen on the smart board.

The instructor alternates between classrooms; thus, in one session, male students are taught face-to-face, while the female students follow the same lecture via videoconferencing. In the following class, female students are taught face-to-face, while male students follow through videoconference. The instructor can see, hear and interact with students in both classrooms, but has to adjust his/her teaching methods in such a manner as to allow students in the remote classroom to follow every aspect of the lesson clearly. Consequently, students from both sections can follow the lecture, see presentations, read notes written on the smart board and interact with the instructor.

At the beginning of each semester, the whole teaching-learning process is initiated through Moodle where course content, learning activities, assessment tasks and schedules are uploaded. Students are encouraged to obtain a printed version of the lecture material in advance so as to prepare for the class.

In class, the computer connected to the smart board is used both to receive material from the smart board and to present the instructor's previously prepared material, including PowerPoint presentations. The instructor can move easily from presentation to smart board writing mode.

The following should be noted:

- Videoconferencing is used for courses with a small number of students, and only for the theoretical part of any course.
- Students in both classrooms have access to the instructor during designated office hours.
- The instructor attends male and female classes alternately.
- Students can access course learning materials using Moodle. They can thus work at their own pace.
- With Moodle, students can request clarification from their instructor in the same way as they would in a traditional face-to-face classroom. They can receive replies from their classmates which can be monitored by the instructor. An answer given by an instructor to one student can also benefit all the others.

The use of videoconferencing in teaching and learning has greatly expanded over the last few years, leading educators and researchers to focus on the effectiveness of videoconferencing. After reviewing the research in this field, Greenberg (2004) concludes that in the delivery of instruction, videoconferencing is neither more nor less effective than the traditional classroom. He adds that compared to other modalities, videoconferencing generates greater interactivity and, when used properly, it is a cost-effective way of delivering educational experiences to an expanded student population.

BENEFITS OF BLENDED LEARNING

A range of benefits for moving to blended learning have been noted in the literature. These fall within four types: institutional, student, instructor and pedagogical.

Institutional Benefits

One benefit of blended learning is that it improves the efficiency of classroom space usage. Universities with a shortage of classrooms can reduce their need to rent extra space (Young, 2002) by offering blended courses. Furthermore, universities can post course resources online instead of photocopying them, and create re-usable learning objects that save both time and money (Sharma & Barrett, 2007). Blended learning also benefits institutions by reducing on-campus traffic and the associated need for parking space. It is equally possible to apply the blended model in innovative ways, both to increase student learning outcomes and to reduce instructional delivery costs (Dziuban, Hartman & Moskal, 2004).

With its blended learning approach, AUST can ensure quality teaching with less use of resources. Instructors do not have to duplicate their efforts in lecturing twice (one for male and again one for female students), which is especially helpful when enrolment is small. As a direct consequence, AUST reduces the course delivery costs while maintaining the same income earned from its face-to-face delivery mode.

Student Benefits

The flexibility and convenience of blended learning benefits students, too. De George-Walker & Keeffe, (2010), for instance, contend that students appreciate the ability to work at their own pace, in times and in places that suit them.

At AUST, instructors alternate their lectures between male and female students. Thus face-to-face meetings are important because of the significance of human contact and its impact on the interaction between learners and instructors. Likewise, meeting face-to-face with classmates allows students to better socialize and interact with peers through Moodle. Leonard & DeLacey (2002) observe that trust among members is crucial and has to be consciously encouraged and supported in the design of activities; people may feel less free to share their personal learning tracks to members of an online community who they do not know well.

Dziuban & al. (2004) have consistently found high levels of student and faculty satisfaction in blended learning courses. According to them, student learning outcomes are higher in such courses than in comparable face-to-face and fully online courses, and student demand is equally high because of the increased convenience and flexibility of these courses.

Unlike most classroom experiences, blended learning allows students to retrieve course content material as often as they need for better grasp. Indeed, students can thus take time to process information before asking or responding to questions. Since blended learning is supported by Moodle, it also allows students to continue asking questions about topics that were not clear in the other side of the blended learning classroom. They can easily communicate directly with their instructors or leave them a question in the discussion section of the LMS (Hijazi, Crowley, Smith, & Shaffer, 2006).

Instructor Benefits

Faculty teaching in a blended delivery model report an increased level of interaction, both among fellow classmates and with their instructor, which suggests that the blended environment offers a less intimidating forum for student participation, specifically accommodating students who tend to be less verbal (Gould, 2003). University of Wisconsin faculties indicated that they could accomplish course learning objectives more successfully within a blended course than within a traditional face-to-face course because of the flexibility of blended learning model (Garnham & Kaleta, 2002).

At AUST, instructors experience greater flexibility in their schedule. They are able to establish online office hours (through Moodle) that are appropriate to their own work /life balance. Additionally, instructors are free to spend as much time answering individual questions as they consider necessary, a luxury that is often unavailable to them in a tightly scheduled classroom environment. Moreover, Instructors are able to enhance their technology skills. They would often experience a shift in their instructional role when they prepare for blended courses. They move from being an expert on a subject, who must engage students, to being a facilitator of students as they engage with the subject. This may increase effectiveness, ensuring that all involved in the learning process play a more significant role. Dziuban & al. (2004) maintain, in fact, that instructors improve and develop as they become more experienced in delivering instruction in a blended learning format.

Pedagogical Benefits

Young (2002) states that the main motivation of hybrid courses supporters is to improve the students' educational experience. Lending him credence, Allan (2007) advances that one of the main rationales for using blended learning is that it enhances the engagement of learners by providing a rich mixture of learning prospects. Osguthorpe & Graham (2003) refer to this opportunity favored faculty in order to increase the level of pedagogical richness in their course delivery. The associated increase in student engagement is an oft-cited benefit of blended learning (Sharma & Barrett 2007; Vaughan, 2007).

At AUST, blended instruction offers faculty and students alike the ability to teach and learn in a variety of different modalities, potentially increasing instructional effectiveness. Making blended learning available in certain courses gives students both the flexibility of online education and the social and instructor support commonly associated with a face-to-face class.

CHALLENGES OF BLENDED LEARNING

The development of information and communication technology in recent years has made the associated technology more reliable than in the past. It is the human rather than the technological factor that limits the adoption and application of technology-enhanced learning environments, as instructors need considerable commitment and training. The transition from a traditional teaching and learning experience to a blended one is not easy in that it requires students and faculty to interact differently both with each other and with the course content. The literature reports several challenges associated with blended learning faced by students and faculty, as well as by the institutions as a whole. There are also many cultural and ethical issues that require consideration.

Student Challenges

The primary challenge for students is the transition from a passive to an active/collaborative learning approach. Blended learning places more responsibility on students, requiring them to rethink their behavior in the blended learning classes. They have to reconsider their time management skills, and use sophisticated technologies (Vaughan, 2007). Blended courses require a degree of self-motivation and independent learning which might be unfamiliar to students who have only experienced traditional face-to-face formats (MacDonald, 2008).

Investigating students' refusal to use materials in blended courses, Orton-Johnson (2009) asserts that students' rejection of blended learning stems from their perception of traditional printed texts as authentic academic knowledge, which results in more trust in these texts than in Web-based sources.

Faculty Challenges

Faculty members at AUST are often resistant to blended learning strategies. They are, thus, reluctant to reduce class time, integrate unfamiliar technologies, and take on the perceived additional work in developing blended courses.

From a faculty perspective, blended learning brings new responsibilities and roles to teachers who already have significant workloads (Alebaikan & Troudi, 2010; Guri-Rosenblit, 2009; Ocak, 2011; Vaughan, 2007). A major concern for faculty members is the increased time commitment involved (Vaughan, 2007) since blended courses take longer to prepare and administer than their traditional counterparts. Faculty support and resources for course redesign, along with the development of new teaching and technology skills, are also important factors in delivering successful blended courses (Gerbic & Stacey, 2009). Bailey & Card (2009) hold that many educators who shift towards blended teaching agree that their institutions provide technical support and training, but that advice and assistance relating to pedagogical and instructional support are limited or lacking.

Likewise, Vaughan (2007) lists major risk factors which have been identified by faculty who have taught blended courses, including anxiety over losing control of the course, lower student evaluations, and uneasiness about how this type of learning model fits into the culture of teaching. However, resistance to blended learning is less forceful than resistance to fully online learning due to its combination of traditional and technological methodologies (Niemiec & Otte, 2010).

Institution Challenges

Universities face several barriers and challenges that must be addressed for successful adoption and expansion of blended learning practices.

First, there is an urgent need for a clear policy concerning the target audience of blended learning that determines where the audience fits within the stated goals and priorities of the institution (Wallace & Young, 2010). To integrate blended learning, a clear vision and action plan have to be integrated into the strategic plans of the university. This minimizes the risk of using scarce resources ineffectively, frustrating users, and generating poor learning outcomes (Wallace & Young, 2010). A study by Abel (2005) clearly highlights the relationship between having a clear policy and success in technology-enhanced learning. The study shows that institutions which were successful in their use of online learning strategies had compelling reasons to support such learning.

The second challenge is lack of appropriate leadership to support and sustain blended learning initiatives. Garrison (2011) argues for "collaborative leadership" which pulls together leaders at all levels of the institution to create a real commitment and ownership through a jointly developed vision and plan.

Finally, faculty members who pursue innovative teaching practices should be recognized and offered incentives, both to value their efforts and encourage others. As to younger faculty members, the majority of whom possess strong technological skills, when they are facing the tenure process, they do not have the time to invest in the research and practice of blended learning. They must, instead, focus on research solely within their discipline. If they are, however, offered the opportunity to do research in the use of blended learning within their own discipline, they may have greater impact on the future pedagogical approaches which are inevitably heading towards the blended learning. Ongoing pedagogical and technological support is essential to faculty throughout both development and delivery of blended learning. Developing a blended course, especially preparing resources and materials for videoconferencing classes, requires faculty to invest much more time than they do while preparing for a face-to-face classroom presentation.

Ethical Challenges

Littlejohn & Pegler (2007) discuss a number of ethical issues related to blended learning. Although having a clear code of conduct that is understood by all participants can address trust issues, privacy and confidentiality are essential in order to maintain security for online resources and communications. Concerns about copyright also need to be addressed, especially when considering the ease with which material can be published online.

Cultural Challenges

There is a strong link between culture and learning that is reflected in how people prefer to learn and how they tend to process information (Samover, Porter & McDaniel, 2009). In the gulf region, religion and culture play a major role in shaping social practicalities and learning experiences. Accordingly, AUST provides a gender segregated environment where students of the same gender can work together in the same classroom. In the blended classroom and through Moodle, students of different genders are able to work together. Similarly, the kind of social environment created when online learning is integrated with face-to-face learning, can exert considerable influence on students' perceptions (Alebaikan & Troudi, 2010).

STUDENT SATISFACTION

According to the Sloan Consortium, student satisfaction is achieved when students are effective in the learning and are pleased with their practice (Moore, 2009). Along the same lines, Sweeney & Ingram (2001) define satisfaction as the observation of pleasure and success in the learning environment. Both definitions focus on accomplishment and success in learning, and pleasure in and enjoyment of the experience. Thurmond, Wambach, Connors, & Frey (2002) describe student satisfaction as a concept that reflects outcomes and exchange that occurs between students and an instructor. Reporting on satisfaction in a blended learning environment, Wu, Tennyson, & Hsia (2010) define satisfaction as the sum of student feeling and attitude that result from aggregating all the benefits that a student hopes to receive from blended learning environment system.

Students spend a considerable amount of time and money, and exert substantial effort in obtaining a quality education. They should, therefore, perceive their post-secondary educational experiences as being of high value (Knox, Lindsay, & Kolb, 1993). Student satisfaction is important because it influences the student's level of motivation (Chute, Thompson, & Hancock, 1999; Donahue & Wong, 1997), which is an important psychological factor in student success (American Psychological Association, 1997). Meeting and exceeding students' expectations also lead them to become advocates who provide a free promotion for the university.

Sun, Tsai, Finger, Chen, & Yeh, (2008) argue that satisfaction of learners is the most significant factor in developing online courses. Their research demonstrates a framework of six dimensions that influences satisfaction of online learners. Among them, learners and technology are two dimensions that obviously relate to the development of e-learning tools and resources. These two dimensions contain several factors that are characterized by three significant features: usability, quality, and flexibility. All of these features are of acute importance due to their effect on satisfaction of learners within online learning environments (Sun & al., 2008).

Sinclaire (2011) reports three convincing reasons for interest in student satisfaction. First, the Sloan Consortium's "Five Pillars of Quality Online Education" declares student satisfaction to be the most important key to continuing learning. It reflects learners' evaluation of the quality of all aspects of the educational program (Sloan, 2011). There is also evidence that student satisfaction is positively related to retention and a decision to take one or more additional courses (Booker & Rebman, 2005). Lastly, student satisfaction is important because satisfied students represent a public relations asset for a college or university. If students are viewed as customers of college education, their satisfaction is important to recruitment efforts. Therefore, there is a need for a greater understanding of factors that affect student satisfaction with blended learning.

FACULTY SATISFACTION

Instructor satisfaction is crucial and should be carefully studied to ensure successful deployment of blended learning. Faculty satisfaction is defined as the perception that teaching in the blended learning environment is effective and professionally beneficial. Because faculty members are instrumental in the success of distance education programs as part of the blended learning, levels of faculty satisfaction are one measure for the assessment of program effectiveness (Lock Haven University, 2004). Hartman, Dziuban, & Moskal (2000) have suggested that faculty satisfaction and student learning are closely correlated.

MAIN FOCUS OF THE CHAPTER

In order to assess the effectiveness of the blended teaching approach adopted in AUST, instructors and students from different colleges at AUST completed forms in order to study whether using the blended learning mode affects the student learning process.

Samples

Data used in this study were collected in two different periods: the first pool of data was completed in 2010 and the second in 2012. In both periods, students and instructors were asked to complete two different survey forms to evaluate their satisfaction in blended learning.

In 2010, eighteen instructors (14 from the College of IT and 4 from other colleges) completed the instructor survey form, and a sample of 334 students (142 from the IT College and 192 from other Colleges), drawn from the pool of undergraduate students enrolled in blended learning courses offered at AUST, completed the student survey form.

In 2012, thirty instructors (21 from the College of IT and 9 from other colleges) completed the instructor survey form and 207 students (108 from the IT College and 99 from other Colleges), enrolled in blended learning courses completed the student survey form.

Instruments

Students were asked to give a value from 1 to 5 for each question (item) of the survey ('1' being 'poor' and '5' being 'excellent'). The scores were collected in order to evaluate the average score by item. Student survey form questions were divided into four factor sections: 1) interaction, 2) technology, 3) student performance, and 4) course management (see Table 1).

Instructors were also asked to give a value from 1 to 5 for each question (item) of the survey ('1' being 'poor' and '5' being 'excellent'). The rating scores were collected in order to evaluate the average score by item. Instructor survey form questions were also divided into four factor sections: 1) interaction, 2) technology, 3) student performance, and 4) course management (see Table 2).

STUDENT SATISFACTION

A t-test was conducted on the category of overall student satisfaction with blended learning courses,

Table 1. Student survey form

Factor	No.	Item
Interaction	S1	A blended learning session always keeps me alert and focused.
	S2	Interaction is adequately maintained with the instructor when s/he is in the other side of the blended learning classroom.
	S3	Having students from the opposite gender in the other classroom listening to what I might say restricts my participation.
	S4	A blended learning course makes it more important for students to visit the instructor during office-hours.
	S5	I would have felt more engaged in a traditional classroom setting.
Technology	S6	The instructor's voice is audible.
	S7	Course content shown or displayed on the smart board is clear.
	S8	The microphone is in good working condition.
	S9	Technical problems are not frequent and they do not affect my understanding of the course.
	S10	The technology used for blended learning is reliable.
	S11	Not having an individual microphone for each student is a reason for not participating effectively.
Student Performance	S12	The use of blended learning technology in this course encourages me to learn independently.
	S13	My understanding is improved compared to similar courses I have studied before.
	S14	My performance in exams is improved compared to similar courses I have studied before.
	S15	I am satisfied with the level of effort this course requires.
Course Management	S16	Discipline is highly observed when the instructor is on the other side of the blended learning classroom.
	S17	The instructor/supervisor always takes attendance.
	S18	Taking the course via face-to-face delivery is more effective.
	S19	If I had known this was going to be a blended learning class, I would not have taken it.
	S20	I am willing to take another course using the blended learning delivery mode.

to evaluate whether the mean was significantly different from 2.5 - an accepted mean for student satisfaction (Giannousi, Vernadaki, Derri, Michalopoulos, & Kioumourtzoglou, 2009). The sample grand mean of 3.38 (SD=0.521) was higher than 2.5, ($t=7.529$, $df=19$, $p<0.05$) for blended learning satisfaction. The 95% confidence interval for blended learning satisfaction mean ranged from 0.634 to 1.122. These results show that students are satisfied with blended learning, whites is compatible with the literature (Alebaikan, 2010; Dziuban & al, 2004; Garrison & Vaughan, 2008; Graham, Allen, & Ure, 2005; Holley & Oliver, 2010; Iqbal, Kokash, & Al-Oun, 2011).

In order to evaluate the overall student satisfaction related to the different factors identified in Table 1, an average of data collected related to each factor was computed. Figure 1 shows a summarized indication of the overall student data collected in both periods, 2010 and 2012.

Interaction Related Factor

The overall mean for student satisfaction in this factor was 3.17 (3.16 in 2010 and 3.18 in 2012).

These results show that students are satisfied with the level of interaction, which is compatible with the findings of several research projects (Najafabadi & Najafabadi, 2011; Napier, Dekhane,

Table 2. Instructor survey form

Factor	No.	Item
Interaction	I1	I believe students are alert and focused most of the time.
	I2	I think interaction is adequately maintained with students on the other side of the blended learning classroom.
	I3	Having students from the opposite gender on the other side of the blended learning classroom has a negative impact on the ability to participate and speak-out freely.
	I4	I believe my interaction with students would be better in a normal class setting (face-to-face).
Technology	I5	Adequate training on how to use the different equipment was provided.
	I6	The laptop used in blended learning classroom is always ready and up to date.
	I7	Using the smart board is more effective than using the white board.
	I8	Audio equipment is always working properly.
	I9	The technical support and maintenance provided are satisfactory.
Student Performance	I10	A blended learning course can promote independent learning.
	I11	Students' understanding is comparable to courses in face-to-face delivery mode.
	I12	Students' performance in exams is similar to courses in face-to-face delivery mode.
	I13	The learning process of students is accelerated.
	I14	For the same course given in a face-to-face delivery mode, students' achievements in blended learning course were equivalent.
	I15	The percentage of students with at least a C grade exceeds 70%.
Course Management	I16	When I am not physically present in the classroom, the presence of a Supervisor is necessary.
	I17	Students are as serious with attendance as in courses taught in face-to-face delivery mode.
	I18	Teaching this course in face-to-face delivery mode is more appropriate.
	I19	I am willing to teach again using blended learning technique delivery mode.
	I20	The same teaching materials were used as in a face-to-face lecture session.

& Smith, 2011; Riffell & Sibley, 2004; Story & DiElsi, 2003; Wingard, 2004). Higher quality level of interaction has been linked to student satisfaction (Arbaugh, 2000; Kaleta, Skibba, & Joosten, 2007; Picciano, 2002; Russo & Benson, 2005; Swan, 2001).

Item S3 is related to interaction with other students having the highest mean, 3.41. This suggests that students are satisfied with the level of interaction. The two items S1 and S2 have the lowest score in this group with an average mean of 2.87 and 2.83 respectively. These scores are understandable because there may be less discipline and more interruption among students when the lecturer is in the remote classroom.

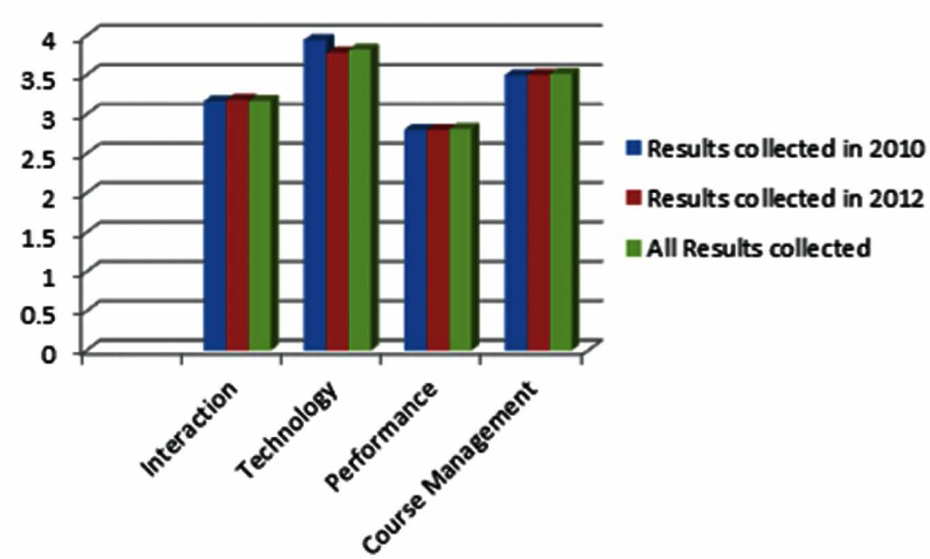
Technology Related Factor

Most students are satisfied with the technology used in the videoconferencing component of blended learning (mean=3.82, SD=0.01). The data collected had shown that 2010 students were more satisfied with the technology (mean=3.94) than 2012 students (mean=3.78). When investigated, this was found to be the result of some technology having become old and less reliable.

Performance Related Factor

Generally, students were moderately satisfied with their performance in blended learning courses (mean = 2.8, SD= 0.18). Item S12 ("The use of

Figure 1. Summary of students' scores



blended learning technology in this course encourages me to learn independently") has the highest satisfaction in this group (mean=3.26). Item S14 ("My performance in exams is improved compared to similar courses I have studied before.") had the lowest satisfaction in this group (mean=2.60). When asked about their satisfaction with the level of effort the blended learning course requires (S15), students showed adequate satisfaction with mean = 2.8 (2.69 in 2010 and 2.92 in 2012). The results suggest that students prefer face-to-face learning, even if their performance and grades with blended learning are similar. These findings are in line with a larger data-mining study of several thousands of students, conducted by researchers at the University of Central Florida. The researchers found out that blending learning courses produced comparable or superior success rates to face-to-face (Dziuban, Hartman, Juge, Moskal, & Sorg, 2006).

Course Management Related Factor

The results show that students are generally satisfied with class management (mean=3.51, SD= 0.02). Although there was some change between 2010 (mean=2.49) and 2012 (mean=3.50), this item still needs improvement. Item S17 has the highest satisfaction in this group (mean=4.31). Students agree that the instructor/supervisor always takes attendance.

However, there were also some areas where the students were less satisfied. When asked whether they were willing to take another course in blended learning (S20), most students disagreed with mean=2.20 (2.02 in 2010 and 2.4 in 2012).

Time-Related Factor

Table 3 shows the mean and standard deviation for student satisfaction among 2010 students and 2012 students who experienced blended learning courses. A t-test was to check the following hypothesis:

There is no significant difference in student satisfaction between 2010 and 2012 students who experienced blended learning courses.

Table 3. Students scores based on time-related factor

Item No.	Students Score Collected in 2010		Students Score Collected in 2012		Students Score	
	Mean	SD	Mean	SD	Mean	SD
S1	2.92	1.29	2.82	1.07	2.87	0.05
S2	2.81	1.36	2.85	1.19	2.83	0.02
S3	3.37	1.47	3.46	1.39	3.41	0.04
S4	3.05	1.30	3.22	1.17	3.12	0.08
S5	3.64	1.37	3.35	1.27	3.50	0.14
S6	4.23	1.13	3.81	1.17	4.04	0.21
S7	4.32	1.04	4.37	0.87	4.34	0.02
S8	4.05	1.15	3.69	1.29	3.88	0.18
S9	4.04	1.66	3.62	1.22	3.85	0.21
S10	3.73	1.14	3.48	1.13	3.61	0.13
S11	3.27	1.47	3.19	1.49	3.24	0.04
S12	3.30	1.22	3.17	1.07	3.26	0.06
S13	2.61	1.27	2.61	1.14	2.62	0.00
S14	2.60	1.31	2.59	1.13	2.60	0.01
S15	2.69	1.32	2.92	1.25	2.80	0.11
S16	3.81	1.32	3.65	1.08	3.73	0.08
S17	4.30	1.15	4.32	1.02	4.31	0.01
S18	4.17	1.18	4.2	1.1	4.18	0.02
S19	3.14	1.05	**3.1**	**1.03**	3.12	0.02
S20	2.02	0.20	**2.4**	**0.79**	2.20	0.19

The result was (t=1.321, df=19, p=.202>.05). Accordingly, the hypothesis is accepted. There is no significant difference in student satisfaction between 2010 and 2012 students who experienced blended learning courses.

College-Related Factor

Table 4 shows the mean and standard deviation for student satisfaction among IT students and students enrolled in other colleges who experienced blended learning courses. A t-test was to check the following hypothesis:

There is no significant difference in student satisfaction between IT and other College students who experienced blended learning courses.

The result was (t= -.365, df=19, p=.719>.05). Thus, the hypothesis is accepted. There is no significant difference in student satisfaction between IT and other College students who experienced blended learning courses. The mean and standard deviations for IT students are 3.366 and 0.537 respectively, while for other colleges they are 3.39 and 0.719 respectively.

INSTRUCTOR SATISFACTION

A t-test was conducted on the category of overall instructor satisfaction with blended learning courses, to evaluate whether the mean was significantly different from 2.5 - an accepted mean for student satisfaction (Giannousi & al., 2009). The sample

Table 4. Students scores based on College-related factor

Item No.	IT Students Score		Other Students Score		All Students Score	
	Mean	SD	Mean	SD	Mean	SD
S1	2.87	1.00	2.86	1.37	2.87	0.05
S2	3.04	1.06	2.64	1.44	2.83	0.02
S3	3.36	1.23	3.44	1.60	3.41	0.04
S4	3.26	1.13	2.99	1.34	3.12	0.08
S5	3.24	1.26	3.79	1.35	3.50	0.14
S6	3.96	1.20	4.17	1.13	4.04	0.21
S7	4.35	0.94	4.32	1.01	4.34	0.02
S8	3.73	1.19	4.07	1.22	3.88	0.18
S9	3.88	1.77	3.88	1.26	3.85	0.21
S10	3.50	1.07	3.75	1.19	3.61	0.13
S11	3.38	1.40	3.11	1.52	3.24	0.04
S12	3.15	1.06	3.34	1.24	3.26	0.06
S13	2.74	1.01	2.50	1.37	2.62	0.00
S14	2.66	1.03	2.54	1.39	2.60	0.01
S15	2.99	1.09	2.60	1.42	2.80	0.11
S16	3.50	1.15	3.96	1.27	3.73	0.08
S17	4.18	1.09	4.42	1.10	4.31	0.01
S18	4.07	1.12	4.28	1.16	4.18	0.02
S19	3.13	1.05	3.12	1.03	3.12	0.02
S20	2.34	0.74	2.01	0.18	2.20	0.19

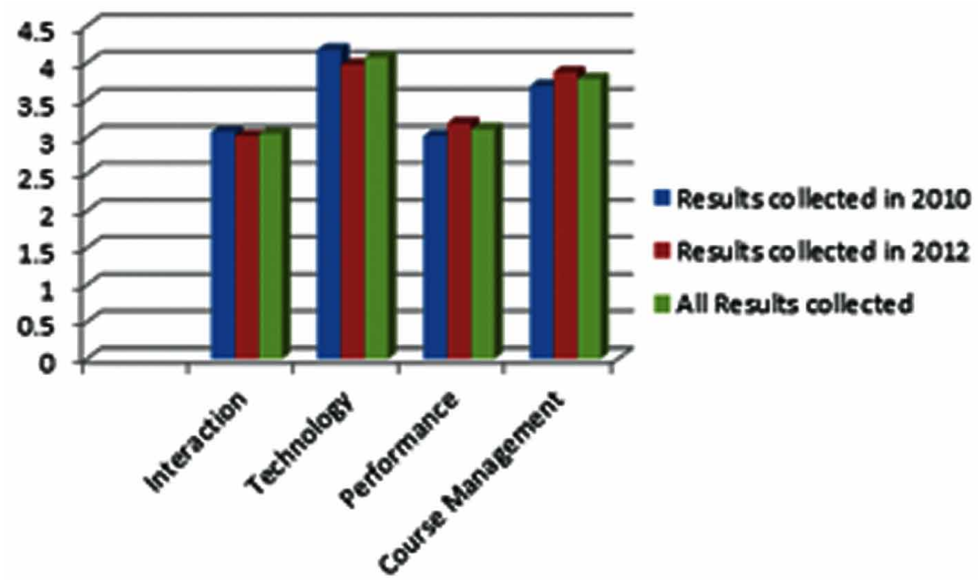
grand mean of 3.41 (SD=.643) was higher than 2.5, ($t=6.342$, $df=19$, $p<0.05$) for blended learning satisfaction. The 95% confidence interval of difference for blended learning satisfaction mean ranged between 0.611 and 1.2143. The results show that instructor satisfaction is higher than the average. These results are in line with other research. 88% of the faculty who taught blended learning courses at the University of Central Florida were satisfied with blended teaching and would teach in a blended format again ((Dziuban & al., 2004). All faculty involved in the blended learning pilot program at the University of Wisconsin were happy with their first blended teaching experience and were willing to recommend it to others (Aycock, Garnham, & Kaleta, 2002). In contrast, a blended learning pilot project at the Rochester Institute of Technology revealed that only 41% were willing to teach a blended course again (Vignare, & Starenko, 2005).

In order to evaluate the overall instructor satisfaction related to the different factors identified in Table 2, an average of data collected related to each factor was computed. Figure 2 shows a summarized indication of the overall instructor scores collected in both periods, 2010 and 2012.

Interaction Related Factor

The overall mean for instructor satisfaction in this factor was 3.04 (3.06 in 2010 and 3.01 in 2012). Item I1 "I believe students are alert and focused most of the time" having the highest (mean= 3.25). This suggests that instructors are satisfied with

Figure 2. Summary of instructors' scores



the level of interaction with their students. Item I4 "I believe my interaction with students would be better in a normal class setting (face-to-face)" has the lowest score in this group (mean= 2.22). This shows that most instructors believe that a higher interaction with students can be achieved in face-to-face instruction.

Technology Related Factor

Most instructors are satisfied with the technology used in the videoconferencing component of blended learning (mean=4.07, SD=.14). The data collected had shown that 2010 instructors were more satisfied with the technology (mean=4.17) than 2012 instructors (mean=3.97). When investigated, this was found to be the result of some of the technology having become old and less reliable.

Performance Related Factor

Instructors were generally satisfied with student performance in blended learning courses (mean = 3.10, SD= 0.12). Item I15 ("The percentage of students with at least a C grade exceeds 70%") has the highest satisfaction in this group with mean=3.43. Item I13 ("The learning process of students is accelerated") has the lowest satisfaction in this group with mean=2.38.

This can be attributed to the following factors:

- Most instructors believe that blended learning does not accelerate the learning process compared to face-to face learning.
- Student performance in blended learning courses is similar to that in face-to-face courses.

Course Management Related Factor

The results showed that instructors are generally satisfied with class management (mean=3.78, SD= 0.13). Item I16 "When I am not present physically in the classroom, the presence of a Supervisor is necessary" has the highest satisfaction in this group (mean=4.25). The lowest mean item was I17 "Students are serious with attendance compared to similar courses taught in face-to-face delivery mode" (mean = 3.17).

Time-Related Factor

Table 5 shows the mean and standard deviation for instructor satisfaction among 2010 and 2012 instructors who experienced blended learning courses. A 2-paired t-test was to check the following hypothesis:

There is no significant difference in instructor satisfaction between 2010 and 2012 students who experienced blended learning courses.

The result was (t=-2.415, df=19, p=.025 <.05), 95% confidence interval of difference ranging from lower= -0.405 to upper= 0.289. Accordingly, the hypothesis is rejected. There is a significant difference in instructor satisfaction among 2010 and 2012 instructors who experienced blended learning courses. Instructors are more satisfied in 2012 (mean= 3.52) than they were in 2010. This can be attributed to the fact that instructors in 2012 have become more experienced with blended learning than were their colleagues in 2010.

College-Related Factor

Tables 6 and 7 show the mean and standard deviation for instructor satisfaction among IT and other colleges' instructors who experienced blended learning courses. A 2-paired t-test was to check the following 3 hypotheses:

Hypothesis 1: There is no significant difference in instructor satisfaction between IT and other colleges' instructors who experienced blended learning courses in 2010.

The result was (t=-2 .366, df=19, p=.029<.05). The 95% confidence interval of difference ranges from lower= -.645 to upper= - 0.395. Accordingly, the hypothesis is rejected. There is a significant difference in instructor satisfaction between IT and other colleges' instructors who experienced blended learning courses. Instructors from other colleges were more satisfied with blended learning than IT instructors. The mean and standard deviation for IT instructors are 3.30 and 0.792 respectively while for other colleges they are 3.65 and 0.675, respectively. This can be attributed to the fact that blended learning started late in the college of IT.

Hypothesis 2: There is no significant difference in instructor satisfaction between IT and other colleges' instructors who experienced blended learning courses in 2012.

The result was (t= -1 .001, df=19, p= 0.329>.05). The 95% confidence interval of difference ranges from lower= -.2827 to upper= - 0.0997. Thus, the hypothesis is accepted. There is no significant difference in instructor satisfaction between IT and other colleges' instructors who experienced blended learning courses.

Hypothesis 3: Overall, there is no significant difference in instructor satisfaction between IT and other colleges' instructors who experienced blended learning courses.

The result was (t=-2 .461, df=19, p=.024<.05). The 95% confidence interval of difference range from lower= -.1730 to upper= - 0.01398. Thus, the hypothesis is rejected. There is a significant difference in instructor satisfaction between IT and other colleges' instructors who experienced blended learning courses. Instructors from other colleges were more satisfied with blended learning than IT instructors. This can be attributed to the fact that blended learning started late in the college of IT.

Moreover, instructors gave some observations regarding the benefits of adopting blended learning at AUST. This delivery mode is more suitable for theoretical courses than for practical ones. It

Table 5. Instructors data based on time- related factor

Item No.	Instructors Score Collected in 2010		Instructors Score Collected in 2012		All Instructors Score	
	Mean	SD	Mean	SD	Mean	SD
I1	3.22	0.73	3.27	0.83	3.25	0.04
I2	2.89	0.67	3.03	0.81	2.96	0.10
I3	2.83	0.98	3.37	1.03	3.10	0.38
I4	2.06	0.41	2.37	0.72	2.22	0.22
I5	3.89	1.41	4.1	1.03	4.00	0.15
I6	4.61	0.78	4.4	0.62	4.51	0.15
I7	3.22	1.48	3.73	1.11	3.48	0.36
I8	4.11	0.83	3.67	0.88	3.89	0.31
I9	4.5	0.62	3.97	0.76	4.24	0.37
I10	2.94	1.11	3.4	0.77	3.17	0.33
I11	2.33	0.77	3.17	0.65	2.75	0.59
I12	2.33	0.69	3.23	0.97	2.78	0.64
I13	2.28	0.75	2.47	0.63	2.38	0.13
I14	2.72	0.96	3.3	0.65	3.01	0.41
I15	3.33	0.91	3.53	0.73	3.43	0.14
I16	4.22	1.22	4.27	1.01	4.25	0.04
I17	3.07	1.03	3.33	0.99	3.17	0.23
I18	4.28	0.96	3.77	0.97	4.03	0.36
I19	3.5	0.86	3.8	0.85	3.65	0.21
I20	3.78	0.43	4.2	0.96	3.99	0.30

reduces duplication of teaching time and effort. In addition, instructors give the same material at the same time for both genders; male and female sections are always at the same level and have the same exam questions. Likewise, instructors are better prepared to meet students in two classrooms at once. Any problem discussed on the smart board is recorded and can be referred to in subsequent lectures.

However, the following restrictions were made by instructors regarding the use of blended learning:

- Instructors should prepare reliable and efficient course material and should be confident with the use of the technology.
- More time is needed for preparation and planning, especially when the course is being taught using blended learning mode for the first time.
- Restriction of the lecture style; instructors have to keep an eye on students in the other side of the blended learning classroom.
- It is difficult for instructors to monitor students' behavior when conducting blended learning mode classes.
- More courses have to be taught to complete the teaching load.
- Student control is more difficult.
- There is greater reliance on technology and IT staff.

Table 6. Instructors scores based on college-related factor

Item No.	IT College Instructors Score		Other College Instructors Score		All Instructors Score	
	Mean	SD	Mean	SD	Mean	SD
I1	3.2	0.71	3.46	0.88	3.25	0.04
I2	2.97	0.77	3.31	0.75	2.96	0.10
I3	3.14	0.99	3.46	0.97	3.10	0.38
I4	2.29	0.61	2.31	0.63	2.22	0.22
I5	4.09	1.16	3.92	0.76	4.00	0.15
I6	4.46	0.73	4.54	0.52	4.51	0.15
I7	3.37	1.17	4.15	1.14	3.48	0.36
I8	3.8	0.86	3.92	0.95	3.89	0.31
I9	4.03	0.74	4.54	0.66	4.24	0.37
I10	3.14	0.87	3.62	0.77	3.17	0.33
I11	2.91	0.73	3.08	0.49	2.75	0.59
I12	2.94	0.92	3.23	0.83	2.78	0.64
I13	2.29	0.51	2.77	0.83	2.38	0.13
I14	2.94	0.79	3.46	0.78	3.01	0.41
I15	3.34	0.79	3.77	0.73	3.43	0.14
I16	4.31	1.04	4.08	1.19	4.25	0.04
I17	3.2	0.92	3.38	1.04	3.17	0.23
I18	4.03	0.94	3.77	1.09	4.03	0.36
I19	3.66	0.89	3.77	0.73	3.65	0.21
I20	4.23	0.76	3.54	0.78	3.99	0.30

LIMITATIONS

This study has two limitations. First, the research findings are based on instructors and undergraduate students in the College of Information Technology and the College of Education at AUST, who are taking blended learning courses. While valid, the results should not be overgeneralized by the reader and may not be applicable to other colleges or other universities. Second, the study used a self-reported questionnaire survey form which is limited in nature by the accuracy of the participant's response. Although the researchers took steps to facilitate accurate reporting, such as confidentiality and voluntary participation, these procedures might have not ruled out the bias associated with self-reported data, including social desirability. Despite these limitations, a self-report data is a strong method to measure the level of students' satisfaction.

FUTURE RESEARCH DIRECTIONS

This study was conducted on a sample from one institution (AUST). Further research can be conducted on larger sample sizes in several universities in the United Arab Emirates and in different countries to generalize and confirm the reliability and the validity of these findings.

Further research is needed to find the reasons behind the varying levels of satisfaction in these areas so as to aid understanding of the components of student satisfaction, and facilitate improvements

Table 7. Instructors scores based on college and time-related factors

Item No.	Data Collected in 2010			Data Collected in 2012		
	All Instructors Mean score	**IT College Mean Score**	**Other College Mean Score**	**All Instructors Mean Score**	**IT College Mean Score**	**Other College Mean Score**
I1	3.22	3.00	4.25	3.27	3.33	3.11
I2	2.89	3.00	3.50	3.03	2.95	3.22
I3	2.83	2.86	3.50	3.37	3.33	3.44
I4	2.06	2.14	2.25	2.37	2.38	2.33
I5	3.89	3.93	4.00	4.1	4.19	3.89
I6	4.61	4.50	5.00	4.4	4.43	4.33
I7	3.22	3.29	3.50	3.73	3.43	4.44
I8	4.11	4.14	4.00	3.67	3.57	3.89
I9	4.5	4.36	5.00	3.97	3.81	4.33
I10	2.94	2.79	4.00	3.4	3.38	3.44
I11	2.33	2.50	3.00	3.17	3.19	3.11
I12	2.33	2.50	3.25	3.23	3.24	3.22
I13	2.28	2.21	2.75	2.47	2.33	2.78
I14	2.72	2.50	3.50	3.3	3.24	3.44
I15	3.33	3.14	4.00	3.53	3.48	3.67
I16	4.22	4.43	3.50	4.27	4.24	4.33
I17	3.07	3.14	3.00	3.33	3.24	3.56
I18	4.28	4.57	3.25	3.77	3.67	4
I19	3.5	3.36	4.00	3.8	3.86	3.67
I20	3.78	3.79	3.75	4.2	4.52	3.44

in the quality of blended learning courses offered. Being able to understand the needs of students, to support students in blended learning courses, and to promote a successful learning experience will be critical to the overall success of blended learning in the university. However, in order to do so, a larger sample will be required, which should include face-to-face and blended learning courses. This would also help to determine the reason for differences in satisfaction based on a wide range of criteria: course, instructor, gender, age difference, socioeconomic status, previous blended learning course experience, organizational issues, proficiency in a learning management system (Moodle), or work experience, personality or other student demographics. Recommendations for improving overall learning outcomes could also be made.

Research should also be extended to investigate the relation between instructor satisfaction and student satisfaction. Further research is equally needed to assess the difference in student satisfaction between blended learning and face-to-face learning through the comparison of blended learning courses with the same courses offered by the face-to-face method.

Future research into the development of effective multimedia resources would be beneficial to students and instructors alike.

Finally we believe that continuous and careful monitoring of learner satisfaction will ensure the success, feasibility and viability of blended learning as a supporting educational technology tool in university study programs.

CONCLUSION

This study has shown that lecturing via blended videoconferencing did not adversely affect students' academic performance or their ability to learn effectively. However, it was found that the approach is:

- More suitable to classes with a small number of students, as instructors may concentrate on delivering the course material rather than on handling distraction and disciplinary issues.
- Less suitable for courses which require the acquisition of practical skills such as learning programming. In such courses, the instructor gives students enough time to solve problems related to teaching objects in the classroom. Solutions are then discussed with the instructor in order to highlight points of strength and those of weakness in each student's answers. This process cannot be fulfilled by the current blended learning classes delivered at AUST.

Contrary to what was thought to be complicated technology, instructors and students have found it reliable, user-friendly and enriching their learning experience. This is important because unreliable technology could frustrate instructors and students in course itself and lower satisfaction level.

Although it had been feared that instructors and students would find the technology too complicated, they have found it reliable and user-friendly, instead. This study has also concluded that instructor satisfaction with blended learning improves with time, and that instructors should therefore be given time and incentives to prepare the course material and adjust their teaching approach to suit the blended teaching/learning approach. To help the instructor control disruptive students in the remote classroom, the university made a class supervisor available upon instructor request. This system has worked well where it has been used.

The study has also revealed that in the blended videoconferencing delivery mode, as in other aspects of the teaching/learning process, the instructor plays an important role. Besides having knowledge of the course material, s/he has to be well prepared, and be a good communicator, presenter and facilitator. For these reasons, the pedagogical skills of the instructor are extremely important.

Finally, we believe that with time, blended learning will become increasingly widespread within institutions of higher education. It offers students the opportunity to be exposed to alternative learning approaches and become involved in collaborative learning, both locally and internationally.

REFERENCES

Abel, R. (2005). Implementing best practices in online learning. *EDUCAUSE Quarterly*, *28*(3), 75–77.

Alebaikan, R. (2010). *Perceptions of blended learning in Saudi universities*. (Unpublished PhD thesis). University of Exeter, Exeter, UK.

Alebaikan, R., & Troudi, S. (2010). Online discussion in blended courses at Saudi universities. *Procedia - Social and Behavioral Sciences, 2*(2), 507-514.

Allan, B. (2007). *Blended learning: Tools for teaching and training*. London: Facet.

American Psychological Association. (1997). *Learner-centered psychological principles: A framework for school redesign and reform*. Washington, DC: APA.

Arbaugh, J. B. (2000). Virtual classroom characteristics and student satisfaction with Internet-based MBA courses. *Journal of Management Education*, *24*(1), 32–54. doi:10.1177/105256290002400104

Aycock, A., Garnham, C., & Kaleta, R. (2002). Lessons learned from the hybrid course project. *Teaching with Technology Today*, *8*(6), 1–6.

Bailey, C. J., & Card, K. A. (2009). Effective pedagogical practices for online teaching: Perception of experienced instructors. *The Internet and Higher Education*, *12*(3), 152–155. doi:10.1016/j.iheduc.2009.08.002

Booker, Q. E., & Rebman, C. E. (2005). E-student retention: Factors affecting customer loyalty for online program success. *Issues in Information Systems*, *1*(1), 183–189.

Chute, A. G., Thompson, M. M., & Hancock, B. W. (1999). *The McGraw-Hill handbook of distance learning*. New York: McGraw-Hill.

De George-Walker, L., & Keeffe, M. (2010). Self-determined blended learning: A case study of blended learning design. *Higher Education Research & Development*, *29*(1), 1–13. doi:10.1080/07294360903277380

Donahue, T. L., & Wong, E. H. (1997). Achievement motivation and college satisfaction in traditional and non-traditional students. *Education*, *118*(2), 237–243.

Dziuban, C. D., Hartman, J., Juge, F., Moskal, P. D., & Sorg, S. (2006). Blended learning enters the mainstream. In C. J. Bonk & C. R. Graham (Eds.), *Handbook of blended learning: Global perspectives, local designs* (pp. 195–208). San Francisco, CA: Pfeiffer Publishing.

Dziuban, C. D., Hartman, J. L., & Moskal, P. D. (2004). *Blended learning*. EDUCAUSE Center for Applied Research, Research Bulletin. Retrieved from http://connect.educause.edu/Library/Abstract/BlendedLearning/40089

Garnham, C., & Kaleta, R. (2002). Introduction to hybrid courses. *Teaching with Technology Today, 8*(6).

Garrison, D., & Vaughan, N. (2008). *Blended learning in higher education: Framework, principles, and guidelines*. San Francisco, CA: Jossey-Bass.

Garrison, D. R. (2011). *E-learning in the 21st century: A framework for research and practice* (2nd ed.). London: Routledge/Taylor and Francis.

Gerbic, P., & Stacey, E. (2009). Conclusion. In E. Stacey & P. Gerbic (Eds.), *Effective blended learning practices: Evidence-based perspectives in ICT facilitated education* (pp. 298–311). Hershey, PA: Information Science Reference. doi:10.4018/978-1-60566-296-1.ch016

Giannousi, M., Vernadakis, N., Derri, V., Michalopoulos, M., & Kioumourtzoglou, E. (2009). Students' satisfaction from blended learning instruction. In *Proceedings of the TCC Worldwide Online Conference*, (pp. 61-68). TCC.

Gould, T. (2003). Hybrid classes: Maximizing institutional resources and student learning. In *Proceedings of the 2003 ASCUE Conference* (pp. 54-59). Myrtle Beach, SC: ASCUE.

Graham, C., Allen, S., & Ure, D. (2005). Benefits and challenges of blended learning environments. In M. Khosrow-Pour (Ed.), *Encyclopedia of information science and technology* (pp. 253–259). Hershey, PA: Idea Group. doi:10.4018/978-1-59140-553-5.ch047

Greenberg, A. (2004). *Navigating the sea of research on videoconferencing-based distance education: A platform for understanding research into the technology's effectiveness and value.* Wainhouse Research. Retrieved from http://www.wainhouse.com/files/papers/wr-navseadistedu.pdf

Guri-Rosenblit, S. (2009). *Digital technologies in higher education: Sweeping expectations and actual effects*. New York: Nova Science.

Hartman, J., Dziuban, C., & Moskal, P. (2000). Faculty satisfaction in ALNs: A dependent or independent variable? *Journal of Asynchronous Learning Networks*, *4*(3), 155–179.

Hijazi, S., Crowley, M., Smith, M. L., & Shaffer, C. (2006). *Maximizing learning by teaching blended courses, conference proceedings of the 2006 ASCUE conference.* Retrieved from http//fits.depauw.edu/ascue/proceedings/2006/Papers/p. 67.pdf

Holley, D., & Oliver, M. (2010). Student engagement and blended learning: Portraits of risk. *Computers & Education*, *54*(3), 693–700. doi:10.1016/j.compedu.2009.08.035

Iqbal, A., Kokash, H., & Al-Oun, S. (2011). The impact assessment of demographic factors on faculty commitment in the Kingdom of Saudi Arabian universities. *Journal of College Teaching and Learning*, *8*(2), 1–13.

Kaleta, R., Skibba, K., & Joosten, T. (2007). Discovering, designing, and delivering hybrid courses. In A. G. Picciano & C. D. Dziuban (Eds.), *Blended learning: Research perspectives* (pp. 111–144). Needham, MA: Sloan Consortium.

Knox, W. E., Lindsay, P., & Kolb, M. N. (1993). *Does college make a difference? Long-term changes in activities and attitudes*. Westport, CT: Greenwood Press.

Leonard, D. A., & DeLacey, B. J. (2002). *Designing hybrid online/in-class learning programs for adults* (Working Paper No. 03-036.2002). Cambridge, MA: Harvard University, Harvard Business School. Retrieved from http//www.hbs.edu/research/facpubs/workingpapers/papers2/0203/03-036.pdf

Littlejohn, A., & Pegler, C. (2007). *Preparing for blended e-learning*. London: Routledge.

Lock Haven University. (2004). *Assessment plan for programs using distance education.* Retrieved from http://www.lhup.edu/planning-andassessment/assessment/assessmentplan/Distance%20 Education%20Assessment%20Plan%2012-03-04.doc

MacDonald, J. (2008). *Blended learning and online tutoring: Planning learner support and activity design* (2nd ed.). Aldershot, UK: Gower.

Moore, J. C. (2009). A synthesis of Sloan-C effective practices: December 2009. *Journal of Asynchronous Learning Networks*, *13*(4), 74–94.

Najafabadi, A. T., & Najafabadi, M. O. (2011). Learner satisfaction for a hybrid course in probability. *Journal of Emerging Trends in Computing and Information Sciences*, *2*(1), 30–36.

Napier, N. P., Dekhane, S., & Smith, S. (2011). Transitioning to blended learning: Understanding student and faculty perceptions. *Journal of Asynchronous Learning Networks*, *15*(1), 20–32.

Niemiec, M., & Otte, G. (2010). An administrator's guide to the whys and hows of blended learning. *Journal of Asynchronous Learning Networks*, *14*(1), 91–102.

Ocak, M. A. (2011). Why are faculty members not teaching blended courses? Insights from faculty members. *Computers & Education*, *56*(3), 689–699. doi:10.1016/j.compedu.2010.10.011

Orton-Johnson, K. (2009). I've stuck to the path I'm afraid: Exploring student non-use of blended learning. *British Journal of Educational Technology*, *40*(5), 837–847. doi:10.1111/j.1467-8535.2008.00860.x

Osguthorpe, R. T., & Graham, C. R. (2003). Blended learning environments: Definitions and directions. *The Quarterly Review of Distance Education*, *4*(3), 227–233.

Picciano, A. G. (2002). Beyond student perceptions: Issues of interaction, presence, and performance in an online course. *Journal of Asynchronous Learning Networks*, *6*(1), 21–40.

Riffell, S. K., & Sibley, D. F. (2004). Can hybrid course formats increase attendance in undergraduate environmental science courses? *Journal of Natural Resources and Life Sciences Education*, *33*, 1–5.

Russo, T. C., & Benson, S. (2005). Learning with invisible others: Perceptions of online presence and their relationship to cognitive and affective learning. *Journal of Educational Technology & Society*, *8*(1), 54–62.

Samover, L. A., Porter, R. E., & McDaniel, E. R. (2009). *Communication between cultures*. Belmont, CA: Wadsworth.

Sharma, P., & Barrett, B. (2007). *Blended learning: Using technology in and beyond the language classroom*. Oxford, UK: Macmillan Education.

Sinclaire, J. (2011). Student satisfaction with online learning: Lessons from organizational behavior. *Research in Higher Education Journal*, *11*, 1–18.

Sloan. (2011). *The 5 pillars of quality online education*. The Sloan Consortium. Retrieved from http://sloanconsortium.org/5pillars

Story, A. E., & DiElsi, J. (2003). Community building easier in blended format? *Distance Education Report*, *7*(11), 2–7.

Sun, P.-C., Tsai, R. J., Finger, G., Chen, Y.-Y., & Yeh, D. (2008). What drives a successful e-learning? An empirical investigation of the critical factors influencing learner satisfaction. *Computers & Education*, *50*(4), 1183–1202. doi:10.1016/j.compedu.2006.11.007

Swan, K. (2001). Virtual interaction: Design factors affecting student satisfaction and perceived learning in asynchronous online courses. *Distance Education*, *22*(2), 306–331. doi:10.1080/0158791010220208

Sweeney, J. C., & Ingram, D. (2001). A comparison of traditional and web-based tutorials in marketing education: An exploratory study. *Journal of Marketing Education*, *23*(1), 55–62. doi:10.1177/0273475301231007

Thurmond, V. A., Wambach, K., Connors, H. R., & Frey, B. B. (2002). Evaluation of student satisfaction: Determining the impact of a web-based environment by controlling for student characteristics. *American Journal of Distance Education*, *16*(3), 169–189. doi:10.1207/S15389286AJDE1603_4

Vaughan, N. (2007). Perspectives on blended learning in higher education. *International Journal on E-Learning*, *6*(1), 81–94.

Vignare, K., & Starenko, M. (2005). *Blended learning pilot project: Final report for 2003-2004, and 2004-2005*. Retrieved from https://ritdml.rit.edu/handle/1850/276

Wallace, L., & Young, J. (2010). Implementing blended learning: Policy implications for universities. *Online Journal of Distance Learning Administration*, *13*(4).

Wingard, R. G. (2004). Classroom teaching in web-enhanced courses: A multi-institutional study. *EDUCAUSE Quarterly*, *27*(1), 26–35.

Wu, H., Tennyson, R. D., & Hsia, T. (2010). A study of student satisfaction in a blended e-learning system environment. *Computers & Education*, *55*(1), 155–164. doi:10.1016/j.compedu.2009.12.012

Young, J. R. (2002). Hybrid teaching seeks to end the divide between traditional and online instruction. *The Chronicle of Higher Education*, *48*(28), 33–34.

ADDITIONAL READING

Bersin, J. (2004). *The Blended Learning Book: Best Practices, Proven Methodologies, and Lessons Learned*. Pfeiffer Publishing.

Bliuc, A., Goodyear, P., & Robert A. Ellis, R. A. (2007). Research focus and methodological choices in studies into students' experiences of blended learning in higher education. *The Internet and Higher Education*, *10*(4), 231–244. doi:10.1016/j.iheduc.2007.08.001

Bonk, C. J., & Graham, C. R. (2006). *The handbook of blended learning: Global perspectives, local designs*. San Francisco, CA: Pfeiffer Publishing.

Brooks, L. (2009). *An analysis of factors that affect faculty attitudes toward a blended learning environment.* Ph.D dissertation, Faculty of the College of Education, TUI University, California.

Caulfield, J., & Aycock, A. (2011). *How to Design and Teach a Hybrid Course: Achieving Student-Centered Learning through Blended Classroom, Online and Experiential Activities*. Stylus Publishing.

Chickering, A. W., & Ehrmann, S. C. (1996). Implementing the Seven Principles: Technology as Lever. *AAHE Bulletin*, *49*(2), 3–6.

Freeman, M. (1998). Videoconferencing: a solution to the multi-campus large classes problem? *British Journal of Educational Technology*, *29*(3), 197–210. doi:10.1111/1467-8535.00064

Graham, C. R. (2006). Blended learning systems. Definitions, current trends and future directions. In C. J. Bonk & C. R. Graham (Eds.), *The handbook of blended learning: Global perspectives, local designs* (pp. 3–21). San Francisco: Pfeiffer.

Jung, I., Choi, S., Lim, C., & Leem, J. (2002). Effects of different types of interaction on learning achievement, satisfaction and participation in Web-based instruction. *Innovations in Education and Teaching International*, *39*(2), 153–162. doi:10.1080/14703290252934603

Michael Grahame Moore. (2013). *Handbook of Distance Education* (3rd ed.). Routledge.

Olson, D. M. (2003). *Student perceptions of hybrid classes at a notebook university.* The University of North Dakota. *ProQuest Dissertations and Theses.* Retrieved from http://search.proquest.com/docview/305315023?accountid=4488.

Rasmussen, R. C. (2003). *The quantity and quality of human interaction in a synchronous blended learning environment.* Brigham Young University. *ProQuest Dissertations and Theses.* Retrieved from http://search.proquest.com/docview/305345928?accountid=4488.

Singh, H., & Reed, C. (2001). *A white paper: Achieving success with blended learning.* ASTD State of the Industry Report, American Society for Training and Development. *Centra Software*. from http//www.centra.com/download/whitepapers/blendedlearning.pdf

Smart, K. L., & Cappel, J. J. (2006). Students' perceptions of online learning: A comparative study. *Journal of Information Technology Education*, *5*, 201–219.

Starenko, M., Vignare, K., & Humbert, J. (2007). Enhancing student interaction and sustaining faculty instructional innovations through blended learning. In A. G. Picciano & C. D. Dziuban (Eds.), *Blended Learning: Research Perspectives* (pp. 161–178). Needham, MA: Sloan Consortium.

Sutton, L. A. (2001). The principle of vicarious interaction in computer-mediated Communications. *International Journal of Educational Telecommunications*, *7*(3), 223–242.

KEY TERMS AND DEFINITIONS

Blended Learning: Blended learning is the teaching practice that combines an equal balance of traditional face-to-face and videoconference learning, complemented with the use of a learning management system.

Face-to-Face Teaching: A teaching method where students and the instructor who is delivering the course material are physically in the same classroom.

Instructor Satisfaction: Instructor satisfaction is defined as perception that the teaching experience in blended environment is a rewarding, effective and professionally beneficial.

Learning Management System (LMS): LMS is a software application or Web-based technology used to administer, plan, implement, track, and assess a specific learning process. Typically, a learning management system provides an instructor with a way to create and deliver content, quizzes, monitor student participation, and assess student performance.

Student Performance: The contentment of students regarding their understanding to the course material and their ability to get adequate grade in the overall course assessment.

Student Satisfaction: The subjective evaluation of a student's behavioral belief and attitude toward the various outcomes and experiences that student receives using blended learning.

Videoconference Classroom: A classroom where students can follow a lecture delivered at the same time by an instructor who is teaching another classroom via videoconferencing techniques.

This work was previously published in Multicultural Awareness and Technology in Higher Education edited by Tomayess Issa, Pedro Isaias, and Piet Kommers, pages 218-242, copyright year 2014 by Information Science Reference (an imprint of IGI Global).

Chapter 55
Blended Learning Experience of Graduate Students

Wafa Hozien
Virginia State University, USA

ABSTRACT

Blended learning has been in existence for over a decade, and more research needs to be done to determine its efficacy and desirability for colleges and universities. The goal of this chapter is to document the ways in which blended learning has changed the university learning experience for graduate students. End-of-semester student questionnaires were analyzed, and it was found that even in the early years of blended learning, students were generally satisfied and appreciated the convenience of the blended modality. Quantitative and qualitative data was collected through the questionnaires, a student focus group, and faculty interviews. The goal of this chapter is to answer the questions: How do graduate students perceive the BL experience? What are the faculty's perspectives about changes in the delivery of instruction? How has the university learning experience been changed as a consequence of BL? Student priorities were teacher presence, faculty skill at teaching blended classes, and the support that was available to them from the faculty and administration. Faculty voiced concerns with transitioning from teaching face-to-face or online to teaching blended.

INTRODUCTION

To increase access to the growing adult population many colleges and universities offer blended learning programs that include a mix of face-to-face, online and hybrid courses. Teaching in a blended learning program requires that faculty members have instructional skills in multiple teaching and learning environments. This has become more challenging since while some receive training, many learn how to teach adults and multiple course delivery formats through experience. This qualitative study investigates graduate students' and faculty perceptions of how they teach adults within a blended program influences their teaching practices; how faculty describe the process of teaching in multiple course delivery formats within a blended program and to document the ways in which blended learning has changed the university learning experience for graduate students. Data were collected through semi-structured interviews, focus groups, background questionnaires and faculty observations.

DOI: 10.4018/978-1-4666-8246-7.ch055

Blended learning (BL) has sometimes been called the best of both worlds, combining the advantages of face-to- face instruction with the advantages of online learning. It has been in existence for over a decade, and more research needs to be done to determine its efficacy and desirability for colleges and universities (Bleed, 2006). The goal of this chapter is to document the ways in which blended learning has changed the university learning experience for graduate students. End-of-semester questionnaires administered to students were analyzed and it was found that blended learning with graduate students was generally satisfied with the experience and appreciated the convenience of the blended modality. Quantitative and Qualitative data was collected through the questionnaires, a student focus group and faculty interviews.

The goal of this chapter is to answer three questions. Namely, how do graduate students perceive the BL experience? What are the faculty's perspectives about changes in the delivery of instruction? How has the university learning experience been changed as a consequence of BL?

BACKGROUND

Researchers have attributed a number of benefits to BL, from improved learning outcomes, to increased student engagement and lower attrition compared to fully online learning (FOL) alone. Dziuban et al. (2004) studied student success rates (as defined by grades of A, B, or C) at the University of Central Florida for seven semesters beginning in spring, 2001, and concluded that student learning outcomes in BL classes were higher than in FOL classes and comparable or in some cases better than face-to-face (F2F). Even student attrition rates were favorable, with withdrawal rates lower than those of FOL and comparable to F2F. Dziuban et al attributed the success of BL courses to sound instructional design, the most effective courses being wholly redesigned rather than only supplemented with online elements. Osguthorpe and Graham (2003) explain that instructors use BL to attain various goals for their courses:

- **Pedagogical Richness:** Student learning can be improved by using class time for rich, in-depth activities, and online time for dispensing information.
- **Access to Knowledge:** The online portion of a BL course can be used to enhance accessibility to information for students. Web-based resources are vast in comparison to textbook content.
- **Social Interaction:** The social interaction present in blended learning environments (BLEs) may not be as prevalent as in FOL systems. Social contact can take place F2F and continue online.
- **Personal Agency:** The development of self-directedness and control by the learner is an important tenet of instructional design. BLEs offer students the opportunity to make choices in their learning, such as what and how they will study.
- **Ease of Revision:** Most BLEs grow out of F2F rather than FOL models; faculty often modify online components in response to student needs or the speed with which the course progresses. BL "has the potential to create a learning atmosphere that is flexible, responsive, and spontaneous" (p. 232).

Skibba (2006) found that connecting F2F and online activities establishes a *continuous learning loop* that creates an active and meaningful learning experience. When instructors reflect upon their course learning objectives and decide which activities work best F2F and which work better online, they can set up a learning experience that transfers seamlessly from one modality to the other, thus creating a learning loop that takes the student from the beginning of learning to using knowledge in meaningful ways. Skibba noted examples such as sharing students' online postings in class to generate richer F2F discussions, and commencing group work online and carrying over activities to the classroom environment.

QUESTION OF THE DAY

Due to the progress in BL, it is time to assess the effect of Blended Learning has had on the learning experience of graduate students. Has it lived up to its potential? Is it working equally as well for graduate students as for those in 4-year colleges and universities? Earlier research on BL and its effect on the student learning experience focused on community colleges. Colleges and universities are increasingly offering open access, developmental courses, technical training, and transfer programs for their students (Vaughan, 2006), differentiating them from universities as well as accepting Massive Open Online Courses (MOOC) from organizations such as coursera. As many colleges and universities offer both BL and FOL (Allen, Seaman, & Garrett, 2007), it is important for students to know whether pursuing BL as a learning modality would be worth the time and effort.

Some university administrators had urged faculty to present their courses in the BL format for practical reasons, such as utilization of scarce classroom space, but faculty wanted to know how BL would affect the student, the university as a whole, and their course goals.

BL had been in existence since 2005 in some universities in Virginia, and questions had arisen as to its impact on the graduate student learning experience (Donahue, 2010). Administrators and faculty alike wanted to know not only BL's effect on graduate students' effect on retention and graduate student satisfaction. Although faculty had a "gut feeling" about BL's success, department chairs, without qualitative data, had expressed concerns that graduate students may simply be using BL as an excuse for less time in the classroom. BL's appropriateness for university graduate students who were struggling with graduate-level learning also had been in question.

Although offering more BL or FOL courses may be an attempt to increase graduate student access choices, it must be done with an eye on learning effectiveness. Vignare (2007), in her review of the literature on BL, concluded that more studies must be done on BL and its effectiveness, stating that research measuring the constructs of retention, completion, perceived learning, and shifts in cognitive presence is more difficult to find for BL and that it is more ambiguous.

Garrison and Vaughan (2008) urge higher education to "start delivering on its promise of providing learning experiences that engage and address the needs of society in the twenty-first century" (p. 7). They maintain that the lecture method of teaching, originating in antiquity, is a way of disseminating knowledge that is no longer effective in engaging learners in critically filtering and making sense of the overabundance of information confronting them. Constructing meaning of complex topics requires more engagement than is possible in a typical lecture. BL has the potential to enhance both online and F2F approaches, where each is improved by the presence of the other (Melton, et.al, 2009).

In earlier work, Garrison and Kanuka (2004) argued that as new forms of communication alter the way we learn and work, the traditional classroom paradigm is questioned. As tuition rises, graduate students are demanding higher quality learning experiences and wonder whether attending classes on a traditional schedule is worth the commute to campus due to their full time work and parenting schedules. BL may be the answer for both institutions and graduate students as they move toward more flexibility in time and space. But this purported answer must be assessed and evaluated as to its effectiveness. More research is needed on the impact that BL will have in terms of learning outcomes, student satisfaction, retention, and achievement.

THE STUDY

The study took place at a suburban Virginia university. A mixed method research design was followed, but because of the small population (students taking BL courses), generalizability to larger, urban university may be limited. The number of faculty teaching BL courses was also limited, so interviews represented only a small number of total university faculty.

A focus group was convened as one of the data collection tools utilized in the study. Although best efforts were made to populate the group with a representative sample of the graduate student body, the limited number of graduate students who volunteered to participate in the focus group affected this plan. Although the demographics did not perfectly match the population, the focus group did contain an acceptable variety of participants.

LITERATURE REVIEW

Defining the concept of *blended learning* has been the topic of much discussion by those researching it. According to Osguthorpe and Graham (2003), BL is a process that combines F2F and distance delivery systems, utilizing the Internet and pedagogies that are focused on the unique needs of learners. They rebuff the contention that anytime the Internet is used, it is considered BL. Instructors using BLEs make a distinction: They seek to maximize the benefit of both delivery systems, using the World Wide Web for what it does best, and using classroom time for what it does best.

Graham (2006) defines BL as a process that combines F2F instruction with computer-mediated instruction. He rejects earlier, broad definitions that maintain BL combines delivery media or instructional methods. It is his position that those definitions dilute the real meaning of BL and that it would be difficult to find learning systems that did not make use of multiple instructional methods or delivery media. Instead, he prefers the more specific definition involving F2F instruction and the central role computer based technologies play in BL.

Another definition by Garnham and Kaleta (2002), adds the element of *replaced seat time* to the combination of F2F and online activities. To add to the convolution of definitions, Garnham and Kaleta use the term *hybrid* to define what is currently referred to as *blended* in the literature. The goal of hybrid, or blended, courses is not only to combine the best features of F2F and FOL learning, but to promote active independent learning, reduce seat time, and to redesign some course content into new learning activities, such as case studies, tutorials, self-testing exercises, simulations, and online group collaborations. In much of the early literature on BL, a distinction was not made as to the absence or presence of reduced seat-time, but more on the addition of technology supported learning activities added onto a classroom environment that was originally F2F (Bliuc, Goodyear, & Ellis, 2007).

The question of definition, and the terms used to describe it, becomes important in research so that consistency can be attained and valid inferences can be made. The current literature contains discourse on a variety of "blended" and "hybrid" topics, but Osguthorpe and Graham (2003) maintain that the term *blended* best describes the balance and harmony sought in the course delivery method. The key, states Skibba (2006), is that the BL course is learner-centered, providing a variety of choices, meaningful activities, and opportunities for student interaction.

Allen et al. (2007) define blended courses as having between 30% and 79% of content delivered online. They state that blended courses (which they also refer to as hybrid) "typically [use] online discussions, and typically [have] some face-to-face meetings" (p. 5). FOL is defined as more than 80% of content delivered online, and courses with 29% or less online content as "web facilitated," but essentially F2F. Those courses that have no online technology use are labeled as "traditional".

For purposes of the study, the investigator used the following definition, agreed upon by invited participants at the 2005 Sloan-C Workshop on Blended Learning (Picciano, 2007, p. 9):

Courses that integrate online with traditional face-to-face class activities in a planned, pedagogically valuable manner, and where a portion (institutionally defined) of face-to-face time is replaced by online activity.

The term used to define the courses in which BL takes place will be referred to as *blended.*

The key phrase in the above definition is integration *in a planned, pedagogically valuable manner.* Undesirable blends can take place which bring together the weaknesses of F2F and FOL learning, rather than the strengths. For instance, the F2F portion of the course may emphasize poorly-delivered lectures with no student participation, and the online element may stress tedious, over-prompted practice (Osguthorpe & Graham, 2003).

Graham (2006) illustrates the importance of understanding the strengths and weaknesses inherent in F2F and BLEs by using the example of class discussions. Besides being one of the most common instructional methods, class discussions focus on learner interaction, rather than knowledge transmission. This makes the class discussion an excellent vehicle in which to analyze which type of instruction is best suited to meet instructional goals. For instance, one of the strengths of BLEs is that student participation is increased because time and space constraints are removed; this would be advantageous in large-enrollment classes in that everyone has the opportunity to contribute to a class discussion. Conversely, instructors may choose to use classroom time for discussions if they find students are procrastinating and may be unmotivated; a lively F2F discourse, where enthusiasm for the topic can be communicated through voice and gesture, may be the best choice in these circumstances. Graham notes, however, that a weakness of F2F discussions is that dominant personalities may control the discussion at the expense of shy or quiet students. In that case, perhaps an online discussion, where students are afforded the time for more thoughtful reflection on the topic, would be best suited to meet instructional goals.

BL's strengths and weaknesses were further studied by Jackson and Helms (2008) who concluded that blended, or hybrid, courses are characterized by the best and the worst of both online and F2F formats. They utilized the method of SWOT analysis, a technique that facilitates free-form discussion and helps to identify key criteria and issues surrounding a problem or decision. The term SWOT is an acronym for its components: strengths, weaknesses, opportunities, and threats. They surveyed students in three sections of two senior-level business courses about how the students perceived the BL experience. Results showed that students cited an almost equal number of strengths as weaknesses, suggesting the existence of trade-offs in the BLE, and that some of the strengths were simultaneously listed as weaknesses. For example, the advantage of spending less time in class may be identified by a student as strength, while having less time in the classroom for learning from the professor or other students may be recognized as a weakness. Jackson and Helms (year) admit that their findings differ from prior research, and suggest that future researchers validate their findings with additional student respondents.

Results of studies done on the impact of BL on the learning experience range from no significant difference to the transformation of higher education. Carmel and Gold (2007) used the constructs of student satisfaction, retention, and grade point average (GPA) to determine the effect course modality had on program success. As the subjects self-selected either blended or F2F course modality, the authors suggest that the students possessed the attributes likely to have made their learning experiences satisfactory in the chosen modalities. There were no significant differences in satisfaction, retention, or GPA between the F2For blended classes.

BL has tremendous potential to transform higher education (Garrison & Kanuka, 2004). As the Internet and electronic communication technologies have transformed much of society, those components have also transformed education. FOL learning holds the advantage of allowing students to be both together and apart, connected to a learning community without being bound by place or time. Similarly, BL facilitates a community of learners who are connected through Internet communication technologies. When combining the emphasis on writing in an electronic communication, which encourages reflection, with fast-paced, spur-of-the-moment verbal communication, learning possibilities are increased. The F2F community-building opportunities, together with the open communication and unlimited access to information on the Internet, make BL particularly effective at facilitating a community of learning and inquiry. Free and open dialog, critical debate, negotiation, and agreement are the hallmarks of higher education.

According to Shea (2007), a conceptual framework should include answers to questions on how learning occurs in general, how it takes place among adult learners, and how it happens in technology-mediated environments. He suggests Bransford, Brown, and Cocking's (2000) *How People Learn* (HPL) framework to view learning in a blended environment generally. Bransford and his colleagues found that successful learning environments shared the characteristics of being learner-centered, knowledge-centered, assessment-centered, and community-centered. Shea goes on to explain the HPL framework in terms of BL.

For BLEs to be learner-centered, activities must center on the goals, objectives, needs, and interests of the learner. Instructors and designers should not only understand who their students are, but they should also create learning activities that align with their students' abilities—and passions—and that put learners in active roles. For instance, it is desirable to help students understand that their approaches to learning vary, and that they can leverage their strengths and different approaches to make the most of the learning experience. Although Shea (2007) concedes that these issues are also implied in principles of good practice in undergraduate education, the concern in blended environments is how to give learners more responsibility, ownership, and understanding of their learning.

In relation to knowledge-centeredness, BLEs can utilize mechanisms available in F2F and online instruction to emphasize active learning that centers on depth of understanding. Knowledge-centered environments focus on enhancing understanding, rather than on memorization; students *participate in* the discipline, instead of simply learning *about* it (Shea, 2007). BLEs provide the setting in which to combine F2F and online pedagogy to effectively promote learning with understanding. Assessment-centered BLEs, as described by Shea (2007), should help learners "make their thinking visible" (p. 23), so that they may gain feedback and assessment of their understanding. In designing quality learning environments, certain types of assessment are more effective in person or online, and rationales for choosing one type of modality over the other should facilitate frequent evaluation of understanding. BLEs present the opportunity for designing assessments that provide formative feedback, not only conventional, summative evaluation.

Finally, the last characteristic of the HPL framework centers on community. Learning environments that promote a sense of connectedness, collaboration, and safety are more effective in fostering learning (Bransford et al., 2000, as cited in Shea, 2007). To follow through on Shea's (2007) vision of a conceptual framework for BL, understanding how adults learn is an important lens through which to view BL. Perhaps the best known theory of adult learning is that of *andragogy.* Knowles (2005) compared the popular theory of *pedagogy*, the art and science of teaching children, with a more accurate model for teaching adults, *andragogy.* He maintained that the assumptions we make about teaching children do not hold true for adults. For instance, in the pedagogical model, learners are dependent personalities, learning what the teacher teaches and having little say in what is taught and how instruction is delivered. The andragogical model allows for learner self-direction, and the role of the teacher becomes that of a guide, conqueror, or resource person.

Knowles (2005) is careful to point out that the models of pedagogy and andragogy are not mutually exclusive, although he originally presented them as such in his early writings (1970). Through the years, teachers in elementary and secondary schools adopted some of the tenets of andragogy and found that they worked well with their students. Conversely, some teachers of adults found instances where the andragogical model did not work. In practice, Knowles recommended that educators determine which assumptions are practical in a given situation. Sometimes a pedagogical approach is appropriate, such as when an adult learner is dependent because of the newness of the subject matter, or if he has no previous experience with the content area.

However, the ideological pedagogy and andragogy part ways when moving forward. The pedagogy will insist that learners remain dependent upon the teacher, whereas the ideological andragogy will strive to help learners take increasing responsibility for their own learning. The last of Shea's (2007) elements of a BL framework hinges on how learning occurs in technology-mediated environments. The Community of Inquiry (CoI) model integrates the constructs of *cognitive presence, social presence,* and *teaching presence* to guide the design of meaningful learning experiences. Originally developed by Garrison, Anderson, and Archer (2000) as a framework for online learning, Garrison and Vaughan (2008) have applied the CoI model to BL.

CoI model illustrates the interdependence between and among the presences, each supporting the others. Garrison et al. (2000) maintain that these elements are "crucial prerequisites for a successful higher educational experience" (p. 87). Most basic to achievement in higher education is *cognitive presence,* which they define as the extent to which learners in a CoI are able to construct meaning through sustained communication. An essential element of critical thinking, cognitive presence is identified in an online environment by discourse encompassing a sense of puzzlement, exchange of information, connection of ideas, and application of new ideas. Garrison and his colleagues argue that although computer (text-based) communication lacks the dynamics of F2F dialog, it has the advantage of providing time for reflection. The literature suggests that written communication facilitates higher-order learning objectives, such as careful and critical thinking about complex issues (Garrison et al., 2000).

Teaching presence is indicated by instructional management, building understanding, and direct instruction. Instructional management involves planning and organizational guidelines, such as setting curriculum, designing assessments, and establishing deadlines. Building understanding occurs when individual contributions are acknowledged and reinforced, discussion is focused, and less active participants are drawn in. Direct instruction, as the term implies, is concerned with content, answering questions, and guiding and summarizing discussions (Garrison et al., 2000). In a BLE especially, teaching presence is the unifying force in bringing together the cognitive and social presences. Its unifying force helps sustain a CoI when students are shifting between F2F and computer mediated communication (Garrison & Vaughan, 2008).

Student Environment

This section will describe the elements that make up the learning experience of graduate university students. As mentioned previously, for purposes of this study, the learning experience will encompass student satisfaction, engagement and motivation; successful acquisition of knowledge; course delivery methods; and faculty and institutional support. Although some authors compartmentalize the learning experience into what happens in the classroom (Fink, 2003), others broaden their scope to include other variables, such as faculty and institutional support, financial aid, and quality of instruction (Herbert, 2006). This section will illustrate the interconnection among the elements of the student learning experience.

So and Brush (2008) define student satisfaction as "an affective learning outcome indicating the degree of: (a) learner reaction to values and quality of learning, and (b) motivation for learning" (p. 323). An understanding of the elements of student satisfaction, while related to engagement and motivation, can be gained by looking at the items most likely to be measured by higher education institutions in determining the satisfaction of their own students.

The Noel-Levitz Student Satisfaction survey includes the following scales measuring student satisfaction (Bryant, 2006):

- **Academic Advising and Counseling:** The comprehensiveness of a college or university advising program, including advisor knowledge, competence, approachability, and concern for student success.
- **Academic Services:** Services, such as library, computer labs, tutoring, and study areas.
- **Admissions and Financial Aid:** The institution's ability to enroll students efficiently; the competence and knowledge of admissions counselors and the availability of financial aid programs.
- **Campus Climate:** The extent to which a college or university fosters activities that promote a sense of campus pride and feelings of belonging; the proficiency of communication channels with students.
- **Campus Support Services:** The quality of support services that allow students to make their educational experiences more meaningful and productive; programs and services such as career counseling and new-student orientation.
- **Concern for the Individual:** Groups dealing with students on a personal level (such as faculty, advisors, and campus staff) and their commitment to treating each student as an individual.
- **Instructional Effectiveness:** The effectiveness of students' academic experiences, the curriculum, and the institution's commitment to academic excellence; the effectiveness of faculty inside and outside the classroom, course content, and sufficiency of course offerings.
- **Registration Effectiveness:** The institution's commitment to making the registration and billing process as smooth and effective as possible.
- **Responsiveness to Diverse Populations:** Commitments to populations that are historically underrepresented in higher education: those with disabilities, commuters, part-time students, and older, returning students.
- **Safety and Security:** The effectiveness of security personnel and campus facilities that promote students' personal safety and security on campus.
- **Service Excellence:** The perceived attitudes of college or university staff, particularly those dealing with students directly.
- **Student Centeredness:** The extent to which students feel welcome and valued.

The National Survey of Student Engagement (2012) measures characteristics of the student experience that are linked to student success. The five benchmarks that gauge the most important aspects of the student experience are described here:

- **Active and Collaborative Learning:** Students learn better when they are actively involved in their education and can apply what they learn in different contexts. Examples of active and collaborative learning include asking questions in class, making presentations, and working with classmates outside of class to prepare assignments.
- **Student Effort:** Students who apply themselves to the learning process, spending "time on task," are likely to achieve their educational goals. Studying, rehearsing, using peer or other tutoring, and reading for academic enrichment are indicators of student effort.
- **Academic Challenge:** Challenging and creative coursework is central to student learning and quality of education. The standards and expectations of instructors, the complexity of cognitive tasks presented to students, and assessment instruments that challenge students to do their best are indicators of the quality of learning.
- **Student-Faculty Interaction:** Personal interaction with faculty helps students learn more effectively, and they are more likely to persist in attaining their educational goals. This interaction strengthens the student's connection to the college, and faculty become role models, mentors, and guides in encouraging lifelong learning.
- **Support for Learners:** Student satisfaction is higher at colleges that are committed to their success; students in particular benefit from career planning and academic skill development. Colleges and universities that nurture positive working and social relationships among different campus groups are also rated higher in student satisfaction.

The items listed above encompass many aspects of the student learning experience and some similarity among items that should be noted. Satisfaction with other course modalities, such as BL and FOL, relies on many of the same constructs. So and Brush (2008) developed a questionnaire on student perceptions of collaborative learning, social presence, and satisfaction in a BLE. Among the items used to measure student satisfaction were engagement (participation in discussions), perceived usefulness of the course learning experience, and achievement of learning expectations. Jackson and Helms (2008) note that meeting or exceeding student expectations in the use and application of technology affects their perception of the quality of education.

Bean and Bradley (1986) and Pascarella, et. al (2005) explored the relationship between performance and satisfaction. An interesting discovery they made related to the differences between men and women in the effect satisfaction had on grade point average (GPA), the measure they used to represent academic performance. For men, satisfaction did not play as prominent a role in performance as it did in women; men were able to perform well or poorly independent of their level of satisfaction. Men's levels of satisfaction were influenced more by academic integration, defined as being "interested, motivated, and confident as a student" (p. 395). For women, the effect of satisfaction on GPA was nearly twice as large as the effect of GPA on satisfaction. Bean and Bradley's study was limited by the fact that their sample consisted of white, single university students with a GPA of at least 2.0.

Today's university graduate student population is quite different. However, it does serve to illustrate that relationships exist between student satisfaction and, as measured by GPA, student success. Povasnik, et. al (2007) and Astin (1993) studied the factors that affect students' college experiences. Lack of student community, one of the variables measured by Astin, was associated with *not* wanting to re-enroll in the same college. Lack of student community pertains to poor socialization among students, little contact among students, and student apathy. It has, according to Astin, the strongest direct negative effect on student satisfaction with the overall college experience. In addition, it impacts negatively on emotional health and student life. Conversely, lack of student community has a direct positive effect on the view that the primary benefit of college is to increase one's earning power. It would appear that creating a stronger sense of community would increase student satisfaction, emotional health, and students' positive perceptions of the college or university experience.

A strong sense of community in the classroom was found to positively impact student enjoyment and learning by McKinney, McKinney, Franiuk, and Schweitzer (2006). McKinney and his colleagues found a strong relationship between sense of community and each of the three variables. After the experimental treatment (classroom activities supporting sense of community) was applied, students perceived they learned better, they scored higher on exams, and they felt satisfied with the course.

More recently, Larson and Sung (2009) conducted a three-way comparison among FOL, BL, and F2F delivery modes. The same course taught by one instructor, but utilizing a different delivery mode, was examined. Using exams and final grades, they determined that there were no significant differences among the three modalities. Using student evaluation surveys, however, they noted interesting results. Regarding the construct of student satisfaction, they found that 52% of students felt that their interest in the subject (Management Information Systems) increased as a result of taking the blended course, versus 38% for FOL and 40% for F2F. Motivation was also higher in the blended delivery mode: more students taking the BL class reported that they were motivated to work at their highest level, 78% for BL, 71% for FOL, and 52% for F2F.

From an institutional viewpoint, student satisfaction has been linked to institutional success; colleges with high levels of student satisfaction benefit from higher retention and graduation rates, lower loan default rates, and increased alumni contributions (Miller, 2003, as cited in Bryant, 2006). Colleges and universities can use the measurement of student satisfaction to identify their strengths and recognize areas that need improvement (Outcomes Working Group, 2003).

Relating Literature to Study

Blended learning has the potential to impact university graduate students in terms of the entire learning experience. As BL becomes more widespread, and universities take the necessary first look at the phenomenon, they will need to know what they are *getting into* and how others have fared before them. There is no doubt, based on the literature reviewed, that this is already happening. There remain gaps, however, in the literature regarding BL and graduate student learning experience; this study will contribute to closing this gap by providing a rich description of how BL has affected this large but relatively under-researched segment of higher education.

RESEARCH DESIGN

The investigation took place at a university in Virginia. The university is classified as a suburban research university, enrolling approximately 5,890 students. The student body is 62.2% female and 37.5% male. The graduate school has 18 full time faculty members are employed by the university. There are 34 full time graduate students and 414 part time graduate students enrolled in the graduate school.

The following characteristics of participants would result in a representative sample of BL graduate students:

- Twelve females and six males, or another combination maintaining this ratio.
- An even mix of full- and part-time students.
- Two-thirds should be age 21 or older.

More than the desired 20-30 participants were invited, as it was anticipated that there inevitably would be some "no-shows" (Stewart & Shamdasani, 1990). A fully representative sample was impossible to attain, but a best effort was made. Based on their extensive review of research on BL, Bliuc, et al. (2007) state that current research should be more *holistic* in nature than previous research, taking into account the different components of the learning experience, how they are integrated, and what this means in terms of learning. For BL, this would be gathering evidence about the online, or technology-supported aspect of the experience; evidence about the learning experience in a F2F context; and evidence of the connections between the two that would describe an integrated learning experience. This study *holistically* explored these complexities. Sharpe, Benfield, Roberts, and Francis (2006) state that holistic studies on blended learning "shed light on the complex interplay of the virtual and the physical and the choices that learners make in finding pathways to successful outcomes" (p. 54). The qualitative measures used contributed to understanding the complexities of the phenomenon.

RQ1: How do students perceive the BL experience?

At the research site, archival research existed that was undertaken when BL was first introduced at the university. This was in the form of end-of-semester questionnaires distributed to students taking BL classes. The first questionnaires were distributed at the end of the Fall 2012 semester and Winter intersession 2012. The nature of some of the open-ended questions included in the questionnaire resulted in broad, ill-defined responses. Therefore, the questions were revised for the Spring 2013 semester to include a set of choices, taken from data extracted from the open-ended questions in the previous instrument. This resulted in more usable data.

Only the demographics, opinion items, and questions relating to student satisfaction were used. Descriptive statistics (Gay et al., 2006) were used to quantitatively describe the learning experience of the students in the BLE at the university.

RQ2: What are the faculty's perspectives about changes in the delivery of instruction?

In order to answer this question an Interview Guide for Faculty was created. The purpose of the faculty interviews was to gain the instructor's perspective on BL. Even if students were generally satisfied with BL, if the faculty were uncomfortable or wary as to its worth for the time and trouble, it would ultimately fail. Therefore, questions were developed that would shed light on the instructor's perception of the worth of BL. For example, one of the questions dealt with changes in teaching F2F and/or FOL courses as a result of teaching a BL class, indicating the potential for professional development, definitely a worthy result. Also, questions dealing with advantages and disadvantages were designed to further investigate the faculty's viewpoint on teaching BL.

Questions were constructed, and then reviewed by five BL faculty members for clarity and ease of reply (Gay et al., 2006). The five faculty members had concerns that the interview questions were too lengthy, and comments from the reviewing faculty members were used to modify the questions to clarify intent. It was important to know how faculty teaching BL courses perceived the experience. Although research has shown (Dziuban et al., 2004) that faculty are generally satisfied with teaching blended courses, it was the intent of this chapter to dig deeper into this part of the student learning experience. Therefore, instructors who had taught or were currently teaching BL courses were interviewed in order to determine their perspectives on teaching in this delivery mode. Specifically, the semi-structured interviews probed for viewpoints on ease or difficulty in achieving course goals, problems inherent in teaching via the BL mode, enhancement of professional skills as a result of BL, and overall satisfaction. Twelve interviews took place.

Seidman (2006) recommends that interviews be audio taped in order to preserve the words of the participants, and interviewers can return to the transcripts to check for accuracy.

The following steps were taken to collect and analyze the data:

1. The investigator transcribed the interviews from the digital recorder. This allowed her to "know the interview better" (Seidman, 2006).
2. Faculty were given a copy of their interview transcript to assure that it was consistent with their intended meaning (Gay et al., 2006).
3. Finally, categories and sub-categories were reviewed and combined to fall under each of the six interview questions. This brought the data together and organized them into analyzable form. In addition, there were several categories that were found to stand on their own and became a part of the analysis of the faculty interviews.

The data analysis and coding was accomplished manually using word-processing software. The amount of data collected, although large, was not considered overwhelming; thus, qualitative data analysis software was not used.

RQ3: How has the university learning experience been changed as a consequence of BL?

This RQ was possibly the most important part of this chapter: It tied together the research that was conducted initially with the goal of this study. The university administrators and registrar were presented with the results of the three RQs and asked for written comments, i.e., to note if there were any surprises in the data (e.g., were the results better or worse than they expected), and if they saw any new opportunities or challenges contained within the data. Gay et al. (2006) state that qualitative research is descriptive and non-numerical; the researcher may choose which type of data collected will contribute to understanding the phenomenon. In this case, written comments were the most helpful in answering RQ3 and facilitated deeper, more well-thought-out responses than would be possible with an *off the cuff* interview.

The analyzed results were presented to the administrators in the form of a packet that was organized according to RQ. This document later became an invaluable tool in tying the data from various sources together. It made possible comparisons and contrasts among respondent groups and contributed to the holistic analysis that was desired for this chapter. Graphs were generated for the questionnaire Likert-type responses, and this made it easier to note trends and possible discrepancies among responses grouped by semester. Quotes from focus group participants and faculty interviewees were also included. The format was informal in nature, mostly in the form of bullet points, and this fluidity contributed to its ease of use, both for the administrators and the investigator.

Focus Group

Considerable care was given to the construction of the focus group, the data collection, and the analysis of the focus group data. Stewart and Shamdasani (1990) characterize the focus group as a well-planned research endeavor, not a haphazard discussion of a group of people who happen to be available. Thus, participants were recruited from several existing blended classes, being contacted personally by the investigator. Out of 35 students expressing interest in participating, 26 actually took part in the focus group. Although all students in the classes were invited, a mix roughly resembling the university population responded; that is, there were more part-time graduate students than full-time students, and females outnumbered males. The focus group convened for approximately 60 minutes on the university campus.

Stewart and Shamdasani (1990) recommend that focus groups take place in a nondescript setting with minimal distractions such as pictures, artwork, or props. In addition, communication is facilitated when participants are seated neither too close nor too far apart. Seating the group in a circle is advantageous for communication and also reduces the tendency for a particular member or members to emerge as dominating the discussion. Therefore, a conference room with minimal wall decorations was chosen, and the seating was arranged as closely as possible to a circle.

A moderator for the focus group was chosen who had experience in facilitating this type of research and who possessed most, if not all, of the above qualities. The moderator had no stake in the outcome of the research, thus reducing bias. The investigator attended the focus group and made notes on non-verbal communication, gestures, and behavioral responses occurring during the discussion (Stewart & Shamdasani, 1990).

RESULTS

The goal was to document ways in which BL is changing the university learning experience for graduate students. This chapter will describe the results of qualitative research undertaken. Qualitative research methods were used to analyze and observe the classroom experience and interaction between faculty and graduate students at the university level. Qualitative methods were used to examine student perceptions of the BL experience, faculty perspective, and to record the comments of administrators at the study site.

End of Semester Questionnaire

At the beginning of each questionnaire, demographic information was collected.

The percentage of males increased regularly from 31% in Spring 2013 to 57% in Fall 2012. However, the courses from which responses were received remained relatively consistent throughout the study period.

Student commute time was queried to determine if the reduction in seat time may be an incentive to take a blended course. More than half the students, 52%, characterized their commute as being between 30 and 60 minutes. Graduate students living near campus, spending 15 minutes or less travelling to the university, represented 12% of respondents. An almost equal percentage, 23%, spent 31-60 minutes travelling to university.

To gain a snapshot of the employment obligations of the graduate students and the amount of time they require, participants were asked if they worked outside the home and the number of hours they worked. More than 95% of graduate students worked, and of those who did work, 94% were on the job for 40 or more hours per week. The next highest percentage of students, 86%, worked 21 32 hours per week.

In general, graduate students did not feel they could communicate better online with either their instructors or their fellow learners. Email or discussion was not considered the favored method of communication. Thirty-six percent of students were neutral on whether they could communicate better with their instructor online than in the classroom.

Graduate students did feel that BL classes were more difficult than F2F classes. Fifty-five percent of graduate students agreed or strongly agreed with the statement, "I felt this course was more difficult than it would have been face-to-face." In fact, 12% of students polled strongly agreed or agreed with the statement, "I did well in this class." They also felt that the online assignments were helpful in contributing to their understanding of the course material; 27% strongly agreed and 41% agreed. A full 72% knew what was expected of them for the online portion of the class. Students also seemed to value the F2F portion of the class. Sixty-six percent of the respondents strongly agreed and 38% agreed with the statement, "Meeting face-to-face kept me motivated."

Graduate students were asked to select as many choices as they wished from a list of possible answers to specific opinion questions. When asked which aspect of the blended format they liked the most, the top three answers were *less time on campus; reduced travel;* and *frees up time for employment.* A close fourth was *convenience of doing work on my own time.* The top two answers describing what they disliked about the blended format were, *not enough class time* and *prefer face-to-face to fully understand material.* The last two questions dealt with graduate student acceptance of the BL model. Eighty-four percent of respondents would take another blended class. When asked if they would recommend blended classes to their friends, 84% answered *yes.*

Focus Group

A focus group was convened in February 2013, to solicit current student opinions on the BLE. During the course of the focus group discussion, three major themes were revealed: teacher presence, faculty skill at teaching blended courses, and faculty and institutional support. Students also commented on what they liked or did not like about BL classes.

The theme of faculty presence came up frequently as being essential to success in blended classes. Throughout the focus group discussion, graduate students mentioned the value of feedback from the instructor. They expressed frustration when they did not hear from the instructor after submitting assignments, and they wanted personal feedback, not just a generic update to the whole class.

The professor made a difference in whether the graduate students understood basic concepts, learned more, the same, or less in a blended class. One instructor, whom the students characterized as "wonderful," would create short, interesting assignments for the online portion of the class, and then the students would discuss the assignments F2F. "You get more out of it," remarked one of the graduate students. She also felt that she was more "active online" than in class. Another student, who enjoyed her blended class because "the teacher we had was terrific," was "furious about the online course" she was currently taking; she was clearly dissatisfied. The importance of the instructor was delineated when she said, "I would be hesitant to take another online course…unless I really knew the reputation of the instructor." Although the focus group discussion was centered on BL, the students sometimes mentioned their experience in FOL classes, making the connection due to the online portion of blended classes.

According to the participants, student motivation (or lack thereof) depended on the instructor. The consensus was that straight lectures, where the professor would "talk for 50 minutes straight" and demand that students "write down everything I say," were unacceptable, as far as motivation was concerned. A male student remarked: I've had professors that I've loved going to class and I've gotten great grades in them and probably learned just as much or more than in classes I've done terrible in, just because I'd go to those classes dreading them, saying, 'Well, for the next 50 minutes we're just going to be sitting here listenin' to those guys…and it's all boring.'

Graduate students cited intrinsic motivation, having the "right mindset to actually want to learn," as being important. However, as one male student noted, "Teachers who keep their students motivated probably have a higher percentage of people who pass the class and stay in the class." He stated that students drop out of classes because they question the value of the class to their educational goals or because of a distaste for the instructor's teaching methods and end up taking the graduate course at another local university.

When asked if they prefer F2F, BL, for FOL classes, graduate students said "it depends" on the professor. They felt that enthusiastic professors who provide feedback are good teachers, regardless of the course delivery system. The students who liked BL classes liked seeing the professor F2F, knew the location of his office on campus, and liked the fact that they could supplement their online learning with in-class discussions. The overall majority liked having the teacher explain assignments F2F.

Faculty skill at teaching blended classes was another theme that came through prominently during the focus group discussion. Some professors were good at teaching blended classes, while students felt that other instructors were uncomfortable with teaching BL and "cram" the material in the short F2F sessions. One graduate student commented that "some professors favor whatever they feel they're better at teaching," and do all their teaching F2F, with very little substance online. Another graduate student said, "They really don't want the online stuff. They say, 'Yeah, there's material online but we're not gonna talk about it…'" Related to this were comments about the graduate students' frustrations when a professor sees that some graduate students aren't logging on, so he or she will say, "That's fine, we'll just do something in class." This makes the students who do go online feel, "Well, what am I going online for?"

Graduate students felt that some teachers were poor at integrating the F2F portion of a blended class with the online portion; instructors assigned "busy work" such as answering questions at the end of chapters for the online portion. One graduate student was quoted as saying, "It just seems with a lot of the online material professors just say, 'Oh, we need to put something up there [online] because it's a blended course! So let's give you some busy work to do!'" At other times, students wanted to discuss their online work during the F2F class but felt they were not given the opportunity to do so. However, two students remarked on the skill of their teacher in integrating F2F and online activities, saying the professor was "very proactive and positive about the blended class, so the professor does a lot of her own personal things in it," like Internet readings and activities not found in the textbook.

According to the graduate students, some faculty had a difficult time with the technology for blended classes, and this presented itself under the topic of skill in teaching a blended class. Some instructors only put the most basic of discussion boards online, while others uploaded copious notes or lectures. Several of the students expressed concern that an instructor, rather than getting help on a technology problem or question, would simply say a student request was "impossible" with Blackboard. An example was given by a female student who experienced difficulty taking a test online with extended time, an accommodation she required. A male student remarked that he had a difficult time communicating with the instructor through Blackboard and that the instructor was unable to help him. Students agreed that faculty must be sensitive to computer problems occurring and should take that into consideration when planning online assignments.

The third major topic that presented itself during the focus group discussion was support from the faculty and institution. As mentioned earlier, graduate students felt that feedback from the instructor was of primary importance to their success, but they also wanted operational support. For instance, students wanted clear instructions as to how the instructor grades their work. One student, whose native language is not English, remarked, "It really stressful with the test issues and then, like the whole grading, it seems like one big mystery because there is no…kind of rules that they ever explain you how do the grade [sic]." The students agreed that some online items were difficult to find in the class Blackboard shell. Items were "in different places depending on the teacher," but once the items were found, they knew what to do. Some professors never showed a grading rubric therefore grades were a mystery, "from beginning to end". The graduate students felt that some consistency across courses may be helpful.

Technology support for both faculty and students was discussed. Students felt that faculty needed support almost as much as they did, as discussed above. Relating to support given by the university staff, one student was pleased that she was offered help with her computer problems, but the staff member only suggested solutions that the student had already tried herself. "If we can't figure it out, sometimes I think there's an issue with the whole system if us [sic] who were raised on computers can't figure it out!" "Technology help is of no help," one student stated.

Students were asked what they liked or didn't like about BLEs. They liked varied, short assignments online with in-class discussion; this was much better received than "one great big assignment" online. They liked working at their own pace, when they wanted, within course deadlines, not having the pressure of "doing everything all at once, like in a class." They also liked the community that was built as a result of the online discussions. A male student remarked, "I like that it creates a community and you see other people's perspective on the situation and what they think." A female student was very happy with her blended class, stating that there was a lot of communication both online and F2F, and that she liked the in-class time for talking to the professor, "getting more feedback, and putting faces to the posts."

Students did not like lectures online, which they found boring, or working in teams. They felt that communicating with team members online was difficult and time consuming.

"Everything's in messages, so you have to have a conversation over the course of the week that could be held over the course of half an hour [F2F]." Some team members did not log on in a timely fashion, making it difficult to get a great deal of work done online. Students who were punctual and wanted to excel ended up doing the entire "team" project as a result of lack of participation from other students.

Graduate students agreed that some BL classes may require more work than other formats, especially if the professor posts a great deal of material online that must be read. "There is way too much reading in BL courses," one graduate student stated. One graduate student suggested that it was easier to listen to a professor in class and take notes than "navigating the online portion." Due to the decreased seat time, students felt that more was being posted online in order to cover all the course material.

Although the students may have used the focus group as an opportunity to air their frustrations, most did like the blended classes best. Of twelve participants one said he liked online best, ten said they liked F2F or online (and only BL if absolutely necessary), and the remaining liked BL best. All the graduate students liked the classroom interaction instead of reading comments online.

Faculty Interviews

Only one of the twelve instructors interviewed was given training in BLEs before beginning to teach her blended class. The others were given no training; however, two of them continue to avail themselves of the training provided by the instructional designer on campus.

Four instructors taught their first blended class as a last-minute substitute for a professor who was either transferred to an administrative position or not able to continue with the class for other reasons. Even so, the seven instructors tried to make the best of a difficult situation. In all cases, the class was already set up by the university technology coordinator, so course materials were available for the new instructor on Blackboard. Some faculty members ended up using google docs and other internet devices to remain blended and interactive.

The fact that there was very little preparation time or training before the class began may have contributed to one instructor's discomfort with BLEs and his impatience with students who were not themselves ready for this new course delivery system. Two of the remaining three instructors stated that their first encounter with BL was not at all as successful as their subsequent ones; one instructor did not teach another blended class. Some of the concerns of the four instructors centered around presenting the course material to the students and making the transition from teaching a F2F class to a blended one: "I had a hard time pacing the first semester, then my skill with the course progressed. I was able to have my blended students post information on Wednesday and Friday…so I covered the same material." "I had to get used to the class itself, the students in the class, to see how much individual time they needed and how much class time." The remaining instructors who were interviewed decided to teach a blended class because of experience with the subject matter and a desire to try something new.

The first question discussed and dealt with ease or difficulty in achieving course goals. All but one interviewee felt that they achieved their goals. The dissenting individual, an instructor who took over the class at the last minute, held the students responsible; when asked why, he replied, "The students were not ready for a blended experience.

There was some frustration in not being able to use comfortable teaching methods online. For instance, one instructor used what he called a *page-through* of textbook material: he would go through the chapters page-by-page with the students, pointing out important facts and discussing graphs and illustrations. "I don't feel as…successful at not being able to do that in the online [portion] because they're not like moving along with me." Another instructor was unable to translate the worksheets he used in a F2F class to a successful online format. He had difficulty in grading students' writings online. He later determined that that particular course was not well-suited for BL and has not taught it again.

The next interview question dealt with the problems instructors encountered in teaching a blended course. These problems ranged from working with the Blackboard Learning Management System (LMS), to those dealing with pedagogy and students. Technical problems in working with Blackboard were mentioned by all instructors. They felt that Blackboard was not user-friendly and were sometimes at a loss as to why it wasn't working properly. Another problem was with the continuity of instruction when the Internet or Blackboard was not functioning properly or at all.

Some faculty was uncomfortable with the drastic change in teaching style/methods. "I've been teaching 30 years," said a female instructor, "and it's a whole new arena, a whole new different thing." One instructor continued to use teaching methods he was comfortable with. Another instructor interpreted the change as an opportunity, not a threat, and spent a great deal of time redesigning his class.

Difficulty in motivating students was mentioned by eight instructors. One instructor put all the responsibility for success in the course on the students and felt that he couldn't—and shouldn't—be responsible for motivating them, saying, "They were immature, unprepared, didn't care." Another instructor commented on the difficulty in finding the correct combination of motivating students and having them learn the material: "how do you do that, I still have not mastered." Six instructors agreed that most students did the minimum for a BL class, nothing more.

Seven instructors felt that the BL format made it difficult to scrutinize how students understood the material. "The students in the class…can be a variety of levels, a variety of backgrounds, a variety of motivation, learning abilities. You know, it's difficult. Face-to-face, if you're a teacher that's aware, you can within a day, you can tell who's going to make it, who cannot… It's hard to tell online or blended."

Increased workload was mentioned by nine instructors, particularly with planning, grading and feedback to students. Lack of planning can result in even more work, when the instructor has not prepared online and F2F activities and is searching for material at the last minute. Creating this culture of preparedness for class, or possession of self-directed study skills, also requires time to develop. Grading in a BLE can prove to be very time consuming. "You have to read like hours and hours of material in order to get the same kind of interaction [discussion] that you get sitting in a class and having people ask questions." One instructor was particularly troubled by "getting behind" on his grading and feedback to students.

The next question asked related to how the instructors supported the students in their blended classes. Responses ranged from nothing at all to giving extra help outside of class. Most support was in the way of feedback on progress and answering questions.

Interviewees were asked how—or if—teaching a blended course changed the way they teach F2F or FOL courses. They answered this question in either of two ways: how it changed the F2F portion of their blended classes, or how it changed their teaching in general. For the F2F portion of a blended class, two instructors would monitor the discussions going on in the online portion of the class for clues on student understanding of the course material. If they found that students were having trouble with a particular concept, they would focus on that topic in the next F2F class.

As far as teaching BL and its effect on the way they teach classes in other formats, one of the instructors noted, "In all of my courses I have assignments online, on Blackboard and the only difference is now a matter of degree." When asked how satisfied they were teaching a blended course? Two of the instructors were not satisfied with the BL format, and five did not teach another blended class. For the others, six instructors stated that the satisfaction in teaching a blended course comes from the "challenge of creating a new model, not of something that is a done deal." They enjoyed the creativity s/he could exercise online but it was time consuming.

Finally, instructors were asked if they would teach another blended class. Although not all instructors were wholly satisfied with the blended modality, five only answered this question with a resounding *no!* Three instructors answered *yes* with no qualifiers. One instructor would teach BL again only if the students were "higher-level graduate students". Interviewees generally felt that online discussions were not as effective as those done F2F in terms of graduate student participation and acquisition of knowledge. They listed blended courses as undesirable because of language barriers for international graduate students and attitudes toward education that differ across cultures.

RECOMMENDATIONS AND FUTURE RESEARCH DIRECTIONS

This chapter presented the results of qualitative research that was undertaken in achieving the research goal: to document the ways in which BLEs are changing the university learning experience for graduate students. A brief history of BL at the research site was provided.

Qualitative methods included a focus group of students currently or previously taking a blended class and interviews with BL faculty. Three themes were uncovered in the focus group discussion: teacher presence, faculty skill at teaching blended classes, and support from the faculty and institution. Student comments highlighted the importance of teacher presence and feedback to assure student success; they were fully aware of instructors who were uncomfortable with BL; and they felt that in addition to faculty support, they required technical support from the institution.

Twelve faculty members were interviewed to gain their perspectives on BL. Some were clearly uncomfortable in changing their teaching styles to match the BL format. Others were more adventuresome and enjoyed the creativity afforded by BL. Satisfaction with teaching a blended class mostly centered on the attitudes of the graduate students and their preparedness for BL. Of the twelve faculty members that were observed in the classroom only five mentioned the online portion of the blended course. Only two continuously referred to the BLE in the F2F portion. The three others only mentioned the BLE in the first five minutes of the course.

All key stakeholders should know how BL affects the students, the faculty, and the university as a whole. They should understand if BL is worth the time and effort. This study sought to inform them. The questionnaires drew a picture of the graduate students working full-time at a job, full time parental duties and attending classes full-time. Online communication between graduate student and teacher was low, as was online communication between and among graduate students. This could be interpreted to mean that graduate students preferred to talk with their teacher and with each other in the F2F classes or that online activities, such as discussion threads or collaborative work, were poorly designed.

There was no required oversight of BL classes from a design or pedagogical perspective; the instructor was totally in charge not only of the content, but the design and features of the online class. This probably affected graduate student perceptions of the quality of the online portion of the class. The focus group resulted in a better picture of how BL learners felt about the modality and how they perceived the teacher's role. It became apparent immediately that graduate students felt a good teacher was one who took the time to give students feedback and to design the class for the BL modality, rather than use BL as an add-on to an F2F class (Dziuban et al., 2004; Garrison & Vaughan, 2008). They were very astute in recognizing an instructor who was uncomfortable teaching a blended class or who had difficulty integrating the F2F and online components of the class. This finding is consistent with the importance of *teaching presence* as described by Garrison and Vaughan (2008) in their work on the Community of Inquiry (CoI) related to BL. In summary, graduate students perceived the BLE to be convenient and allowed them to complete class work at their own pace. Their satisfaction was affected by the skill and presence of the teacher.

CONCLUSION

In summary, many of the themes or issues uncovered during the faculty interviews were consistent with the literature on BL. Also, concerns such as integrating F2F and online activities, motivation, and workload were noted by both the faculty and students. Skill at teaching in the blended format was a source of stress for instructors who were not comfortable with the transition from F2F to BL, and it was noticed by the students. It became clear through the results of this study that training in the art of teaching BL is essential for both student and faculty success.

The results of the focus group and faculty observations showed that, at least in some of the blended classes taken by the participants, discussions have been moved to the F2F portion of the class and have become a better source of student-student communication and learning than those that were posted online. Faculty support, and what it meant for students, was uncovered in the faculty interviews and the graduate student focus group. Faculty knew that timely feedback to graduate students was important, and sometimes they were frustrated with the lack of time available for individual responses. As shown in the literature, this is a universal complaint among BL faculty (Toth, Amrein-Beardsley, & Foulger, 2010). Lack of or little feedback from instructors is also a universal complaint among BL students (Babb, Stewart, & Johnson, 2010; Stewart, 2008).

Institutional support, the final construct of the BL experience of the university with graduate students, was discussed in the focus group. Students felt they needed training or an orientation to be better prepared to take a blended class. They felt that faculty needed technical support, sometimes more than they did. Many of the issues uncovered were consistent with studies found in the literature. One issue in particular, faculty training, may have caused some of the results to differ from the literature. For instance, Garnham and Kaleta (2002) found that BL students at all undergraduate levels were more enthusiastic, wrote better papers, attained higher grades, and produced superior projects. This was not so of the graduate students in these BL courses. All of the professors complained of poorer quality work and submissions rampant with basic spelling and grammar errors.

Had the faculty been fully trained, it could be construed that the discomfort they felt with the blended modality, the difficulty they had with integrating F2F and online components, and the struggle they had in motivating students may have been moot. A solid faculty development program must be initiated at any college or university considering BL as a course delivery method. However, it does suggest that the BLE entails more than just the technology behind the delivery. The human touch is still an essential part of the learning experience, as it has been all along. This study suggests that faculty development and improved course design can increase the student BL online interaction. Simply put, there is no substitute for an enthusiastic educator who motivates students to learn. These educators increase student learning through their continued positive interaction. This just might mean that F2F courses are here to stay.

REFERENCES

Bleed, R. (2006). The IT leader as alchemist: Finding the true gold. *EDUCAUSE Review*, *41*(1).

Bliuc, A.-M., Goodyear, P., & Ellis, R. A. (2010). Research focus and methodological choices in studies into students' experiences of blended learning in higher education. *The Internet and Higher Education*, *10*(4), 231–244. doi:10.1016/j.iheduc.2007.08.001

Bransford, D., Brown, A., & Cocking, R. (2011). *How people learn: Brain, mind, experience and school*. Washington, DC: National Academy Press.

Carmel, A., & Gold, S. S. (2007). *The effects of course delivery modality on student satisfaction and retention and GPA in on-site vs. hybrid courses*. Columbus, OH: Educational Resources Information Center.

Creswell, J. W., & Plano Clark, V. L. (2010). *Designing and conducting mixed methods research*. Thousand Oaks, CA: Sage.

Donahue, T. (2010). History of online university accreditation. *Online University Data*. Retrieved from http://onlineuniversitydata.com/2010/the-definitiveguide-to-online-college-accreditation/

Dziuban, C. D., Hartman, J. L., & Moskal, P. D. (2004). *Blended learning (ERB0407)*. Boulder, CO: EDUCAUSE Center for Applied Research.

Fink, L. D. (2009). *Creating significant learning experiences*. San Francisco, CA: Jossey-Bass.

Garnham, C., & Kaleta, R. (2002). Introduction to hybrid courses. *Teaching with Technology Today, 8*(6).

Garrison, D. R., Anderson, T., & Archer, W. (2000). Critical inquiry in a text-based environment: Computer conferencing in higher education. *The Internet and Higher Education*, *2*(2-3), 87–105. doi:10.1016/S1096-7516(00)00016-6

Garrison, D. R., & Kanuka, H. (2004). Blended learning: Uncovering its transformative potential in higher education. *The Internet and Higher Education*, *7*(2), 95–105. doi:10.1016/j.iheduc.2004.02.001

Garrison, D. R., & Vaughan, N. D. (2010). *Blended learning in higher education*. San Francisco, CA: Jossey-Bass.

Gay, L. R., Mills, G. E., & Airasian, P. W. (2006). *Educational research: Competencies for analysis and applications* (8th ed.). Upper Saddle River, NJ: Pearson.

Graham, C. R. (2006). Blended learning systems: Definition, current trends, and future directions. In C. J. Bonk & C. R. Graham (Eds.), *Handbook of Blended Learning: Global Perspectives, Local Designs*. San Francisco, CA: Pfeiffer.

Herbert, M. (2011). Staying the course: A study in online student satisfaction and retention. *Online Journal of Distance Learning Administration*, *9*(4).

Hughes, G. (2011). Using blended learning to increase learner support and improve retention. *Teaching in Higher Education*, *12*(3), 349–363. doi:10.1080/13562510701278690

Jackson, M. J., & Helms, M. M. (2008). Student perceptions of hybrid courses: Measuring and interpreting quality. *Journal of Education for Business*, *84*(1), 7–12. doi:10.3200/JOEB.84.1.7-12

Knowles, M. S. (1970). *The modern practice of adult education: Andragogy vs. pedagogy*. New York: Association Press.

Knowles, M. S. (1980). The modern practice of adult education: From pedagogy to andragogy. New York: Cambridge.

Knowles, M. S. et al. (1984). *Andragogy in action: Applying modern principles of adult education*. San Francisco, CA: Jossey-Bass.

Knowles, M. S., Holton, E. F. III, & Swanson, R. A. (2005). *The adult learner* (6th ed.). Houston, TX: Gulf.

Larson, D. K., & Sung, C.-H. (2009). Comparing student performance: Online versus blended versus face-to-face. *Journal of Asynchronous Learning Networks*, *13*(1), 31–42.

McCormick, A. C. (2010). Here's looking at you: Transparency, institutional self-presentation, and the public interest. *Change*, *42*(6), 35–43. doi:10.1080/00091383.2010.523406

Melton, B., Graf, H., & Chopak-Foss, J. (2009). Achievement and satisfaction in blended learning versus traditional general health course designs. *International Journal for the Scholarship of Teaching and Learning*, *3*(1).

Miles, M. B., & Huberman, A. M. (1994). *Qualitative data analysis*. Thousand Oaks, CA: Sage Publications.

Miller, M. T., Pope, M. L., & Steinmann, T. D. (2005). Dealing with the challenges and stressors faced by community college students: The old college try. *Community College Journal of Research and Practice*, *29*(1), 63–74. doi:10.1080/10668920590524067

Miller, R. (2011, May). *Student satisfaction and institutional success*. Paper presented at the 43rd Annual AIR Forum. Tampa, FL.

Morgan, D. L. (1997). *Focus groups as qualitative research* (2nd ed.). Thousand Oaks, CA: Sage.

National Survey of Student Engagement. (2012). *Promoting student learning and institutional improvement: Lessons from NSSE at 13*. Bloomington, IN: Indiana University Center for Postsecondary Research. Retrieved from http://nsse.iub.edu/NSSE_2012_Results/pdf/NSSE_2012_Annual_Results.pdf

Osguthorpe, R. T., & Graham, C. R. (2003). Blended learning environments: Definitions and directions. *Quarterly Review of Distance Education*, *4*(3), 227–233.

Outcomes Working Group. (2003). Understanding student satisfaction. *BC College & Institute Student Outcomes Issue Paper, 3*(1).

Pascarella, E. T., & Terenzini, P. T. (2005). How college affects students: Volume 2, a third decade of research. San Francisco, CA: Jossey-Bass.

Picciano, A. G. (2007). Introduction. In A. G. Picciano & C. D. Dziuban (Eds.), *Blended learning: Research perspectives*. Needham, MA: Sloan Consortium.

Povasnik, S., Hussar, W., Snyder, T., Kena, G., Hampden-Thompson, G., Dinkes, R., et al. (2007). Student effort and education progress. In *The Condition of Education*. Retrieved from http://nces.ed.gov/pubs2007/2007064.pdf

Rovai, A. P., & Jordan, H. M. (2004). Blended learning and sense of community: A comparative analysis with traditional and fully online graduate courses. *International Review of Research in Open and Distance Learning*, *5*(2).

Seidman, I. (2006). *Interviewing as qualitative research* (3rd ed.). New York: Teachers College Press.

Shea, P. (2007). Towards a conceptual framework for learning in blended environments. In A. G. Picciano & C. D. Dziuban (Eds.), *Blended Learning: Research Perspectives* (pp. 19–35). Needham, MA: Sloan Consortium.

Skibba, K. (2006). *A cross-case analysis of how faculty connect learning in hybrid courses*. Adult Education Research Conference. Retrieved from http://www.adulterc.org/Proceedings/2006/Proceedings/Skibba.pdf

So, H.-J., & Brush, T. A. (2008). Student perceptions of collaborative learning, social presence and satisfaction in a blended learning environment: Relationships and critical factors. *Computers & Education*, *51*(1), 318–336. doi:10.1016/j.compedu.2007.05.009

Stewart, D. W., & Shamdasani, P. N. (1990). *Focus groups: Theory and practice* (Vol. 20). Newbury Park, CA: Sage Publications.

Titus, M. A. (2004). An examination of the influence of context on student persistence at 4-year colleges and universities. *Research in Higher Education*, *45*(7), 673–699. doi:10.1023/B:RIHE.0000044227.17161.fa

Vaughan, N. (2007). Perspectives on blended learning in higher education. *International Journal on E-Learning*, *6*(1), 81–94.

Vignare, K. (2007). Review of literature, blended learning: Using ALN to change the classroom--Will it work? In A. G. Picciano & C. D. Dziuban (Eds.), *Blended learning: Research perspectives*. Needham, MA: Sloan-C.

ADDITIONAL READING

Bersin, J. (2004). *The blended learning book: Best practices, proven methodologies, and lessons learned*. San Francisco, CA: Pfeiffer Publishing.

Bonk, C., & Graham, C. (2005). *Handbook of blended learning: Global perspectives, local designs*. San Francisco, CA: Pfeiffer Publishing.

Duffy, T. M., & Kirkley, J. (2004). *Learner-centered theory and practice in distance education: Cases for higher education*. Mahwah, NJ: Lawrence Erblaum Associates.

French, D. (2003). *Blended learning*. London: Trafford Publishing.

Garrison, D. R., & Anderson, T. (2003). *E–Learning in the 21st century: A framework for research and practice*. London: Routledge/Falmer. doi:10.4324/9780203166093

Hiltz, S. R., & Goldman, R. (2005). *Learning together online: Research on asynchronous learning networks*. Mahwah, NJ: Lawrence Erlbaum Associates.

Thorne, K. (2003). *Blended learning: How to integrate online and traditional learning*. London: Kogan Page Publishers.

KEY TERMS AND DEFINITIONS

Blended Learning (BL): Courses that integrate online with traditional face-to-face class activities.

Hybrid/Hybrid Learning: Another term used for courses or classes in which BL takes place.

Learning Experience: A combination of the factors that students experience in the attainment of their educational goals including: satisfaction, engagement and motivation.

This work was previously published in Practical Applications and Experiences in K-20 Blended Learning Environments edited by Lydia Kyei-Blankson and Esther Ntuli, pages 387-409, copyright year 2014 by Information Science Reference (an imprint of IGI Global).

Chapter 56
Flipping the Classroom in a Teacher Education Course

Patricia Dickenson
National University, USA

ABSTRACT

Teacher education preparation programs prepare pre-service teachers for K-12 classrooms. In order to best prepare pre-service teachers, higher education institutions must be cognizant of the changes that are occurring in today's K-12 classes. The flipped model is an approach to instruction where direct instruction and lecture is viewed at home and class time is used for collaboration and project-based learning. This approach to instruction is becoming increasingly popular in primary and secondary education classrooms throughout the United States. It is important to examine how a flipped classroom approach may influence pre-service teachers in a university preparation program. This chapter explores a case study that examined the flipped classroom in a teacher education course compared to a traditional course.

INTRODUCTION

In higher education, instructional strategies have been found to influence teacher self-efficacy (Nietfeld & Cao, 2003). Teachers with high self-efficacy tend to experiment with methods of instruction, seek improved teaching methods, and experiment with instructional materials (Allinder, 1994). Two identical courses of a teacher education program were compared to determine if a flipped approach would have a greater impact on pre-service teachers' self-efficacy than a traditional course. Pre and post-test results revealed students in the flipped classroom had a significantly higher gain in self-efficacy than students in the traditional course. This case study will reveal key factors for implementing a flipped approach in a hybrid teacher education course.

What Is the Flipped Classroom?

When traditional lecture is completed at home via video or audio and student-centered activities take precedence in the classroom the approach to instruction has "flipped." Instructors seeking to maximize the learners' capacity to engage in small group discussion, project based learning, or problem solving tasks, will find the "flipped" model an effective means of student-centered collaboration. This constructivist approach to teach-

DOI: 10.4018/978-1-4666-8246-7.ch056

ing calls on learners to become active classroom participants by placing the passivity of listening to a lecturer at the comfort of home so valuable face-to-face classroom time can be used for peer collaboration, inquiry, and project-based learning.

The "flipped" approach emerged as an educational tool in 2006 by Jonathan Bergmann and Aaron Sams (2011) and is characterized by the use of Screencasting to deliver instruction that can be accessed at any time and place. This instructional approach has been embraced by teachers from primary school to higher education as a means of maximizing time to collaborate, problem solve, and investigate content areas.

BACKGROUND

Self-Efficacy

"Self efficacy is the belief in one's capabilities to organize and execute the courses of action required to manage prospective situations" (Bandura, 1995, p.2). Previous experience strongly influences self-efficacy. Self-efficacy will increase when students experience success in the classroom, and when students experience failure self-efficacy will decrease. When observing others perform a similar task referred to as modeling, self-efficacy may be influenced as well. A live model is especially salient when someone has limited prior experience or they are uncertain about their own ability. In the teacher education classroom, pre-service teachers need an opportunity to model and observe strategies that will be particularly useful as classroom instructors. Often times teachers learn about research-based best practices through course readings and lecture, but do not have an opportunity to either experience or observe these practices until they are working as a classroom teacher.

Teacher efficacy can be described as the teacher's belief that he/she has the ability to organize and execute courses of action required to successfully accomplish a specific teaching task in a particular context (Tschannen-Moran & Woolfolk Hoy, 2001). Beginning teachers need strong self-efficacy beliefs in order to continue in the field of education (Mulholland & Wallace, 2001). Teachers who exhibit high levels of self-efficacy are also more satisfied with their job and more empowered (Edwards et al., 2002). Furthermore, a teacher's experience during student teaching practice has also been correlated with higher self-efficacy levels (Bandura, 1997; Mulholland & Wallace, 2001; Pajares, 1997).

Gerges (2001) investigated the factors that influence pre-service teachers variation in their use of instructional methods. Pre-service teachers with little to no experience with a specific teaching method had a lower rating of teacher efficacy and were less likely to implement new teaching methods in their classrooms. Therefore an opportunity to perceive relevant models as well as demonstrate instructional methods is paramount to influencing pre-service teachers with lower teacher efficacy.

Nietfeld and Cao (2003) examined the type of instructional strategies that promote pre-service teachers self-efficacy within a college course. Students perceived active more than passive instructional strategies to be important for increasing their personal teaching efficacy. Moreover, students with the highest gains identified whole-group discussion, peer collaboration and in-class illustration exercises as the most beneficial.

This case study will examine if a flipped approach as compared to a traditional approach to instruction will increase students' perceived self-efficacy in teaching. Students' self-efficacy toward teaching is referred to as teacher confidence throughout this study.

FLIPPED CLASSROOM IN HIGHER EDUCATION

In higher education the flipped classroom model was referred to as the "inverted classroom" and included lectures that were made available on VHS tapes (Alexander, 1995). The inverted classroom is a similar pedagogical approach to the flipped class as students watched prerecorded lectures at home or in a computer lab. Face-to-face instruction was used to answer student questions and engage in hands-on activities. Lage, Platt, & Treglia (2000) found the inverted classroom approach to be favored among undergraduates in an economics class. Students perception of the inverted classroom was examined by conducting end of course surveys to students enrolled in the inverted classroom. Students responded favorable to the inverted approach and preferred this type of instruction to the traditional method. In a study conducted at the University of Irvine, (Moravec, et al., 2010) students enrolled in a traditional large lecture biology class were switched to an inverted classroom that included pre-recorded videos and interactive exercises. Students' achievement in the inverted classroom increased by 21% on exam questions that were covered in lecture and included in pre-recorded videos. Most recently, Moravec, Williams, Aguilar-Roca & O'Dowd (2010) found an increase in student achievement when a flipped approach to instruction was used among undergraduates in an introductory course for Biology. Students showed a small but significant improvement by the midterm and this improvement slightly increased on the final exam to an 8.6% higher score. In addition, stronger self-ratings of students' ability to write application software and high levels of student engagement (Gannod, Burge, & Helmick, 2008) were found when students experienced the inverted classroom approach. Talbert (2011) used the inverted classroom approach as a choice of solution techniques on a final exam problem. Students that watched the solution technique from the prerecorded video had significantly higher success rate than students who participated in the in-class lecture. Relatively little research has been conducted on the flipped classroom and this approach has yet to be explored in a teacher education course.

Traditional Classroom Practices

In a traditional class there is a greater emphasis on lecture, which is controlled by the instructor. Teacher-centered approaches include instruction where the teacher's role is to present the information that is to be learned and to direct the learning process of students (Shuell, 1996). Direct instruction is a teacher-centered approach that includes four components:

1. Introduction and review,
2. Presentation of new information,
3. Guided practice, and
4. Independent practice.

METHOD

The purpose of this case study was twofold to:

1. Investigate the impact of using the flipped classroom model as compared to a traditional approach, and
2. Establish a framework for incorporating the flipped approach in higher education courses.

The following research questions guide this study:

- What is the relationship between students' perceptions of their confidence in teaching and the instructors' pedagogical approach?
- How can instructors use the flipped classroom approach to create a student-centered learning environment?

- What is the instructors' pedagogical design for the flipped classroom model?
- What types of instructor knowledge and skills are needed to facilitate the flipped model?

To answer these questions, a mixed-method research study was conducted to compare the pedagogical approach of two classroom instructors in a teaching education course. Interviews with instructors determined the designed learning activities and classroom format. Participants' pre and post surveys were compared to measure differences in self-efficacy at the beginning and end of the course. Participants were also asked about their classroom activities and what elements of course design increased their sense of classroom community.

Classroom Setting

This case study took place at two hybrid courses of a student teaching seminar at a university in Northern California. The teachers enrolled in the course were pursuing a California teaching credential and were actively participating in 80 days of student teaching at a designated school site. Students were randomly assigned to one of two identical courses at the university. The course content and assignments were identical in each course and created by a university professor that was not teaching either class. Both the experimental and control groups had access to the course material via an online learning management system. Instructors in both the control and experimental group held face-to-face monthly classes with the students throughout the five-month course period.

Each instructor had over ten years of teaching experience in the K-12 setting and had taught in higher education for over five years. All participants completed prerequisite coursework in order to enter this course. 64% had never taught before and about 20% stated they had taught for less than one year. The participants included: 60% who were pursuing a single subject teaching credential and 40% pursuing a multiple subject teaching credential. 50% of the participants identified as female and 50% male. All participants had taken online and onsite courses. In this case study, convenience sampling was used as participants were enrolled in the same course and participation was voluntary.

The control group received traditional course lectures during face-to-face meetings whereas the experimental group received a flipped classroom approach to onsite meetings. In the flipped model, participants watched prerecorded lectures at home and face-to-face instruction was used to have students work collaboratively on project-based activities, student led presentations, case studies and collaborative lesson planning related to course material. Each course met for approximately 4 hours, which included a thirty-minute lunch break. Table 1 illustrates the traditional (control group) and flipped (experimental group) classroom schedule.

In the traditional teacher education classroom a significant amount of time is allocated for lecturing new material. During this time the instructor displayed a PowerPoint presentation that reviewed key ideas and concepts. Lecture was followed by group work in which students explored a concept or question related to the lecture with their colleagues. The teacher would randomly call on students to share their responses and provide feedback. In the flipped classroom the majority of classroom time was allocated for student-centered activities such as group work and presentation (about 67%). Peer evaluation was a key component of in-class presentations, whereas teacher feedback was provided as students worked in small groups.

DATA COLLECTION

The participants completed a pre and post-survey about their confidence toward teaching and a post-survey only about their perception of instructional approaches used throughout the course. Students'

Table 1. Class schedule for student teaching seminar

Traditional Teacher Education Classroom (based on 240 minute block schedule)		**Flipped Teacher Education Classroom (based on 240 minute block schedule)**	
Agenda & Objectives	10 minutes	Agenda & Objectives	10 minutes
Review prior material	20 minutes	Review Podcast Material/ Questions	20 minutes
Lecture	60 minutes	Group Work	60 minutes
Group work	20 minutes	Presentations	20 minutes
Break	30 minutes	Break	30 minutes
Lecture	60 minutes	Group Work	60 minutes
Group work	20 minutes	Presentations	20 minutes
Closing	10 minutes	Closing	10 minutes

confidence toward teaching was measured with the TSES 24-item long form (Tschannen-Moran & Woolfolk Hoy, 2001). These items are grouped into three subscales:

1. Efficacy for student engagement (SE; 8 items),
2. Efficacy for instructional strategies (IS; 8 items), and
3. Efficacy for classroom management (CM; 8 items).
   - **Cronbach's coefficient:** SE (0.89 & 0.92), CM (0.91 & 0.94), IS (0.91 & 0.94), and total scale (0.96 & 0.97).

Teacher efficacy was measured at the beginning and end of the course. The items did not change. Students self-report were measured using a five-point likert-scale ranging from "Not at all confident" to "Extremely Confident." Pre and post-test self-report of students' perceived "Teacher efficacy" was compared between groups and within groups to determine if differences were statistically significant.

Open-ended questions were also asked to determine which instructional strategies promoted a sense of classroom community. Sample questions include "What strategies did the professor implement to help you feel a sense of community?" and "What strategies do you feel the professor should implement to relieve a sense of isolation in a hybrid course?"

FINDINGS

Students' self-report of their perceived confidence toward teaching was explored at the beginning and end of the study through pre and post survey in both control and experimental groups. The following four statistical comparisons among the groups were made: pre-control vs. pre-experimental, post-control vs. post-experimental, pre-post control, and pre-post experimental. The gain score of experimental and control groups were also compared to determine if there were significant differences in the pre and post survey between groups.

Table 2 suggests a higher mean in the control group confidence toward teaching at the beginning of the study. The difference between means of the control and experimental groups was .42, which was found to be significant on a five-point scale. The resulting t-statistic reveals the difference in teaching confidence between groups was significant ($p<.05$). The second comparison on teacher confidence in this study was the post-control vs.

Table 2. Pre-control and pre-experimental groups' confidence toward teaching

Variable	Group	M*	N	SD	t	Df	P
Confidence	Control	3.39	24	0.41	3.56	46	.0009
Teaching	Experimental	2.97	24	.407			

Note: * Higher mean, positive confidence toward teaching.

Table 3. Post-control and post-experimental groups' confidence toward teaching

Variable	Group	M*	N	SD	t	df	P
Confidence	Control	3.92	24	.30	.096	46	.9236
Teaching	Experimental	3.91	24	.41			

Note: * Higher mean, positive attitudes toward mathematics.

post-experimental. Table 3 reports the results of this study.

The comparison on teaching confidence between control and experimental groups at the end of the study indicates no significant difference ($p > .05$).

In order to compare means between pre and post administration of the confidence toward teaching in control and experimental groups, the statistic analysis carried out was an unpaired samples t-test. Tables 4 and 5 summarize the results of the comparison between pre and post administration of the confidence scale toward teaching in the control and experimental groups, respectively.

The difference between means of the pre and post survey was about .53, which was found to be significant. The resulting t-statistic reveals that the difference in teaching confidence within the control group was significant ($p<. 05$). Table 5 reports the comparison between pre and post administration on confidence toward teaching in the experimental group.

The mean differences between the pre and post survey for the experimental group was about .95, which was about an 80% increase from the traditional group. Similarly, for these comparisons, significant difference ($p > .05$) was found within the groups in confidence toward teaching.

Table 4. Pre and post confidence in teaching: Control group

Variable	Group	M*	N	SD	t	df	P
Confidence	Pre-control	3.40	24	0.409	5.19	46	.102
Teaching	Post-control	3.93	24	.308			

Note: * Higher mean, positive confidence toward teaching.

Table 5. Pre and post confidence toward teaching: experimental group

Variable	Group	M*	N	SD	T	Df	P
Confidence	Pre-experimental	2.97	24	.407	7.97	46	.0001
Teaching	Post-experimental	3.916	24	.414			

Note: * Higher mean, positive attitudes toward mathematics.

Table 6. Gain score of pre and post confidence in teaching: control vs. experimental

Variable	Group	M*	N	SD	t	df	P
Gain	Control	.55	24	0.34	3.9	46	.0003
Score	Experimental	.947	24	0.36			

Note: * Higher mean, greater gain in confidence in teaching.

Considering significant differences were found between the control and experimental group during the pre-test measurement, (which may be due to failure in the randomization), an additional group comparisons was conducted. According to Dallal (2013) one way to resolve the differences between groups prior to the treatment is to compare group differences between post-test and pretest, referred to as change or gain scores. Table 6 reports the comparison between pre and post-test gain scores in the control and experimental group.

The resulting t-statistic reveals that the difference in gain score between pre and posttest of teaching confidence between the control and experimental group was significant ($p<.05$). The experimental group was found to have a significantly higher gain in teaching confidence than student in the control group.

In addition to the pre and post survey of teaching confidence, students also responded to open-ended survey questions about their experience in the course. When asked, "What strategies did the professor implement to help you feel a sense of community?" students in the control group were more likely to report personal attributes of the classroom instructor than actual instructional strategies. Responses included "the instructor was very professional" and "he was open and shared his experiences." This reveals the greatest factor for feeling a sense of community was not strategies within the course but the instructor himself. This finding suggests a teacher-centered approach to teaching where knowledge is constructed by the teacher and students are passive recipients of information.

In the experimental group however, students' reported the instructors' strategies to be indicative of a student-centered teaching approach. When asked "what strategies did the professor implement to help you feel a sense of community?" the students stated, "making connections with colleagues," "group presentations," "sharing experiences" "class projects" and "feedback from instructor and colleagues." These strategies are aligned with a student-centered approach to teaching where the teacher facilitates understanding by creating a classroom environment that is conducive to conceptual change. In a student-centered classroom, participants can engage in activities that focus on a deep approach to learning and understanding the content of study.

The majority of participants in the experimental group also reported that "instructor videos" were a useful tool to help students feel connected throughout the course and promote discussion. The instructor used a web-based screen-casting program to record video lectures. She found this to be a useful tool because of the capacity to have unlimited recording time, and provide students with the accessibility to watch course lectures either on their mobile phone or home computer. There were four videos that were created for each unit of study. Video statistics revealed that on average each video was viewed at least 30 times by the end of the course. This data reveals students in the experimental group may have watched the video more than once, as students in the control group did not have access to teacher created videos.

The survey also asked participants "what strategies should the professor implement?" students in the control group were more likely to skip this question or report "not applicable." However in the experimental group students were more likely to give feedback, which included "more time for group work," "more instructor videos," "team building skills" and "rotate groups more often." The responses in the experimental group were identical to the strategies incorporated into the course. This implies students found these strategies meaningful and relevant. The experimental groups' responses also demonstrate a master classroom environment, where the goal of learning is to master new skills and the process of learning itself is valued. This is indicative of the fact participants in the experimental group were more comfortable providing constructive feedback versus participants in the control group who were more likely not to provide criticism. When the classroom environment is focused on getting good grades and looking competent as compared to others this leads students to adopt a performance goal orientation. Students would be less likely to provide constructive criticism if they believed this would impact their grade.

DISCUSSION

The results from this case study support previous findings that instructional approaches do influence teacher efficacy (Nietfeld and Cao, 2003). This is an important finding for higher-education instructors to take into consideration especially as more schools and universities move to alternative classroom environments such as hybrid, synchronous and asynchronous classes. Knowing what type of instructional approach is most effective can help instructors support positive student outcomes such as mastery of course content, retention and graduation.

In this study both the traditional and flipped class demonstrated a significant difference from pre to post test in teacher confidence, however the gains were significantly greater in the flipped classroom model. The flipped class model is aligned with a student-centered approach to instruction, as the focus is more on the students and their learning than the teacher and their teaching. A student-centered approach allows students to construct knowledge, as well as aim toward mastery of content. The teacher in a student-centered classroom has a greater opportunity to scaffold instruction based on individual student needs as teaching is interactive and the instructor can observe students misconceptions. Coffee & Gibbs (2002) found student-centered teachers have been found to use a wider repertoire of teaching methods than teachers who adopt a teacher-centered approach to teaching.

Although both the traditional and flipped classroom incorporated group work into the class schedule, the amount of time allotted for group work was significantly greater in the flipped class than in the traditional class. In the traditional class about 16% of class time was allocated for group work compared to 50% of class time in the flipped classroom. Furthermore in the flipped classroom an additional 40 minutes of class time or about 16% was used for group presentations. This additional time allowed the instructor to create activities that required a higher level of cognitive demand and for students to demonstrate their knowledge during group presentations.

In a traditional course presentations are delivered by the instructor and not the student, this approach fails to provide pre-service teachers with an opportunity to lead a discussion and demonstrate mastery of the content. If pre-service teachers are preparing to enter the classroom they will need multiple opportunities to present ideas and collaborate with colleagues, which is typically what pre-service teachers will do as classroom teachers. The flipped classroom model lends itself to a greater amount of time for group work, thus providing an opportunity for students to collaborate, share ideas, negotiate meaning and receive feedback from the instructor. In addition there is time for presentations, which is a valuable skill for pre-service teachers to acquire, as interviews for teaching positions require presenting to a panel, teacher evaluation is through observation of classroom practices and teachers must present information everyday as a classroom teacher.

Framework for Flipped Classroom in Teacher Education

In the traditional classroom, the focus is on covering material not mastering skills. When the classroom is flipped, students become self-directed learners and instructors have more time to engage students in hands-on activities, group work, discussion, or inquiry. If classroom instruction must shift to meet the demands of an ever-changing workforce utilizing the "Four Cs' will help educators prepare students by incorporating critical thinking, communication, collaboration, and creativity when teaching the core content subjects.

The skills students will acquire when instruction is infused with the "Four C's will prepare future educators for an ever-changing educational landscape. The opportunity to engage with others and construct meaning, share ideas and negotiate understanding is invaluable. In a traditional classroom collaboration is second to teacher direct instruction. In preparing educators for the 21century classroom what is modeled as effective instruction will inevitably be demonstrated when newly authorized educators begin instruction in their own class. Thus a shift must take place for higher education instructors to model the practices that 21 century teachers should implement in their own class. The experience of "flipping" is a relatively new pedagogical approach, however when infused with 21st Century skills the value will be recognized immediately.

Flipping 21st Century Skills

As students prepare to enter the teaching profession they are exposed to a wide body of knowledge that is subject specific "content knowledge" as well as teaching specific, "pedagogical knowledge" (Ball, 2000). Pedagogical knowledge, referred to as the "how of teaching" is emphasized in teacher education programs, whereas content knowledge is knowledge about the subject matter and is often acquired in undergraduate discipline areas. If the purpose of teacher education programs is to instruct students on "how to teach," then the approach to teacher education programs must reflect the knowledge and skills that are valued by society.

According to Ken-Kay, CEO of EdLeader21, "Today's students need critical thinking and problem-solving skills not just to solve the problems of their current jobs, but to meet the challenges of adapting to our constantly changing workforce" (NEA, page 6, 2010). The National Education Association (2010) identified four specific skills that were most important for educators to instill in their practice: critical thinking, communication, collaboration and creativity. These skills referred to as the Four Cs' prepare students for a global economy in which they will interact with people from many cultural backgrounds and be required to think critically and problem solve in order to master job market competencies. Using the Four C's framework can help instructors design classroom tasks that are engaging as well as supportive of developing the skills and competencies that will be valued by employers in a global economy. To emphasize the significance of this shift President Barack Obama stated "I'm calling on our nation's governors and state education chiefs to develop standards and assessments that don't simply measure whether students can fill in a bubble on a test, but whether they can possess 21st century skills like problem-solving and critical thinking and entrepreneurship and creativity."

Critical Thinking

Critical thinking is the ability to think critically about an issue or situation. It involves reflecting rationally about the beliefs or actions that garner the results, as well as using evidence to support a decision. In the teaching profession, teachers must think critically everyday when working with parents, students, or administrators at their school site. Critical thinking allows teachers to make informed decisions when it comes to completing tasks such as analyzing data from student assessments, planning lessons based on students' prior knowledge and developmental ability, and reflecting on the effectiveness of a lesson plan.

Ways to Integrate Critical Thinking into Your Teacher Education Program

Classroom Management

Students read various case studies of students who are exhibiting behavior problems in the classroom. They are divided into 3-5 grade level groups and determine the evidence, next steps and potential modifications for the selected students. Students can refer to textbooks, websites or other reference materials to support their decision. Each group presents their behavior plan and evaluates the effectiveness and potential shortcomings.

Data Decision Making

Students receive classroom data that are reflective of the grade/subject they would like to teach. In small groups students will review the data, assessment, and grade level standards. Students determine which standards the teacher should reteach for whole group, small group or individual students. They determine the effectiveness of the assessment and which questions might be potentially confusing or misleading to students.

Communication

The ability to express thoughts clearly and coherently is a skill that student teachers need to master prior to entering the teaching profession. Teachers should possess the ability to provide comprehensible instructions, motivate others through speech, express thoughts and opinions clearly. In addition to delivering classroom instruction, teachers are expected to communicate with parents of diverse backgrounds, facilitate professional development, lead grade level and school meetings, and communicate effectively in multilingual and multicultural environments.

Ways to Integrate Communication into Your Teacher Education Program

Screencasting

As an assignment or in class activity, students create a screencast to explain a concept or teach a lesson. This type of assignment is valuable as students not only receive feedback from their instructor and colleagues but they can self-evaluate their ability to communicate, and rerecord their screencast with modifications. The instructor provides a rubric, which the students can use to determine their effectiveness of the screencast. The capacity to share their screencast with others is easily transmittable through a link that is sent via email. In addition, if the screencast is shared via YouTube, the setting can be changed to private and comments can be included to provide feedback.

Presentations

When the classroom is flipped, there is more time for students to deliver presentations to their colleagues. Presentations may include demonstrating a specific skill, sharing a strategy or research findings. In order to make presentations valuable, an evaluation tool such as a rubric should be included to provide feedback (see Table 7). The rubric can be distributed to students who will be watching the presentation to provide different perspectives of the students' performance.

Table 7. Group presentation rubric

Presenter's Names:		
Features	**Rating (1 poor, 5 excellent)**	**Comments**
Engagement with audience. Allows time for others to think & respond.	1 2 3 4 5	
Volume of speaker & rate of speech.	1 2 3 4 5	
Eye contact and posture.	1 2 3 4 5	
Enthusiasm of content and delivery.	1 2 3 4 5	
Visuals are appropriate and make presentation meaningful.	1 2 3 4 5	
Introduction to topic is interesting and "hooks" audience.	1 2 3 4 5	
Presentation is well organized. Clear ideas & transitions.	1 2 3 4 5	
Summarizes topic & assesses issue.	1 2 3 4 5	
Critical thinking questions used to involve audience participation.	1 2 3 4 5	
Research is used to support ideas.	1 2 3 4 5	
Support for conclusions.	1 2 3 4 5	
Student's own perspective & position presented.	1 2 3 4 5	

Collaboration

Over the past decade, the culture of schools has changed from teachers working in isolation to teachers communicating and collaborating on a daily basis. There is a large body of research supporting the value of collaboration in the teaching profession. According to Kardos and Johnson, (2007) when school leaders promote collaboration among veteran and novice teachers this can improve teacher satisfaction and retention. Collaboration is a skill that involves working in a group to share multiple perspectives. However the benefits of shared knowledge, will not be valued or understood if students fail to work effectively and respectfully in a group setting. Thus it is

Table 8. Group paper: Individual feedback form

Your Name:____________________________ **Group Members:**____
1. Discuss your contributions to the preparation of this assignment.
2. Do you feel that all members of your group contributed equally to this presentation? ☐ Yes ☐ No (If no, please explain)
3. Discuss your general thoughts on this assignment.
4. Additional questions and/or comments.

important for students to have an opportunity to practice and master collaborative skills so that they can be effective facilitators of collaborative group work when they enter the teaching profession. Collaboration requires group members to share responsibility for collaborative work and make compromises in order to achieve a common goal. Such tasks require group members to communicate clearly and fairly, provide constructive feedback and value the contributions of each group member (see Table 8).

Ways to Integrate Collaboration into Your Teacher Education Program

Lesson Planning Evaluation

Students work in teams to evaluate the effectiveness of individual teachers' lesson plan. Students discuss how well the lesson plan meets the needs of diverse classroom learners, and is aligned with the assessment. Each group designs criteria for evaluating the lesson in advance and grades their work accordingly.

Developing School-Wide Achievement Plans

Students form teams and are asked to investigate the academic performance of a particular school site. Each team receives a school plan, results of summative assessment, demographics of teachers, students and socioeconomic status. Students then formulate possible causal variables for schools performance. They conduct an Internet search to collect data on factors contributing to achievement and prepare a presentation to explain their findings, conclusions and recommendations.

Creativity

According to Sir Kenneth Robinson (n.d.), "Creativity is as important in education as literacy and we should treat it with the same status." Creativity is what drives a global economy. Students who leave school with the ability to create and innovate will be sought after in a workforce that thrives on innovation. Thus it is imperative for teacher educators to know how to create tasks that foster creativity and innovation in all subject areas. Teachers who facilitate creative thinking have the capacity to incorporate a wide range of creation techniques, provide time and opportunity to explore concepts and discover learning. Teachers should also model how to evaluate, analyze and improve ideas so that students understand that creativity is a cyclical process that includes multiple revisions and improvements.

Ways to Integrate Creativity into Your Teacher Education Program

Choice Boards

Students create a choice board related to a specific topic or concept. A choice board contains activities that students can select from to demonstrate their knowledge and understanding of a topic. For example if the topic was fractions the choice board might contain activities such as design a board game using fractions, create an Ad with fractions, perform a skit using fractions, or create a rap on how to add, or subtract fractions.

Action Research

Students can interview teachers and or administrators to identify a problem at their school site (classroom management, testing, bullying, etc.). As a group they design an intervention to address the problem, create data as a result of the intervention, examine research related, and reflect on the results of their intervention. Students present their intervention, data and conclusion to the class.

UNDERSTANDING FLIPPED CLASSROOM IMPLEMENTATION FOR FACULTY AND STUDENTS

The Learner's Experience

With the flipped classroom model no longer do students spend a minimal amount of time collaborating with peers as they enter the classroom. Lectures are watched or listened to when the student is at home, so that during face-to-face instructional students can participate in collaborative problem-solving activities. The role of the learner in the flipped classroom is to demonstrate mastery. With a mastery approach to learning the likelihood of leaving some students behind as the teacher proceeds to increasingly challenging material is minimized (Bloom, 1981; Guskey, 1985; Zimmerman & Didenedetto, 2008). The flipped classroom model is aligned with a mastery approach as instruction allows students to proceed through a unit at their own pace. Since some students need more time than others to master a topic, they can review at home activities, practice skills or concepts demonstrated in a screencast over and over again, and use valuable classroom time to ask questions or seek help from a classmate or instructor.

In a traditional classroom, students who need additional assistance may be so overwhelmed with lower-level tasks such as copying notes or comprehending material, they might not have an opportunity to ask questions or collaborate so that new information can be made meaningful.

In order for the learner's experience to be successful in a flipped classroom, the instructor needs to set clear expectations for the course, and demonstrate how to use and access course tools and videos during the first course meeting. Furthermore, the learner should be held accountable to participate in onsite activities as well as at home videos. Participation might include reflective journal prompts, discussion boards, graphic organizers, quizzes or quick-writes. Using rubrics, self and peer evaluation tools are vital to promote self-directed learning and hold students accountable for their learning experience. There could be an belief on the part of the student that simply "showing up" counts as participation for class meetings therefore it is imperative that the instructor is well prepared for the flipped classroom, sets clear expectations and provides necessary materials to facilitate this experience.

The Instructor's Experience

The role of the instructor in a flipped classroom is two fold. First the instructor should create dynamic lectures that are aligned with the course learning objectives. Lectures should explain, discuss or clarify theoretical concepts that students will need to know and understand in order to participate in classroom activities. Next, the instructor should plan in-class activities that allow students to apply the theoretical concepts discussed in the screencast lectures. Activities should provide students with an opportunity to explain, create, justify, elaborate and/or share their understanding and knowledge in a way that demonstrates transfer of learning.

Bloom's Taxonomy (Bloom, 1956), is a good tool for creating both at home video's (screencasts) and in class activities. Lower level tasks such as "remembering" and "understanding" can be incorporated into at home lectures. Instructors can use a variety of media to create a powerful video experience such as incorporating websites, expert videos and asking reflective questions that would assist students in defining, describing, or explaining concepts and theoretical perspectives. For example, if students were learning about the Constructivist theory the teacher might create a screencast to explains the timeframe from which constructivism emerged, key terms, concepts, and philosophical underpinnings related to the theory. In addition to the screencast the teacher should create a classroom assessment technique related to the video that can be assessed by the instructor. The classroom assessment could be a variety of approaches such as a quiz at the beginning of the class based on the video lecture or a take home activity such as a graphic organizer or discussion board post. The instructor in this course used a variety of classroom assessment techniques such as discussion board posts related to the video, quick write that students would respond to at the beginning of the course, and online assessments created through survey tools such as Google forms. The rational for creating assessments related to the video is two fold, first to hold the student accountable for course content, and second to determine students' understandings and misconceptions. This will allow the instructor with an opportunity to reteach important ideas as well as scaffold content during face-to-face meetings.

Tasks that require students to demonstrate a higher-level of cognitive demand such as analyzing and applying a concept can take a considerable amount of time, effort and assistance from the classroom instructor. Providing an opportunity for students to engage in higher-level tasks creates a challenging classroom environment that allows the student to demonstrate what they know and the teacher to assess the knowledge and skills that students can accomplish independently. In the teacher education classroom higher-level tasks such as applying a specific teaching strategy or modeling classroom management procedures are usually assessed through a written paper, however this type of assessment does not measure what the student is able to demonstrate. A performance-based task such as demonstrating using cooperative groups, or applying a management technique would allow the instructor to assess if this skill would transfer into the students' teaching practice. Being able to define or describe a skill or strategy does not mean the students' has demonstrated mastery. Thus it is imperative to provide students with an opportunity to demonstrate their understanding in multiple ways. An example model of flipped classroom is as follows:

1. Prepare recorded lectures and accompanying quizzes or assessments that students complete on their own prior to class meeting.
2. Review student online assessment to determine what gaps or misconceptions might exist in student understanding
3. Prepare mini lectures to address gaps in student understanding as well as pose open-ended questions that would enable students to engage in whole-class dialogue.
4. Design in-class activities that require students to transfer knowledge from lecture to real application. Activities might require students to negotiate content, apply ideas, create solutions and demonstrate understanding (think of higher end bloom's taxonomy).
5. Prepare evaluation tools such as criteria chart, rubric and/or reflection to check student understanding as well as hold students accountable for group activities.
6. Model instructional practices, skills and strategies that you want students to demonstrate in the classroom. When in doubt create a screencast so that students may practice for accuracy.

FUTURE RESEARCH DIRECTIONS

This study found that students in a flipped classroom had significant gains in teacher efficacy as compared to students in a traditional hybrid class. Future studies should continue to compare flipped and traditional classrooms across academic disciplines and classroom platforms.

Differences were also found in how students perceived the instructor's teaching practices and how their perception is related to their sense of classroom community. Future studies should include classroom observations, to determine how instructional practices are being implemented. Group interviews could also show, which practices are most and least helpful in promoting teacher efficacy. The instructor in the flipped classroom also implemented the Four C's framework in the design of classroom activities, however research has yet to explore what impact this model has on student learning and engagement.

CONCLUSION

According to the American Association of Colleges for Teacher Education (2009), teachers who make a positive difference in their students' lives have the following characteristics: Strong general intelligence and verbal ability that help teachers organize and explain ideas as well as observe and think diagnostically; strong content knowledge up to a threshold level that relates to what is to be taught; knowledge of how to teach others in their content area (content pedagogy) in using hands-on learning techniques and in developing higher-order thinking skills; an understanding of learners and their development, including how to assess and scaffold learning; how to assist students with learning differences, and how to support the learning of language and content for those not yet proficient in the language of instruction; adaptive expertise that allows teachers to make judgments about what will likely work in a given context in response to students' needs.

These characteristics can be incorporated into a teacher preparation program if classroom time is provided in order for mastery to take place. With the flipped classroom approach more time is available for students to demonstrate, explain, model, create and analyze situations that are analogous to the experience of a classroom teacher.

In higher education the "flipped classroom" is a familiar approach to instruction where students watch prerecorded lectures at home so that in class time can be used to collaborate with classmates, work in small groups, and engage in project based activities. The flipped model circumvents the traditional teaching approach of expertise delivered from a professor and provides students with an opportunity to construct knowledge on their own. The traditional approach fails to capitalize on the wealth of knowledge from the collective group and the instructor tends to only support students who seek out assistance. The flipped classroom approach capitalizes on active learning by using in class time to engage all students in meaningful discussions and peer collaboration. This approach requires a considerable amount of planning and preparation to create a learning environment that engages all learners and makes content matter meaningful.

Although this approach is widely known it is not widely implemented. Face-to-face classes tend to be more teacher-centered than student-directed. The online learning environment has reinvented how students take classes it has not replaced how professors deliver instruction. With more than one third of all higher education students taking at least one course online (Allen & Seaman, 2011) and dropout rates for online learning courses 10-20% higher than traditional courses (Carr, 2000; Frankola, 2001) it is vital for higher education instructors to know best practices for student success.

REFERENCES

Alexander, S. (1995). *Teaching and learning on the world wide web*. The AusWeb95 Conference. Retrieved from http://ausweb.scu.edu.au/aw95/education2/alexander/

Allen, I. E., & Seaman, J. (2011). *Going the distance online education in the United States*. Babson Survey Research Group.

Allinder, R. M. (1994). The relationship between efficacy and the instructional practices of special education teachers and consultants. *Teacher Education and Special Education*, *17*, 86–95. doi:10.1177/088840649401700203

American Association of College for Teacher Education. (2009). *Teacher preparation makes a difference: Impact of education preparation*. Retrieved from http://aacte.org/research-policy/impact-of-educator-preparation/teacher-preparation-makes-a-difference.html

Ball, D. L. (2000). Bridging practices: Intertwining content and pedagogy in teaching and learning to teach. *Journal of Teacher Education*, *51*(2), 241–247. doi:10.1177/0022487100051003013

Bandura, A. (1995). Exercise of personal and collective efficacy in changing societies. In A. Bandura (Ed.), *Self-efficacy in changing societies* (pp. 1–45). New York, NY: Cambridge University Press. doi:10.1017/CBO9780511527692.003

Bandura, A. (1997). *Self-efficacy: The exercise of control*. New York, NY: Freeman.

Carr, S. (2000, February 11). As distance education comes of age, the challenge is keeping the students. *The Chronicle of Higher Education*, A39.

Edwards, J., Green, K., & Lyons, C. (2002). Personal empowerment, efficacy and environmental characteristics. *Journal of Educational Administration*, *40*(1), 67–86. doi:10.1108/09578230210415652

Gannod, G., Burge, J., & Helmick, M. (2008). Using the inverted classroom to teach software engineering. In W. Schäfer, M. B. Dwyer, & V. Gruhn (Eds.), *Proceedings of the 30th International Conference on Software Engineering* (pp. 777-786). Leipsig, Germany: IEEE.

Gerges, G. (2001). Factors influencing preservice teachers' variation in use of instructional methods: Why is teacher efficacy not a significant contributor? *Teacher Education Quarterly*, *28*(4), 71–88.

Kardos, S. M., & Johnson, S. M. (2007). On their own and presumed expert: New teachers' experience with their colleagues. *Teachers College Record*, *109*(9), 2083–2106.

Lage, M. J., Platt, G. J., & Treglia, M. (2000). Inverting the classroom: A gateway to creating an inclusive learning environment. *The Journal of Economic Education*, *31*(1), 30–43.

Moravec, M., Williams, A., Aguilar-Roca, N., & O'Dowd, D. K. (2010). Learn before lecture: A strategy that improves learning outcomes in a large introductory biology class. *CBE Life Sciences Education*, *9*, 473–481. doi:10.1187/cbe.10-04-0063 PMID:21123694

Mulholland, J., & Wallace, J. (2001). Teacher induction and elementary science teaching, enhancing self-efficacy. *Teaching and Teacher Education*, *17*, 243–261. doi:10.1016/S0742-051X(00)00054-8

National Education Association. (2010) *Educator's guide to the four C's: Preparing 21st century students for a global society*. Retrieved from http://www.nea.org/tools/52217.htm

National Education Association National Education Association. (2002). *Rankings and estimates: Rankings of the states 2001 and estimates of school statistics 2002*. Retrieved April 21, 2003, from http://www.nea.org/edstats/

Nietfeld, J. L., & Cao, L. (2003). Examining instructional strategies that promote pre-service teachers' personal teaching efficacy. *Current Issues in Education, 6*(11).

Pajares, F. (1997). Current directions in self-efficacy. In M. Maehr & P. Pintrich (Eds.), *Advances in motivation and achievement* (pp. 1–49). Greenwich, CT: JAI Press.

Robert, T. (2012). Inverted classroom. *Colleagues, 9*(1).

Robinson, K. (n.d.). *Ken Robinson says schools kill creativity*. Monterey, CA: TED Talks. Retrieved from http://www.ted.com/talks/ken_robinson_says_schools_kill_creativity.html

Rovai, A. (2002). Development of an instrument to measure classroom community. *The Internet and Higher Education*, (5): 197–211. doi:10.1016/S1096-7516(02)00102-1

Sams, A. (2011). The flipped class: Shedding light on the confusion, critique and hype. *Learning Innovations and Tech*. Retrieved from http://thedailyriff.com/articles/the-flipped-class-shedding-light-on-the-confusion-critique-and-hype-801.php

Shuell, T. J. (1996). Teaching and learning in a classroom context. In D. C. Berliner & R. C. Calfee (Eds.), *Handbook of educational psychology* (pp. 726–764). Academic Press.

Tschannen-Moran, M., & Woolfolk Hoy, A. (2001). Teacher efficacy: Capturing an elusive construct. *Teaching and Teacher Education*, *17*(7), 783–805. doi:10.1016/S0742-051X(01)00036-1

ADDITIONAL READING

Bryne, R. (2013) Free Technology Tools for Teachers. Retrieved from: www.freetech4teachers.com

Course, C. Ten years of tracking online education in the United States. The Sloan Consortium. Retrieved from: http://sloanconsortium.org/publications/survey/changing_course_2012

Dickenson, P. (2013, March 3) Differentiation for ALL learners. [Blog Post] Retrieved from: http://teachingandlearningforteachers.blogspot.com

Dickenson, Patricia (2013) Research and Best Practices to Engage the Online Learner. Retrieved from: http:drdickenson.com

Ed, T. (2013) Lessons Worth Sharing: Best Flip. Retrieved from: http://ed.ted.com/lessons/featured

Educause 2012 Conference (2013, January 11) Changing the Game in Higher Education. (Video broadcast on YouTube) Retrieved from: http://www.youtube.com/watch?v=9B_sicTp_cM&list=PLckgEVSUS9SxgdZ2qOavfAnA6C26W0jhM&index=1

Educause (2013) Retrieved from: http:www.educause.com

International Society for Technology in Education. (2013) Retrieved from: https://www.iste.org/

Overmyer, J. (2013) Flipped Learning Network: A Professional learning community for teachers using screencasting in education. Retrieved from: http://flippedclassroom.org

Talbert, R. (2011, February 28) How I make screencasts: Chapter 0. [Blog Post] Retrieved from: http://castingoutnines.wordpress.com/2011/02/28/how-i-make-screencasts-chapter-0/

KEY TERMS AND DEFINITIONS

Cooperative Learning: This instructional approach to teaching has students work in heterogeneous small groups and be active participants in the learning process. Five basic elements are incorporated into the cooperative learning environment: interaction, individual and group accountability, positive interdependence, collaborative skills, and group processing (Johnson, Johnson, & Holubec, 1987).

Flipped Class: Approach to instruction where direct instruction and lecture is viewed at home and class time is used for collaboration and project-based learning.

Hybrid Class: A format of course delivery that includes face-to-face seat time and online learning activities. Class participation includes both on-site class time and at home activities that are typically performed through web-based technologies.

Modeling: Instructional approach in which participants observe a relevant and capable person demonstrate how to perform a specific task that they will be expected to perform.

Screencasting: Digital recording of the computer screen, which contains narration. Also referred to as video screen capture.

Student-Centered Instruction: This form of instruction focuses on the individual student and their needs. Students are provided with the opportunity to learn independently or from other classmates. The teacher acts as a coach or facilitator in the process.

Teacher-Centered Instruction: This form of instruction allows the teacher to control the classroom discussion, and decisions by instructing the whole class simultaneously. One of the most salient features is lecture, drill and practice.

This work was previously published in Promoting Active Learning through the Flipped Classroom Model edited by Jared Keengwe, Grace Onchwari, and James N. Oigara, pages 145-162, copyright year 2014 by Information Science Reference (an imprint of IGI Global).

Chapter 57
Case Study of a Hybrid Undergraduate Elementary Certification Program

Carmen Popa
University of Oradea, Romania

Carlton J. Fitzgerald
New England College, USA

Simona Laurian
University of Oradea, Romania

Delia Birle
University of Oradea, Romania

Laura Bochis
University of Oradea, Romania

Elena Bonchis
University of Oradea, Romania

ABSTRACT

The goal of this study was to assist instructors and leadership of a hybrid weekend pre-service teacher education program at the University of Oradea to improve their effectiveness with students. Specifically, this study sought to gather and analyze data from three program constituents: students, instructors, and program leadership. The preschool and primary weekend education program at the University of Oradea was developed to be suitable for students who for various reasons cannot attend the traditional day classes. In 2011, the weekend program was changed into a hybrid program in an effort to more directly meet the needs of the student population. In order to more effectively meet the needs of the students, it became obvious that the pedagogy and structure of the program needed refinement. The data gathered in this study allowed the research team to develop recommendations for program, pedagogical, and textbook improvements.

INTRODUCTION

The University of Oradea, which was charted in 1990, is housed in Oradea, Romania. There are 108 undergraduate programs, 86 master degree programs and 10 doctoral programs offered by the university. The university is organized into 15 faculties at the undergraduate and graduate levels and three independent departments: the Teacher Training Department, the On-line Department, and the Life Long Learning Department. The University has adopted the European Credit Transfer and Accumulation System (ECTS) in

DOI: 10.4018/978-1-4666-8246-7.ch057

order to allow students to participate in classes throughout Europe and transfer their credits to the University of Oradea. This agreement also allows students from other European countries to attend classes in Oradea and transfer those credits to their home universities. Approximately 11781 undergraduate students are enrolled at the university and 2931 students attend graduate levels classes. The Sciences of Education department houses 457 students. The weekend program for primary and pre-school pre-service teachers hosts 184 students.

The mission statement for the university states that its goal is to promote knowledge, research and training through partnerships among teachers, students and the community. According to its mission the University seeks to train and educate undergraduate and graduate students on a large scale and at a high level. The weekend education program was developed to be aligned with and assist the university in accomplishing this mission.

The Pedagogy of the Primary and Pre-School Education program is housed in the Department of Sciences of Education from the Faculty of Social and Humanistic Sciences. There are seventeen full-time instructors in the department. Associate instructors are also hired by the university on a need basis. The certification program is a three year process. Students progress through the program as a cohort with all students taking the same courses together during their program. Each cohort is assigned an advisor who remains with the cohort for their three years at the university. Students participate in 60 courses in three categories: Core Education courses (9 courses), specialty courses (43 courses), and elective courses (8 courses). Students participate in community schools every semester, usually one day per week. Courses are usually divided into two types, theoretical and practical. In the theoretical classes students learn educational and psychological theory. The practical seminars are organized to give students more real life experiences related to the theories studied in the theoretical classes. In their specialty courses students also participate in laboratory (e.g. music, art, etc.) and practicum courses (methods of teaching), based on the discipline under study. At the completion of the program students are certified as Pre-School and Primary Teachers.

The teacher certification program has a long tradition, starting in 1785 with a vocational high school. In 1989 the state changed the certification process and required all teachers to be college graduates. The first weekend classes for education majors began in 1997 as an independent department. In 2005 the program was transferred to the faculty of Social and Humanistic Sciences in the Department of Sciences of Education. University weekend classes were endorsed by the national government in 2001 based on Government Decision No. 1101, and the law was updated in 2011 by the National Education Law. According to national standards weekend programs can only be instituted if there is an identical program in the day program. The education weekend program at the University of Oradea is the only teacher certification program that uses a hybrid weekend model.

In 2011, during the accreditation process, the weekend program acquired its present hybrid format. The program changed its philosophy from being a traditional weekend program running traditional face-to-face classes to a hybrid program based on a tri-dimensional pedagogical model. Online resources were added to the program and policies and procedures changed to adapt to the new roles of instructors in a more student centered and hybrid process. The program identified the non-traditional nature of its weekend students and developed the present instructional philosophy. Instructors who were not experienced working online had to learn how to use a new platform, new procedures, and new technology. Some instructors quickly adapted to the new systems while others struggled with their new teaching environment. Some instructors use the online portion of the program as a significant part of their teaching while other use the online resources to give out information and class resources for students. The format and content of the class texts changed significantly. Instructors are now required to differentiate their teaching in their texts. The text became a student centered resource to assist the students in their independent learning. The format and activities in the new formatted textbooks are set to assist students in their self-assessments and allow students to learn content in a progressive fashion. Instructors are now asked to include graphics and other visuals to assist students in their learning. In addition, the goals and competencies of the course and the content, activities, formative assessments and summative assessments are connected as an integrated whole in each textbook.

Instructors are also now asked to differentiate their teaching to meet the needs of adult full-time workers. Teachers are also asked to consider the travel issues encountered by their students in the development of the three aspects of their classes (face-to-face, online, and the instructor developed textbook). For example, instructors are asked to integrate the content and experiences of the texts and online experiences with their face-to-face work in order to give students multiple access points to the important course content. As the program has developed during the past three years professionals who work in the program have recognized that the weekend student body is extremely different from a traditional day class program. This recognition allowed the program to identify who its students are: older working adults, with families, diverse educational backgrounds, who live in a large geographic area with transportation issues, and most of whom have been out of school for many years. A group of these students is already teaching but have not graduated from a university, while another group is attempting to make a career change. Once the program recognized who the students are it became obvious that the philosophy of teaching and learning had to change from teacher centered teaching to student centered learning.

The purpose of our chapter is to describe the weekend program's progress as we have attempted to develop a high quality hybrid program for our elementary pre-service teachers. Our goal is to develop teachers who will enter the field prepared both theoretically and practically to engage their students in high quality educational activities. As we reflect on our work and the data we have collected our hope is that other programs will learn from both our failures and successes.

BACKGROUND

Introduction

Most people today would agree that modern technologies have drastically changed our world. Students have different situations and needs and it makes sense that our programs should adjust to meet those needs. The weekend pre-school and primary certification program at the University of Oradea has adapted its weekend program in an attempt to adjust to the needs of our future teachers. Blended learning has become an important area of review for many educators. There are various definitions for blended learning (Staker & Horn, 2012) and the program at the University of Oradea is developing the weekend program to be in line with the following definition: Blended learning is composed of a teaching and learning process in which students spend part of their time in face-to-face practical classes supervised by teachers, in schools supervised by a mentor and a classroom teacher, and at home learning independently. Students and teachers have access to an online platform for a portion of their work and most of the class resources (Staker & Horn, 2012).

The weekend program is a unique program for the University. There are two faculties that employ online programs at the University for students in traditional type of programs. In Romania there are various online teacher education programs (e.g. Cluj, Brasov, Bucharest, Iasi, Timisoara) but the weekend program at the University of Oradea is the only hybrid program developed for preschool and primary certification. Hybrid programs are developing at a rapid rate around the world (Picciano et al., 2013). As these programs develop people are learning how to integrate what they see as best practices from both face-to-face and online learning (Staker & Horn, 2012). To be successful, hybrid programs have to do more than just use technology to start discussion boards. Programs that have been successful work to develop a sense of community with the use of various tools and methods to engage students and their instructors in interacting (Lord & Lomicka, 2008). As the weekend program has developed it has been important to attempt to make it more student centered (Leese, 2009). The goal is to have students become immersed in deep and complex activities (Caine et al, 2009) in which students take more control over their learning (Tucker, 2012). Instructors have to change their focus from disseminators of information to coaches who guide their students in their learning (Tucker, 2012; Whipp, 2009). In this process part of the traditional classroom has been flipped (Berhmann & Sams, 2012) in order to give students more time to interact with each other and with their instructor (Hall, 2007).

At New England College, in Henniker, New Hampshire, USA, we have developed a fully online program for three of our majors, psychology, business, and criminal justice. The college has also developed a hybrid evening program for master of education students who are full-time teachers. Instructors at the college are using flipped classroom concepts in some of their teaching (Berhmann & Sams, 2012). Blended classrooms are becoming popular throughout the nation (Clark, 2011; Lloyd-Smith, 2010; Means et al, 2013). These blended classes take on many forms depending on the preferences of the instructors. The program at the University of Oradea is unique with its ability to include seminar, online, and practicum experiences in every class.

Our search into the relevant literature indicates that the use of blended classes will benefit our students (Clark, 2011; Lloyd-Smith, 2010; Means et al, 2013). We understand that just introducing technology will not give us blended classes (Clark, 2011; Glading, 2004). Therefore, the program has been developed to enhance the teaching and learning process by attempting to adapt the program using basic constructivist activities (Brooks & Brooks, 1999). We believe that our students must be engaged in the development of their own learning and students must interact more with the curriculum, their peers and their instructors (Hall, 2007). Brain research also agrees with the notion that active engagement leads to more student effort and higher achievement levels (Sousa, 2011).

Textbooks for the weekend program are developed by the instructors so that students can independently accomplish the reading assignments and follow-up activities. This version of a flipped class (Berhmann & Sams, 2012) has the students using the text either in hard copy or online to learn the basics of the theories. Then students are asked to apply their knowledge and skills during the practical and in-school portions of the program. This process was developed as an attempt to create an effective blended instructional system for students and instructors (Staker & Horn, 2012) that will enhance their engagement and learning (Clark, 2011; Lloyd-Smith, 2010; Toyama et al, 2013). The weekend program's vision is to create and use pedagogical techniques aimed to differentiate learning (Tomlinson, 2003) and move from teacher-centered to student-centered practices (Sousa, 2011).

Institutional Data

A review of the institutional data was conducted in relation to student numbers, GPAs, student grades by groups (i.e. 9.5 – 10, 8.5 – 9.49, etc.), retention rates, and graduation rates. The graduating class of 2012 began the program with 119 students of which 64 graduated in 2012. This gave that class graduation rate of 53.78%. In their second year there were 88 students for a retention rate from year one to year two of 73.94%. This class began their third year with 79 students for a retention rate between year two and three of 89.77%. The graduation class of 2013 began the program with

61 students of which 45 of those students graduated in 2013. This gave that class a graduation rate of 73.77%. The graduating class of 2014 started the program with 48 students and began their second year with 38 for a retention rate of 79.16%. This class began their third year with 34 students for a retention rate of 89.47%. If all of these students graduate in 2014 their graduation rate will be 70.83%. The graduating class of 2015 began the program with 55 students and in their second retained 49 of those students for a retention rate of 83.63%.

Data in relation to grades for the current program were reviewed for the 2012 – 2013 school year. First year students earned an average grade of 6.32 (using a 10 point scale). Seven students failed due to non attendance to classes, practicums, and exams. When those grades of zero are removed from the data, the average for those students who attended school was 7.09. For this group of students 1.8% earned a grade average of 9.5 to 10; 29; 1% earned an average of 8.5 to 9.4; 20% earned an average of 7 to 8.49; 23.6% earned an average of 5; 25.45% earned failing grades.

Second year students earned an average grade of 7.78 (10 point scale). Two students failed due to non attendance to classes, practicums, and exams. When those grades of zero are removed from the data, the average for those students who attended school was 7.94. For this group of students 6.12% earned a grade average of 9.5 to 10; 36.73% earned an average of 8.5 to 9.4; 43% earned an average of 7 to 8.49; 6.12% earned an average of 5; 8.19% earned failing grades.

Third year students earned an average grade of 8.05 (10 point scale). Five students failed due to non attendance to classes, practicums, and exams. When those grades of zero are removed from the data, the average for those students who attended school was 8.19. For this group of students 20.33% earned a grade average of 9.5 to 10; 30.51% earned an average of 8.5 to 9.4; 34% earned an average of 7 to 8.49; 5.09% earned an average of 5; 10.17% failed.

PRE-SCHOOL AND PRIMARY WEEKEND PROGRAM

Program Overview

The Pedagogy of Primary and Pre-School Education Weekend Classes program works as a hybrid program with face-to-face practical seminars, laboratories, and practical classes and online theoretical classes. Students attend face-to-face activities on Saturdays and Sundays each semester for three years. Students participate in these classes for between twelve and fourteen hours per week. In all cases the curriculum and expectations for students is the same as the regular day program for the university teacher preparation program.

Schedule

Each semester is fourteen weeks in length. Students attend classes on the weekend (Saturday and Sunday) throughout the term. Professors are required to meet with their students between one or two hours per week face-to-face, depending on the course. Students usually attend classes for six or seven hours per day each weekend. For those students who do not have access to the internet at home the library has internet access available for weekend student use. Students are expected to work on the theoretical portion of their courses online at home. Each instructor schedules assignments and activities with her or his individual class. At the completion of each semester the instructors engage with their students in exams during a two or three week period of time.

Curriculum and Instruction

All students in the program are pre-service teachers working toward certification as pre-school and primary teachers. Students participate in sixty courses during their three year program. The curriculum consists of nine core education courses (15%), forty-three specialty courses (72%), and eight compulsory general study courses (13%). All students also must engage in a capstone action research project at the conclusion of their program. Students present their final results and research paper to a professor committee at the completion of the sixth semester.

The program philosophy to create specific pedagogy for our non-traditional students has led us to create a tri-dimensional approach to instruction: face-to-face engaging activities, online access, and independent learning resources. It is important for our program professors to use instructional strategies that are flexible and that enhance independent learning for our students. Our instructors also have to develop strategies that are effective with older and more experienced adults.

One of the goals of the weekend program is to develop our system so that student learning can occur as independently as possible. Each professor must create a text for the course she or he teaches. This class text is written with the understanding that students will have to use the material individually outside of class time.

Online Elements

The weekend classes use Moodle as the technological platform for the online portion of the program. Students have access to all program resources through this platform including syllabi, announcements, discussion forums, assignments, communications from instructors and administration, and textbooks. Students also have access to the Secretariat in order to access schedules, grades and other important information necessary for students. Students are expected to engage in the theoretical portion of their class work using the online text and other resources. Administration and the three mentors post announcements, schedules and important information that students need during the year. Mentors also use the online program to engage with their students in a general forum in which the mentor or any student may pose questions or work to resolve issues that develop during a semester.

Assessment

Students are assessed by all teachers both formatively and summatively. In seminars and theoretical classes 50% of the students' final grade is determined through the use of formative assessments and 50% of the final grade is determined through the use of summative assessments. In laboratory and practical classes 60% of the final grade is determined through the use of formative assessment and 40% of the final grade is determined through the use of the summative assessments. Each instructor develops formative assessments that match the discipline of the course. Every teacher implements a summative exam connected to the organization of the discipline. Instructors may use written, oral performances, final portfolios, writing prompts or real classroom activities as part of their assessment process. At the completion of their program all students develop and implement an action research project that they present either to a panel of professors or at a conference.

Professional Development

Each year instructors must provide evidence of professional development in their discipline. Every five years instructors in the weekend program must participate in training organized by the Department of Online Education. Each instructor in the program must participate in training for teaching in the weekend program. In order to qualify to teach in the program an instructor must pass an online test. In addition, each instructor must successfully develop a weekend course online using the program platform. The Director of Online Learning and the administrator of the program platform review and assess the course developed by the potential instructor. Once both aspects of the exam are successfully completed the Director of

Online Learning awards a certificate of completion to the instructor who is then eligible to teach in the weekend program. The program director and coordinators also attend yearly state run training sessions developed by national online experts.

METHODOLOGY

In order to gather appropriate data for analysis this study used a case study approach for its research. According to Bogdan and Biklen (2003) the case study approach gives the researcher the opportunity to study complex social relationships and processes that change over time in order to develop a more complete understanding of the case under study. This approach enables the researcher to develop the story behind the quantitative numbers. We chose this case study approach because it allowed the researchers to gather both quantitative and qualitative data directly from the participants in our program, instructors, students, and administration. Quantitative data used in this study was gathered by surveying students and instructors and by analyzing institutional data: retention rates, graduation rates and student grades. Qualitative data was gathered through interviews of the director of the online department, the administrative assistant for finances and the weekend program budget, weekend program advisors, and the coordinator of the weekend program.

The student survey consisted of 20 items. The survey was divided into four categories: student background and demographic information, reasons for choosing the weekend program, online platform and technology use, and assessment of and recommendations for the program. The instructor survey consisted of eight sections: the use of the e-learning platform, use of text, face-to-face activities, a comparison of typical day classes to weekend classes, media used in the program, assessment of the program, professional development, and recommendations.

RESEARCH RESULTS

Student Survey

Background and Demographic Information

Of the total students in the program 126 students participated in the student surveys (68.48%). The results indicate that most students have positive attitudes about the program with 96.8% of the students indicating that they recommend the program for other students. The student body is diverse in its demographic make-up with 53.2% of the students living in urban areas and 46.8% living in rural areas.

Weekend program students may be considered to be non-traditional students in other ways. The students are generally older than a typical day program student body. For the weekend program 42.1% of the students are between 18 and 25 years old, 45.3% are between 24 and 39 years of age, and 12.7% are 40 years of age or older. When they enter the program approximately 25% of the students are 23 years old, meaning that although they are in the youngest category, they are older than typical graduating students in the day program. The majority of the weekend program students work (76.3%). Of this group of working students 84.4% of them work full time. From this group 35.7% of the students work as teachers. Of these teachers 23 (51% of the people who work) have been teaching for ten or more years. Forty-four percent of the weekend program students are married and 39.7% of the students have children of their own, with 26 students having two or more children in their homes.

The weekend program students have a variety of program and career needs. Approximately 23% of the weekend program students already hold a degree of some kind and 29% of the students are working to earn two degrees simultaneously. Approximately 50% of the weekend program students enrolled at the university four or more years after graduation from high school.

Transportation is a major issue for many of the weekend program students. Approximately 40% of the students travel to school by automobile, either their own car or through car pooling. The most common mode of transportation is through the use public transportation, bus or train (55%). For students who live in the city in which the college is housed this is not a major issue but for those students who live in other cities or in rural areas transportation schedules cause issues. People often have to travel significant distances to get to a train or bus station and students have to travel based on the schedule of the bus or train (which may or may not coincide with class schedules). The range of distances from the university to the residencies of the students ranged from 3 kilometers to 840 kilometers. The mode and mean distance from the university is 60 kilometers.

Reasons for Choosing Weekend Program

In addition to questions about their backgrounds, the survey asked students to select from a list one or more reasons for choosing the weekend program. The list included: 1. Their older age, 2. Family obligations, 3. Work obligations, 4. Free time, 5. They live outside of the city which houses the university. Students also had the opportunity to add their own reasons (no students did so). The Students indicated that the most important reason for choosing the weekend program was their working obligations (54.8%). The majority of the weekend program students work (76.3%). Of this group of working students 84.4% of them work full time. Approximately 17% of the students chose the weekend program in order to change their careers or job situations. From that group, most of the students chose this program because they work in a school and have decided that teaching would be a good career choice for them. Thirty-two percent of the students chose the program as their university choice upon graduating from high school. Thirty-five point seven percent of the students are already working as teachers and want to or have to complete their degree for their work. The preponderance of these students are forty years of age or older and have been working in the field for a number of years.

The second most important reason chosen was family obligations (34.9%). Forty-four percent of the weekend program students are married and 39.7% of the students have children of their own. Twenty-six students have two or more children in their homes. The majority of these students also work full time.

Their third most important reason for choosing the weekend program was that students live in another city than where the university is (29.4%). Students indicated that transportation is an issue and the weekend program offers them the opportunity to not have to travel every day to the university. Free time was the fourth most important reason for choosing the weekend program (15.9%). The survey did not ask the students to define what fee time meant to them (e.g. leisure, time to work, time for family obligations, etc.). The fifth reason for choosing the program was the older age of the students (10.3%). The students are generally older than a typical day program student body. For the weekend program 42.1% of the students are between 18 and 25 years old, 45.3% are between 24 and 39 years of age, and 12.7% are 40 years of age or older. When they enter the program approximately 25% of the students are 23 years old, meaning that although they are in the youngest category, they are older than typical graduating students in the day program.

Technology Use and Online Platform

All of the students in the weekend program indicated that they are at least somewhat familiar with using a computer to access the internet. Data from the survey indicated that 69% of weekend program students are familiar or very familiar with using a computer. Another 25.4% of the students indicated that they have average familiarity with using a computer. Six students indicated that they were somewhat familiar with using a computer. No students indicated that they were not at all familiar with using a computer.

No students indicated that they were totally unfamiliar with using the online platform for the weekend program. Sixty-five percent of the students indicated that they were familiar or very familiar with using the online platform. Another 29.4% indicated that they were somewhat familiar with the online platform, and 5.6% of the students indicated that they were unfamiliar with the program. As students gain more experience in the program they become more familiar with the program. In the first year 54.7% of students indicated they were familiar or very familiar with the online program; in the second that number was 76.5%; in the third year the number rose to 78.7%.

The survey also asked students to indicate how often they use the online platform for their school work and/or learning. Forty-six point eight percent of the students indicated that they access the online platform on a daily basis. Another 32.5% of students indicated they use the online platform 2 or 3 times per week. Twelve point seven percent of the students indicated they use the platform daily during the exam periods. Five point six percent of students indicated they use the platform at least once per week. Lastly, 2.4% of students use the platform once per month. First year students (64.2%) use the platform at a higher rate than do second and third year students (35% and 33.3%).

Students were asked to prioritize their reasons for using the online platform (scale of 1 – 7). The first priority for students was to access posts uploaded to the platform by their instructors (mean 5.35). Their second priority was to post assignments for their classes (mean 4.95). The third most frequent reason were individual student reasons that they added to the list (mean 4.83). The fourth most important reason to access the online platform was to communicate with their instructors (mean 3.62). Students chose forum discussions as their fifth most important reason to access the online platform (mean 3.45). The sixth priority for accessing the online platform was to communicate with their mentor (3.04). Students' final choice was to use the online platform to communicate with secretariat (mean 1.42).

The survey also asked students about how much help they needed in using the online platform. One third of the students indicated they needed assistance with using the online platform, while the other two thirds indicated they did not need assistance. The youngest group of students (18 – 23) indicated they needed assistance at the highest rate (43.4%). The students from age 24 to 39 indicated the lowest need for assistance (22.6%). Students were also asked by the survey to indicate their preference for lowering the face-to-face time of the program and substituting that time with online work. This would include doing more of their assignments and discussions in the online format. The majority of the students (65.9%) indicated they did not want to change the face-to face to online ratio as it now exists.

In response to the survey students indicated that almost all of them (96%) have access to the internet at home. Three percent indicated that they have access at their work, and one student indicated the she or he does not have internet access.

Program Leaders Survey

Introduction

The program implemented an open ended survey with five people: program administrator, coordinator of the weekend program, and the three program advisors. All participants responded to the same six questions: What are the strengths of the program? What can be improved in the program? What are the needs of the students in our program? What are the needs of the instructors in the program? How effective are the resources provided by the program (i.e. text, online resources, program library)? Are there any other comments you would like to add?

Results

For question one, strengths of the program, there were three major themes raised by the respondents. All five participants responded that although the program is presented in an alternative format the students receive the same level of training and certification as do students in the traditional day program. Four of the five respondents noted that the weekend program offers easier access to the textbooks and classes for their students. Three participants responded that the flexibility of the program and its use of weekend classes, online resources, and independent learning opportunities allow students to be successful within their family and work situations. Two people stated that the cooperation among online instructors and classroom instructors is effective. In addition, two respondents noted that the instructors are well prepared to teach in the program.

The second questions asked for ways to improve the program. Three participants responded that although the program is working with non-traditional students, a significant number of instructors do not differentiated their instruction and assessment practices to adjust to their students' needs. These respondents believe the weekend program should develop a professional development system to ensure that instructors understand the needs of the program, their students, and the program's pedagogical philosophy and best practices necessary for student success. Two respondents noted that they are not sure that the textbooks they created are accurate in terms of the time students need to accomplish the tasks. They recommended that the program could assist instructors in the process of developing texts and of researching the accuracy of the time requirements for the students. Two participants noted that working with smaller classes would improve their effectiveness.

The third questions referred to the student needs in the program. The responses to this question did not develop any major themes. The different responses discussed the general concepts that the students have diverse needs and need flexibility in order to meet those needs. The theme of the responses appeared to be that the program should constantly assess the student needs and respond to each group of students as necessary. For the fourth question, needs of instructors, all five respondents indicated that the salary for their efforts should be more in line with the work required of the instructors, mentors, and administrators in the program.

The fifth question asked about resources in the program for students. Three people noted that the content of texts should be "essentialized" in order to give a more accurate set of activities in terms of the amount of time students need to complete text activities. Two participants suggested that the program should develop more ways to motivate students to access the online platform on a more regular basis.

Participants were asked to give other recommendations. Two people responded to this question. Their suggestion was to improve the consultation time offered by the program. Instructors offer two-hour blocks of time for students to come to the university to get assistance of any kind. Few students take advantage of these opportunities. The suggestion was to have the program look into other ways to format the consultation time (e.g. include online office hours, etc.).

Instructor Survey

Introduction

The program implemented an instructor survey that was organized into eight sections: 1. Online Platform, 2. Textbooks, 3. Face-to-Face Activities, 4. Comparison with Day Program, 5. Use of Media, 6. Assessment, 7. Professional Development, 8. Other Comments. Sixteen full-time instructors (66.67%) responded to the survey. There are two types of classes offered by these instructors, online theoretical classes and face-to-face practical classes.

Results

Section 1 asked instructors three items: How important is the online platform for the weekend program? What aspects of the platform are important for you? How often do you access the online platform? For the first question the instructors' mean was 4.43 (scale of 1 – 5) indicating that instructors believe the platform is important to the program. When asked how often instructors access the program 81% responded that they use the online platform on a weekly basis. Instructors indicated that they use the platform to post information (mean 5.00) for their classes (e.g. syllabus, text book, assessments, schedules, etc.). The second most important reason (4.64) given was to create the buttons for the assessment tasks for students. The third purpose for accessing the online program was for the online discussions (4.40).

Section 2 referred to the program textbooks (12 questions). There were four questions in this section that related to student use of the text. Instructors indicated that the textbooks were effective for students use and needs (means 4.42, 4.57, 4.42, 4.42). The rest of the questions for Section I referred to the required elements of the texts according to program standards. Instructors indicated their texts followed program standards, with mean scores ranging from 4.14 to 4.71.

Section 3 referred to face-to-face activities (eight questions). There were five questions related to the effectiveness of the face-to-face classes in helping students to learn and apply the concepts of each course. Instructors indicated in four of the five questions that the classes were successful for students. The means for those questions ranged from 4.40 to 4.60. The fifth question asked if the materials used in the classroom were useful for the future careers of these pre-service teachers. The mean score for this question was 3.93 which was the lowest mean for this section. The other three questions for this section asked about the content of the classes as they related to program requirements. Instructors indicated that their content was in line with program requirements with means between 4.4 and 4.73.

Section 4 asked instructors to compare the weekend program to the traditional day program. This section gave instructors ten typical teacher functions, and they were asked to choose which, if any, were more difficult in the weekend program as compared to their work in the day program. A majority of instructors (11 of 16) indicated that presenting the same content is more difficult in the weekend format as compared to the day program format. For question nine (motivating students) nine of the sixteen instructors indicated that it is more difficult to motivate their students in the weekend program. Five instructors indicated that it is more difficult to organize the class time effectively in the weekend program format. For the other seven questions a minimum of 13 of the 16 instructors indicated there is no difference in difficulty in preparing and implementing their classes in the weekend program.

Section 5 asked instructors their ideas about video use in the program. Three of the 16 instructors indicated that they sometimes use videos, while 6 instructors indicate that they use videos often or very often. Seven instructors indicated they either rarely or never use videos. Thirteen instructors indicated that the use of videos is somewhat important, important, or very important. Three people indicated that video use in class is not at all important. When asked if the program created videos how they would like to use them three instructors indicated they would like the videos to use in both the day and weekend program and seven instructors indicated the videos should be developed specifically for the weekend students. One person indicated that the videos should be prepared by someone other than her. Five people gave other written ideas which included: three of them suggested recording lessons in the schools and kindergarten and use them as models and for class discussions for students; two of respondents suggested creating an electronic presentation program with audio (e.g. Powerpoint).

Section 6 asked instructors about their assessment practices. This survey asked three questions about assessment, one in relation to formative and summative assessments, one question asking instructors to indicate the formats their assessments take for their students, and one question about feedback to students. Sixty-nine percent of the instructors indicated that they use formative assessment strategies with their students and 94% of the instructors indicated that they use summative assessments. Nineteen percent of the instructors indicated that they also use other forms of assessments: pre assessments and differentiated or personalized assessments.

Instructors were asked whether or not they use oral, written, and practical assessment techniques. Forty-four percent of the instructors indicated they use oral assessments. Sixty-three percent indicated they use written assessments, and 44% indicated they use practical assessment techniques. Thirteen percent of the instructors also indicated they use other assessment techniques which include: portfolios, structured essays, and individual projects. The third question asked teachers to rate at what levels instructors believe their students understand how they receive the grades they achieve on their assessments. The results for formative assessments indicated that 81.3% of the instructors believe that students have a good or very good understanding of why their grades are what they are. Thirteen percent of the instructors believe that students have little understanding of what their grades mean. For summative assessments 75% of the instructors indicated that students have a good or very good understanding of what their summative assessment scores mean about their learning. Thirteen percent of the instructors indicated that students do not understand what their grades mean about what they have learned.

Section 7 asked instructors to share their ideas about professional development. Ninety-four percent of the instructors indicated that the professional development provided by the weekend program was useful to the instructors. When asked how often instructors would like to participate in professional development activities provided by the weekend program 50% indicated they would like professional development to occur every other year, 13% indicated they would like to have annual professional development activities, and another 13% indicated they would like professional development to occur every semester. Thirteen percent also indicated they would like professional development to occur every five years.

The final section of the instructor survey asked instructors for recommendations to improve the weekend program: four people suggested to reduce the content volume of the material taught in the textbooks; four people suggested making attendance mandatory for the face to face meetings; three people stated that the curriculum content should be coordinated throughout the program, three people indicated they thought working with smaller groups of students would benefit teachers and students; three instructors indicated that learning should be more adapted to the individual needs of students.

DISCUSSION

The weekend program consists of students who have diverse backgrounds, experiences, and needs. Students range in age from 18 to older than 50, and their experiences in the world of work and life are vastly differently from each other. A significant group of students work full time, many as teachers, a large group of students has families of their own, and a significant number of students live long distances from campus. These peculiarities mean that the weekend community members have a variety needs for the program to address. This diversity suggests the necessity for a program that is also diverse. From an instructor perspective the program goals suggest flexible teachers who understand older and more experienced students, while at the same time understanding young adults. The weekend program has an obligation to maintain high standards for future educators while creatively integrating the curriculum for its students. Data indicates that instructors could take more advantage of the online portion of the program, especially to communicate with and give feedback to students.

The people who work in the weekend program understand that they are working with a diverse population that has varied needs. An analysis of the data from the study indicates that leaders and instructors in the program should regularly assess the program and its students' and instructors' needs in order to build in the necessary flexibility for the success of its students. The hybrid nature of the program implies a pedagogical philosophy that all instructors should understand, buy-into, and participate in appropriate professional development.

The results of the instructors survey indicates that there is a wide range of experiences and needs among instructors. In general it appears that instructors have worked hard to prepare their classes to be in line with the requirements of the program. There are some areas of concern in these results. For example, the low mean from the instructors with regards to whether the materials used in the classroom were useful for the future careers of these pre-service teachers is disconcerting. Another area of concern is the fact that 31% of the instructors surveyed indicated they do not use formative assessments. Twenty-six percent of the instructors indicated they would like professional development to occur yearly or during each semester. That means that 74% of the instructors indicated they want or need professional development less than yearly, with 13% indicating once every five years. When combined with other results from this research from students and program leaders, it appears that there is a wide range of understanding of and commitment to the philosophy, pedagogical requirements, and goals of the weekend program from its instructors. This area of the program is going to require further review to determine needs and develop appropriate refinements in the program.

From the review of the data in relation to retention and graduation the program appears to maintain higher retention and graduation rates with smaller classes. For the class that started with 119 students the graduation rate was 53.48% and the graduation rates for the smaller classes were 73.77% and 70.83%. As students progress through the program they do better both in terms of retention rates and in terms of grades. The percentage of students who attain low or failing grades during the first year is significantly higher than in the second and third year of the program. The program leaders should look to develop a system to work with first year students in order to help them transition into the university and into the rigors of higher education. Additionally, program leaders will attempt to develop ideas with program instructors to create systems to work with students in alternative ways during their first year. The system in place for class mentors may also be able to adapt to the needs of program students, especially first year students. Strategic online learning strategies could play a significant role in the process of working with program students.

SOLUTIONS AND RECOMMENDATIONS

It is clear from this research that the weekend program should continue to move toward a student-centered teaching and learning structure. Instructors and students indicated that more personalized instruction and materials would be useful. The program would do well to strategically create and implement a professional development program to assist instructors in the creation and use of constructivist teaching and learning strategies. The online component of the weekend program has not been used to its fullest potential. Instructors use the online platform to make curriculum resources, textbooks, schedules, and other information available to students but the interactive potential of more discussions, lessons, meetings, and other kinds of learning activities are underutilized. Students asked for more consistent communication and feedback among instructors and students online. The incorporation of online office hours could assist in this request. Instructors will need training and support to effectively use the technological tools available to them.

In order to develop a more student-centered approach the program might contemplate ways to lower the student to teacher ratio. For example, creating a schedule in which instructors can meet with students in smaller groups with flipped classroom activities for the rest of the class might assist instructors in this matter. The program might incorporate more cooperative grouping techniques to assist with the class size issue. The weekend program has done a great job of developing its ideas in relation to the texts. Students would benefit from further development. The program could consider ways to make the activities more in line with the time required from students to accomplish the requested readings and tasks. It appears that the content of the texts and the content of the practical classes could be more coordinated so that students are getting into complex activities rather than being introduced to a myriad of ideas with little depth. In line with the differentiated instructional philosophy of the program it makes sense to consider creating video lectures and interactive video activities for instructors and students. Finally, we recommend that the discussion aspects of the online platform could be used more effectively. This aspect of the program could allow students and instructors to communicate more regularly and for students to interact more frequently with their peers in connection to important curriculum.

The weekend program is working with a diverse group of students and instructors. There is no question that it needs instructors who are committed to working in such a program because the success of our future teachers cannot be left to chance. The program and its instructors are working hard to identify needs and develop the philosophical and pedagogical structures to make the program highly effective. This will require a full commitment on the part of both the program and its instructors. The program should commit to a systematic and strategic professional development program for its leaders, advisors, and instructors. As part of this professional development system the program should develop procedures to ensure ongoing support and training for all staff. It is imperative that all instructors understand, buy-into, and receive the support necessary to be effective in meeting the requirements and goals of the weekend program. Since teaching in the weekend program is voluntary, people who disagree with the goals and philosophy of the weekend program should not volunteer to work in the program. On the other hand any person who wants to teach in such a program should receive great training and the full support from the program.

The use of hybrid programs such as the weekend program is going to continue to play an important role for students, and the trend appears to indicate that more students will be attracted to and need such programs. We believe that the recommendations made above will assist the program in its continued growth as it works to meet as many needs of their students and instructors as possible.

FUTURE RESEARCH DIRECTIONS

Further research into the connection between online activities and academic achievement would benefit the weekend program and so would research in the area of working with diverse populations in effective ways and exploring the use of texts in a hybrid program, which has potential for such a program as the weekend classes. Instructors agree that individualized learning is important and further research into techniques that work to differentiate instruction and assessment with diverse groups would help instructor growth. Research in relation to the building of a cooperative culture for students and instructors working together in a weekend model would assist all participants in the program. The advisors in the weekend program would benefit from research into the roles of advising in an alternative model such as the weekend program. Finally, research into the development of a highly effective professional development program and support system for instructors in an alternative program such as the weekend program would be beneficial to everyone involved in the program.

The weekend program is developing an exciting model for its instructors and students. This model is probably going to attract more students in the coming years. The program has the potential of changing how universities prepare their future public school teachers.

CONCLUSION

As we move to prepare teachers for the rest of the 21st century and beyond it is clear that to be successful universities must adapt to the changing times and technologies. Teaching in a world in which borders and travel no longer limit access will require adapted or completely different models of teaching and learning. It appears that the model in which professors have more access to information than do the students has to change. In the area of open access the needs of the students is changing and programs should adapt to meet those emerging needs. In this chapter we reviewed one case study of a program that is working hard to adjust to the present and future needs of its students and their future students. The willingness of the people in this weekend program to venture into alternative strategies for teaching and learning is commendable. Hopefully, their hard work will assist others as they contemplate how to adapt for the future in their programs. Teacher preparation programs have the impossible task of preparing students to be successful teachers who exhibit the habits and abilities of veteran teachers on their first day of teaching. University teacher preparation programs must transcend the curriculum and help students to develop into knowledgeable, dedicated, and caring human beings. The job is impossible but that is what great teachers do, accomplish the impossible with their students.

REFERENCES

Berhmann, J., & Sams, A. (2012). *Flip your classroom: Reach every student in every class every day*. Alexandria, VA: Association for Supervision and Curriculum Development and International society for Technology in Education.

Bogdan, R. C., & Biklen, S. K. (2003). *Qualitative research for education: An introduction to theories and methods* (4th ed.). New York: Pearson.

Brooks, J. G., & Brooks, M. G. (1999). *In search of understanding: The case for constructivist classrooms*. Alexandria, VA: Association for Supervision and Curriculum Development.

Caine, R. N., Caine, G., McClintic, C., & Klimek, K. (2009). *12 brain/mind learning principles in action*. Thousand Oaks, CA: Corwin Press.

Clark, B. (2011). *Moving the technology into the classroom project blended delivery: A literature review*. College Sector Committee for Adult Upgrading. Retrieved from ProQuest

Gladings, N. (2004, March 8). Blended learning in K-12 social studies instruction. *Literature Review*.

Hall, A. (2007). Vygotsky goes online: Learning design from a socio-cultural perspective. *Learning and Socio-Cultural Theory: Exploring Modern Vygotskian Perspectives, 1*(1), article 6. Retrieved from http://ro.uow.edu.au//llrg/vol1/iss1/6

Leese, M. (2009). Out of class - Out of mind? The use of virtual learning environment to encourage student engagement in out of class activities. *British Journal of Educational Technology*, *40*(1), 70–77. doi:10.1111/j.1467-8535.2008.00822.x

Lloyd-Smith, L. (2010). Exploring the advantages of blended instruction at community colleges and technical schools. *MERLOT Journal of Online Learning and Teaching, 6*(2), 508-515. Retrieved from http://jolt.merlot.org/vol6no2/lloyd-smith_0610.htm

Lord, G., & Lomicka, L. (2008). Blended learning in teacher education: An investigation of classroom community across media. *Contemporary Issues in Technology & Teacher Education*, *8*(2), 158–174.

Means, B., Toyama, Y., Murphy, R., Bakia, M., & Jones, K. (2009). *Evaluation of evidence-based practices in online learning: A meta-analysis and review of online learning studies*. Washington, DC: U.S. Department of Education, Office of Planning, Evaluation, and Policy Development.

Means, B., Toyama, Y., Murphy, R. F., & Baki, M. (2013). The effectiveness of online and blended learning: A meta-analysis of the empirical literature. *Teachers College Record*, *115*(3), 1–47. Retrieved from http://www.tcrecord.org/library

Picciano, A., Dziuban, C., & Graham, C. (2013). *Blended learning: Research perspectives* (Vol. 2). London: Routledge.

Sousa, D. (2011). *How the brain learns* (4th ed.). Thousand Oaks, CA: Corwin.

Staker, H., & Horn, M. B. (2012). *Classifying K-12 blended learning*. INNOSIGHT Institute. Retrieved from http://files.eric.ed.gov/fulltext/ED535180.pdf

Tomlinson, C. A., & Imbeau, M. B. (2013). *Leading and managing a differentiated classroom*. Alexandria, VA: Association for Supervision and Curriculum Development.

Tucker, B. (2012). The flipped classroom. *Education Next, 12*(1). Retrieved from http://educationnext.org/the-flipped-classroom

Whipp, J., & Lorentz, R. R. (2009). Cognitive and social help giving in online teaching: An exploratory study. *Educational Technology Research and Development*, *57*(2), 169–192. doi:10.1007/s11423-008-9104-7

ADDITIONAL READING

Akinsola, M. K., & Awofala, A. A. (2009). Effect of personalization of instruction on students' achievement and self-efficacy in mathematics word problems. *International Journal of Mathematical Education in Science and Technology*, *40*(3), 389–404. doi:10.1080/00207390802643169

Allen, I. E., & Seaman, J. (2013). *Changing course: Ten years of tracking online education in the United States*. Babson Survey Research Group and Quahog Research Group, LLC. Retrieved from http://www.gedcouncil.org/publications/changing-course-ten-years-tracking-online-education-united-states

Alliance for Excellent Education. (2012). *Culture shift: Teaching in a learner-centered environment powered by digital learning*. Washington, DC: Alliance for Excellent Education.

Arnold-Garza, S. (2014). The flipped classroom. *College & Research Libraries News*, *75*(1), 10–13.

Aspden, L., & Helm, P. (2004). Making the connection in a blended learning environment. *Educational Media International*, *41*(3), 245–252. doi:10.1080/09523980410001680851

Ausburn, L. J. (2004). Course design elements most valued by adult learners in blended online education environments: An American perspective. *Educational Media International*, *41*(4), 327–337. doi:10.1080/0952398042000314820

Aycock, A., Garnham, C., & Kaleta, R. (2002). Lessons learned from the hybrid course project. *Teaching with Technology Today, 8*(6). Available from http://www.uwsa.edu/ttt/articles/garnham2.htm

Beecher, M., & Sweeny, S. M. (2008). Closing the achievement gap with curriculum enrichment and differentiation: One school's story. *Journal of Advanced Academics*, *19*(3), 502–530.

Benjamin, A. (2005). *Differentiated instruction using technology: A guide for middle and high school teachers*. New York, NY: Eye on Education.

Bergmann, J. (2011). Flipped classroom offers new learning path. *Electronic Education Report*, *18*(23), 1–3.

Bergmann, J. & Sams, A. (2014). Flipped learning: Maximizing face time. *Training+Development, 68*(2), 28-31.

Berrett, D. (2012). How 'flipping' the classroom can improve the traditional lecture. *The Chronicle of Higher Education*, *58*(25), 16–18.

Boyle, T. (2005). A dynamic, systematic method for developing blended learning. *Education Communication and Information*, *5*(3), 221–232. doi:10.1080/14636310500350422

Boyle, T., Bradley, C., Chalk, P., Jones, R., & Pickard, P. (2003). Using blended learning to improve student success rates in learning to program. *Journal of Educational Media*, *28*(2-3), 165–178. doi:10.1080/1358165032000153160

Brown, B. W., & Liedholm, C. E. (2004). Student preferences in using online learning resources. *Quality in Higher Education*, *11*(1), 56–67.

Bull, G., Ferster, B., & Kjellstrom, W. (2012). Inventing the flipped classroom. *Learning and Leading with Technology*, *40*(1), 10–11.

Choudhury, S., Charman, T., & Blakemore, S. (2008). Development of the teenage brain. *Mind, Brain, and Education*, *2*(3), 142–147. doi:10.1111/j.1751-228X.2008.00045.x

Christiansen, C., Horn, M., & Staker, H. (2013). Is K-12 blended learning disruptive? An introduction of the theory of hybrids. Clayton Christensen Institute. Retrieved from www.christenseninstitute.org

Clark, B. (2011). Moving the technology into the classroom project blended delivery: A literature review. Ontario, Canada: LBS Research and Development Fund, Ministry of Training, Colleges and Universities. Retrieved from ProQuest.

Clark, I., & James, P. (2005). Blended learning: An approach to delivering science courses online. In *Proceedings of UniServe Science Blended Learning Symposium* (pp. 19-24). Available from http://science.uniserve.edu.au/pubs/procs/wshop10/index.html

Collins, A., & Halverson, R. (2009). *Rethinking education in the age of technology: The digital revolution and school in America*. New York: Teachers College Press.

Crouch, M. (2014). The flipped classroom. *Scholastic Parent & Child*, *21*(5), 59–59.

Darling-Hammond, L., & Bransford, J. (Eds.). (2005). *Preparing teachers for a changing world: What teachers should learn and be able to do*. San Francisco, CA: John Wiley and Sons.

Davies, J., & Graff, M. (2005). Performance in e-learning: Online participation and student grades. *British Journal of Educational Technology*, *36*(4), 657–663. doi:10.1111/j.1467-8535.2005.00542.x

Du, C. (2011). A comparison of traditional and blended learning in introductory principles of accounting course. *American Journal of Business Education*, *4*(9), 1–10.

Elebiary, H., & Mahmoud, S. (2013). Enhancing blended courses to facilitate student achievement of learning outcomes. *Life Science Journal, 10*(2), 401-407. Retrieved from http://www.lifesciencesite.com

Ellis, R. A., Marcus, G., & Taylor, R. (2005). Learning through inquiry: Student difficulties with online course-based material. *Journal of Computer Assisted Learning*, *21*(4), 239–252. doi:10.1111/j.1365-2729.2005.00131.x

Esfandiari, M., Barr, C., & Sugano, A. (2006). *Examining the effectiveness of blended instruction on teaching introductory statistics*. Unpublished Manuscript. Available from EbscoHost.

Flynn, A., Concannon, F., & Ni Bheachain, C. (2005). Undergraduate students' perceptions of technology supported learning: The case of an accounting class. *International Journal on E-Learning*, *4*(4), 427–444.

Fulton, K. P. (2013, September). Byron's flipped classrooms. *Education Digest*, *79*(1), 22–26.

Garrison, D. R., & Anderson, T. (2003). *E-learning in the 21st century: A framework for research and practice*. New York: RoutledgeFalmer. doi:10.4324/9780203166093

Garrison, D. R., & Vaughn, N. (2008). *Blended learning in higher education*. San Francisco, CA: Jossey-Bass.

Global Engineering Deans Council. (2012). *Six articles on online and blended learning*. Milwaukee, WI: Global Engineering Deans Council. Retrieved from http://www.gedcouncil.org/publications/six-articles-online-and-blended-learning

Greener, S. (2008). Self-aware and self-directed: Student conceptions of blended learning. *MERLOT Journal of Online Learning and Teaching*, *4*(2), 243-253. Retrieved from http://jolt.merlot.org/vol4no2/greener0608.htm

Hess, K. K., Jones, B. S., Carlock, D., & Walkup, J. R. (2009). *Cognitive rigor: Blending the strengths of Bloom's taxonomy and Webb's depth of knowledge to enhance classroom-level processes.* Online Submission. Retrieved from http://eric.ed.gov/?id=ED517804

Lim, D. H., Morris, M. L., & Kupritz, V. W. (2007). Online vs. blended learning: Differences in instructional outcomes and learner satisfaction. *Journal of Asynchronous Learning Networks*, *11*(2), 27–42. Retrieved from http://www.editlib.org/p/104046

Lim, D. H., & Yoon, S. W. (2008). Team learning and collaboration between online and blended learner groups. *Performance Improvement Quarterly*, *21*(3), 59–72. doi:10.1002/piq.20031

MacDonald, J. (2008). *Blended learning and online tutoring* (2nd ed.). Hampshire, UK: Gower Publishing.

Mangan, K. (2013). Inside the flipped classroom. *The Chronicle of Higher Education*, *60*(5), 18–21.

Mitchell, P., & Forer, P. (2010). Blended learning: The perceptions of first-year geography students. *Journal of Geography in Higher Education*, *34*(2), 77–89. doi:10.1080/03098260902982484

Musallam, R. (2011). *Should you flip your classroom?*. Retrieved from Edutopia.

Nielsen, S. M. (2008). Half bricks and half clicks: Is blended onsite and online teaching and learning the best of both worlds? In *Proceedings of the Seventh Annual College of Education Research Conference: Urban and International Education*. Academic Press.

November, A., & Mull, B. (2012, March 26). Flipped learning: A response to five common criticisms. *eSchool News*.

Pane, D.M. (2009). Third space: Blended teaching and learning. *Journal of the Research Center for Educational Technology, 5*(1), Article 8.

Parker, D. R., Robinson, L. E., & Hannafin, R. D. (2007). Blending technology and effective pedagogy in a core course for pre-service teachers. *Journal of Computing in Teacher Education*, *24*(2), 49–54.

Pearcy, A. G. (2009). *Finding the perfect blend: A comparative study of online, face-to-face, and blended instruction*. Dissertation Prepared for the Degree of Doctor of Philosophy. Retrieved from ProQuest.

Reach Every Student. (n.d.). Retrieved from http://www.edugains.ca/resourcesDI/Brochures/DIBrochureOct08.pdf

Roehl, A., Reddy, S. L., & Shannon, G. J. (2013). The Flipped classroom: An opportunity to engage millennial students through active learning strategies. *Journal of Family and Consumer Sciences*, *105*(2), 44–49. doi:10.14307/JFCS105.2.12

Rowntree, D. (1990). *Teaching through self-instruction: How to develop open learning material*. London: Kogan Page.

Sousa, D., & Tomlinson, C. A. (2011). *Differentiation and the brain: How neuroscience supports the learner-friendly classroom*. Bloomington, IN: Solution Tree Press.

Sousa, D., & Tomlinson, C. A. (2011). *Differentiation and the brain: How neuroscience supports the learner-friendly classroom*. Bloomington, IN: Solution Tree Press.

Sprenger, M. (2010). *Brain-based teaching the digital age*. Alexandria, VA: ASCD.

Springen, K. (2013). Flipped. *School Library Journal*, *59*(4), 23.

Staker, H. (2011). The rise of k-12 blended learning. Boston: Innosight Institute. Retrieved from http://www.innosightinstitute.org/blended_learning_models/

Sweeney, J., O'donoghue, T., & Whitehead, C. (2004). Traditional face to face and web-based tutorials: A study of university students' perspectives on the roles of tutorial participants. *Teaching in Higher Education*, *9*(3), 311–323. doi:10.1080/1356251042000216633

Tomlinson, C. A. (2004). *Fulfilling the promise of the differentiated classroom*. Alexandria, VA: Association for Supervision and Curriculum Development.

Tomlinson, C. A. (2008). *The differentiated school: Making revolutionary changes in teaching and learning*. Alexandria, VA: Association for Supervision and Curriculum Development.

Tucker, B. (2012). The flipped classroom. *Education Next, 12*(1). Retrieved from http://educationnext.org/the-flipped-classroom

Tucker, C. (2012). Blended learning in grades 4-12: Leveraging the power of technology to create student-centered classrooms. Thousand Oaks, CA: Corwin.

U.S. Department of Education. (2013). *Evaluation of evidence-based practices in online learning: A meta-analysis and review of online learning studies*. Washington, DC: Office of Planning, Evaluation, and Policy Development Policy and Program Studies Service. Retrieved from http://www.gedcouncil.org/publications/evaluation-evidence-based-practices-online-learning-meta-analysis-and-review-online-lear

Uzen, & Senturk, A. (2010). Blending makes the difference: Comparison of blended and traditional instruction on students' performance and attitudes in computer literacy. *Contemporary Educational Technology, 1*(3), 196-207. Retrieved from ProQuest.

Vignare, K. (2007). Review of literature blended learning: Using ALN to change the classroom – Will it work? In A. G. Picciano & C. D. Dziuban (Eds.), Blended learning: Research perspectives (pp. 37–63). Needham, MA: Sloan Consortium. Retrieved from http://msuglobal.com

Yapici, I., & Akbayin, H. (2012). High school students' views on blended learning. *Turkish Online Journal of Distance Education, 13*(4), article 8. Retrieved from http://www.academia.edu/2089803/HIGH_SCHOOL_STUDENTS_VIEWS_ON_BLENDED_LEARNING

Yapici, I., & Akbayin, H. (2012). The effect of blended learning model on high school students' biology achievement and on their attitudes towards the internet. *The Turkish Online Journal of Educational Technology*, *11*(2), 228–237.

KEY TERMS AND DEFINITIONS

Blended Learning: Blended learning occurs in an environment in which the student work and learn in a classroom part of the time and work outside of the classroom part of the time. For the portion of the work accomplished outside of the classroom students have some control over timing and pace. In a blended environment the use of technology is integrated into the learning process in order to give students more time working with the curriculum, their peers, and the teacher.

Differentiated Instruction: In a classroom that differentiates instruction the teacher attempts to adjust her/his teaching to the needs of the students. The differentiated teacher attempts to teach at different levels using a variety of approaches and thinking level processes to assist all students in learning all of the important material.

Flipped Classroom: The concept of a flipped classroom approach to teaching is to allow students to accomplish the lower level activities outside of the classroom in order to give the students and the teacher more time to work together in higher levels of engagement. For example, a teacher may video her/his lecture and have the students view the lecture as homework. When the students come to class the teacher and students then engage in application and guided practice activities rather than note-taking activities.

Practicum Experiences: Pre-service teachers gain experiences in the field at public schools under the guidance of a university supervisor and a public school teacher. Practicum experiences occur every semester for all students.

Seminar Experiences: In the weekend program students participate in face-to-face seminar classes built each week to give students practical experiences in relation to the theory learned from their text and online activities.

Student-Centered Learning: In a student-centered classroom the focus is on student learning rather than teacher led activities. In this process the teacher sets up the learning activities in ways that engage students in active ways. The teacher role becomes more of a coaching and guiding role as opposed to a dissemination of information role.

Weekend Program: For the purposes of this study, a weekend program is one in which students attend classes on the weekend as opposed to the week days of a traditional program. The weekend program also uses a blended model of learning in which the students are responsible for the text learning in an independent fashion. This includes independent reading and activities, self assessment activities, and online learning. The weekend program utilizes face-to-face practical classes, independent and online theoretical learning, and in-school practicum experiences.

This work was previously published in New Voices in Higher Education Research and Scholarship edited by Filipa M. Ribeiro, Yurgos Politis, and Bojana Culum, pages 271-291, copyright year 2015 by Information Science Reference (an imprint of IGI Global).

Chapter 58
Blended Learning and Digital Curation:
A Learning Design Sequence

Nathaniel Ostashewski
Curtin University, Australia

Romana Martin
Curtin University, Australia

Andrew Brennan
Curtin University, Australia

ABSTRACT

This chapter presents a case of successful integration of digital curation in a repeating series of blended classroom activities. Digital curation, in education, can be understood as the collection, organization, interpretation, summary, and sharing of online resources by learners on a topic of inquiry. This research reports on a blended digital curation learning design integrated into a third-year university course. A digital curation activity sequence development process and the classroom activity structure form the basis of the educational implementation presented here. In theory, digital curation activities can support the sharing of collected resources between learners. In practice, digital curation learning activities in higher education can also support blended and flipped classroom engagement models while providing opportunities for the development of critical thinking skills. The chapter describes the activities, the learning design, and the outcomes of a digital curation activity sequence. This provides other educators with a learning design roadmap for engaging students in pre-lecture activities or blended learning that adds value to classroom lectures.

DOI: 10.4018/978-1-4666-8246-7.ch058

INTRODUCTION

In a recent study of online learning activities (Ostashewski, 2013) students reported that building a collection of online curated resources that could be later used in their professional practice was particularly valuable. Students reported that their exposure to some of the content-focused hyperlinked websites supporting a workplace topic continued to be helpful beyond the course. Similarly, sharing of the website URLs and short annotations or descriptions of the particular value of those websites provided a "filtering" or "digital curation" of content for others. Digital curation is about "maintaining and adding value to, a trusted body of digital information for current and future use" (Beagrie, 2008, p. 3). A simplified definition of digital curation for education is: "the online or digital curation of content for education can be understood as the sharing and reviewing of online resources using websites" (Good, 2012). The literature supports digital curation activities as valuable learning designs for both blended and online learning (Ravitz & Hoadley, 2005). For example, resource sharing or *sharing and curation of online resource* is reported as a key online-networked learning activity (Wenger, Trayner, de Laat, 2011; Ostashewski & Reid, 2011; Sinha, Rosson, Carroll, & Du, 2010) and may, in fact, represent a learning design suitable for blended or flipped education delivery. In summary, the literature reports that students engaged in online or blended learning describe their joint and shared exploration and evaluation of curricular resources (e.g. materials presented to them in a course or found via researching) as valuable online learning experiences. This was the basis upon which digital curation activities were integrated into a third year business education course in one Australian university. This chapter will provide an examination of how integration of digital curation activities into a blended higher education classroom occurred and presents a learning design sequence arising from the research.

The goal of this chapter is to present a case of successful integration of digital curation as a series of weekly classroom activities. Some ways that digital curation activities can be utilized are by:

1. Taking advantage of a network of curators working for you (building your own customized network) and consuming the curated information.
2. Collecting, organizing, connecting, attributing, interpreting, summarizing vast amount of information on any topic.
3. Sharing knowledge by being the curator for others for a particular niche area of expertise or interest.

The unique implementation of digital curation activities in a university setting described in this chapter demonstrates digital curation activities can provide a method for students to prepare for lectures and critical analysis of topics. The activities are described, including the underlying learning design rationale, and the outcomes of the blended digital curation sequence are outlined in order to provide a roadmap for others looking to actively engage students in pre-lecture, flipped, or blended learning activities that can add value to classroom lectures.

DIGITAL CURATION

Blended learning often requires a considered use of one or many of the online technologies which support educational tasks and activities. Yakel, Conway, Hedstrom, and Wallace (2011) noted that with the ever-expanding collection of digital information all around us, a new generation of digital curators is needed to manage this information. Digital curation, as a process, aligns positively with the affordances of blended learning, and has been defined as an active process whereby content/artifacts are purposely selected to be preserved for future access. In the digital environment, additional elements can be leveraged, such as the inclusion of social media to disseminate collected content, the ability for other users to suggest content or leave comments and the critical evaluation and selection of aggregated content. This latter part especially is important in defining this as an active process (Antonio, Martin, & Stagg, 2012).

Curation of digital information is, according to Mihailidis and Cohen (2013), something that we have been doing in classrooms for decades. They argue that digital curation activities are those where we have been "[i]ncorporating critical approaches to framing, bias, analysis of agendas and perspectives in the information landscape has been going on for quite some time, as evidenced by scholarship dating back decades" (p. 15). In many ways, we all participate in curation of digital information on our personal computers and devices. Incorporating meaningful activities in the classroom that are tied to learning outcomes is one way in which digital curation skills can lead to the development of a more proficient generation of information users.

A digital curation learning cycle proposed by Wolff and Mulholland (2013) which utilizes Internet-based content provides one model suitable for blended learning design. Their curatorial inquiry model is designed to support inquiry learning with the development of a digital artifact as a result of the process. Wolf and Mulholland describe the learning process as one where:

… a learner is assisted in building stories around the primary and secondary source evidence. Learning occurs through the process of developing a coherent story in response to the inquiry question and in curating the web-based source materials to reflect this understanding. (Wolff & Mulholland, 2013)

Their model presents an activity approach whereby the artifact created in the process is represented as a story. This is the same kind of artifact that is shown in museum displays, usually curated by professionals in the field, and often telling a story. The storytelling approach to digital curation activities is also reported in other literature focused on exploring digital curation in education (Antonio, Martin, & Stagg, 2012).

The seven stages of the curatorial inquiry learning cycle in the model developed by Wolff and Mulholand (2013, p. 2) are:

1. **Research:** Choose a learning goal and define the task boundaries.
2. **Content Selection and Collection:** Filtering out the bad resources and highlighting the good.
3. **Interpretation of Individual Content:** Annotate individual content to identify important points.
4. **Interpretation Across Content:** Annotate from a task perspective, finding the important relations linking content and annotations.
5. **Organization:** Organising the content and annotations in respect to an underlying coherent story addressing the learning goal.
6. **Narration:** Presentation to an audience through a chosen medium.
7. **Research/Recuration:** The process through which the audience become participants in a narrative construction based on a previously curated output. Includes reflection (the author can recurate to improve understanding).

The implementation sequence for digital curation activities presented in this chapter differs significantly from the Wolff and Mulholland model in that it incorporates a lecture or presentation and face-to-face student discussion as a key intermediate stage to the process.

LEARNING ACTIVITIES AND DIGITAL CURATION

There are several challenges in providing university students with active learning activities that make effective use of online resources identified by students. Some of the challenges include linking these resources to unit objectives, and providing ways for students to engage in reflective metacognitive activities centered on the related curricular outcomes (Johnson, Smith, Willis, Levine, & Haywood, 2011; Chen and Looi, 2007). A major concern is often one of ensuring the learning objectives are met over the course of study. One recently publicized way to engage students in active learning is to 'flip' classroom activities (Bergmann & Sams, 2012), requiring students to prepare for classroom discussions and presentations by engaging with unit topics prior to the classroom activities. It has also been reported in the literature that students are now coming to university expecting activity structures and designs that utilise this approach (Johnson, Adams, Cummins, Freeman, Ifenthaler, Vardaxis, and Taylor 2013) mainly due to the shift in K12 education activities towards such approaches.

The literature reports that active learning designs in university education, using flipped or blended learning models, can improve student attitudes, performance and critical analysis skills (Armbruster, Patel, Johnson, & Weiss, 2009; Meyers & Jones, 1993) and develop students' metacognitive skills (Garrison, 2006; Garrison & Akyol, 2013). In the study reported on in this chapter, the researchers intended to evaluate an active learning flipped classroom sequence which incorporated a bi-weekly digital curation activity. The digital curation learning activity was designed and developed to engage students in critical analysis of economic policy issues linked to the unit outcomes. The goal of this research is toward the future development of a digital content curation model which incorporates active learning originating from the evaluation of the digital curation learning sequence in a third year economics unit.

Supporting the development of 21st Century skills related to online media, such as the development of critical analysis and sense-making skills, is paramount in a world where digital resources continue to expand in volume and presence (Johnson, Adams, & Cummins, 2012). However, while this need for developing digital resource analysis skills continues to be noted as a key attribute for a 21st Century employee, articulation of educational activities developing these skills is sorely needed (Baker, 2010). The provision of a guided opportunity for students to develop an increased understanding and awareness of the critical inquiry process (metacognition) helps them improve their regulation of cognition by enabling them to select the appropriate learning strategies corresponding to the level of inquiry. These critical inquiry elements informed the integration of the digital curation learning sequence.

Recent literature states that engaging students in meaningful digital curation activities can support the development of analytical and critical thinking skills (Gadot & Levin, 2012; Mihailidis and Cohen, 2013; Verhaart, 2012; Wolff & Mulholland, 2013). Furthermore, digital curation can be described as a system/process for "maintaining and adding value to, a trusted body of digital information for current and future use" (Beagrie, 2006, p. 3) and, online digital curation of content for educational purposes has been described as a learning activity where students share and review online resources (Campbell, 2010; Good, 2012). A number of researchers have suggested that these activities can be valuable for blended and flipped learning activity designs (Antonio, Martin, & Stagg, 2012; Barret, 2012; Miller, 2012; Ravitz & Hoadley, 2005).

THE CONTEXT: UNIVERSITY'S THIRD YEAR ECONOMICS COURSE

Curtin University is a vibrant, international organization, future focused and committed to making tomorrow better. It strives to be an international leader in research and education, changing minds, changing lives and changing the world. Curtin strives to provide a challenging and rewarding education that is relevant to current careers and workplaces. Curtin is the largest and most preferred university in Western Australia, with more than 50,000 students spread across 16 different locations, including campuses in Sydney, Singapore and East Malaysia. It is one of only two Western Australian universities to rank in the prestigious Shanghai Jiao Tong Annual Ranking of World Universities (2012) and the Times Higher Education's 2011-12 world university rankings.

The School of Economics and Finance is a part of one of the Asia-Pacific region's largest multinational, multicultural business schools. The School of Economics and Finance has a cosmopolitan mix of local and international students, offering a range of undergraduate and postgraduate programs in the study areas of economics, banking and finance, financial planning and property. The school is striving towards delivering high-quality research and teaching that influences industry—for instance, the school is home to the Centre for Research in Applied Economics (CRAE). There is extensive and varied research expertise across all of school's discipline areas, including econometrics and quantitative modelling.

One of the most popular program choices among students is the economics and finance double major, which is part of a larger program in the Bachelor of Commerce pass degree (three year duration, studying full time). This double major has been designed for students who seek careers in both the public and private sectors, whereby students acquire good analytical and quantitative skills. This course is accredited by the Economic Society of Australia (Western Australian Branch) and graduates are eligible to apply for professional membership. In the economics major/stream for example, most courses have regular (weekly) 2-hour lectures and 1-hour tutorials. Each course is typically based on a suitable textbook to aid the Lecturer's presentation of the course materials.

The Economic Policy course is a little different to others that students typically undertake. Rather than a set text and syllabus, the undergraduate/postgraduate course comprises of a series of invited lectures from specialists (in academia or industry) in a wide range of policy areas. It provides students with a chance to apply their economics training to a range of topical economic, environmental and social issues and to engage in stimulating debates. Students are most successful in this course when they prepare well by completing the weekly readings and other online tasks, and actively contribute to class discussions.

The course is delivered in two semesters each year and often has enrolments of around 30 to 60 students per semester (over a 12-week teaching schedule). Curtin University has a relatively large international learner cohorts and this is reflected in the activities and expectations of students. The Economic Policy course is usually made up of about 40 percent international students and 60 percent local students. Historically, the course consists of a one 3-hour seminar per week. Two segments split the time during the seminar. Invited guest speakers present on a topic of interest/expertise for about 1 hour, followed by 15 to 20 minutes of class discussion with the speaker. The second half is allocated to student presentations on the previous week's policy topic. A reading list is not set because of the nature of the course. Instead the key references and material for each week's topic is given to students through the Blackboard Learning Management System (LMS).

The course is designed to give students the opportunity to be active agents in knowledge creation and to learn how to apply their economics training to address key economic problems and policy issues. It is based upon lectures that provide an

Table 1. Economics course topics

Lecture	Week	Topic Heading and Lecture (L)	Digital Curation Activities
Intro	1	Introduction to Economic Policy: Theory and Principles	
L1	2	L1. Economics of Climate Change	
L2	3	L2. Poaching & Ivory Trafficking of Elephants	Digital Curation 1 on L2
L3	4	L3. Is the Asian Natural Gas Market Large Enough for All? Implications for Energy Policy in Western Australia	Digital Curation 2 on L3
Tuition Free	5		
L4	6	L4. Addressing Indigenous Disadvantage: The Role of Culture	Digital Curation 3 on L4
L5	7	L5. Industrial Clusters and Regional Economic Policy	
Tuition Free	8		
L6	9	L6. Competing Economic Analyses of Equal Pay	Digital Curation 4 on L6
L7	10	L7. Women's Leadership Issues	
L8	11	L8. Australia's Federal Financial Relations	
L9	12	L9. Monetary Policy	Digital Curation 5 on L9 (Optional)
L10	13	L10. Insider Trading	
Review	14	Final Exam	

overview of key issues and explore selected areas in depth; as well as using blended learning technologies such as the digital curation of resources (introduced for the first time in semester one 2013); and student-based seminar presentations during the class that afford students the opportunity to research a specialized topic in-depth and generate some lively academic discussion and debate. An individual written assignment is included in the semester's learning activities.

A range of contemporary policy and current issues are analyzed in the Economic Policy course. Topics vary from year to year and typically address contemporary policy issues. Topics include the goals and instruments of economic policy and the principles of policy analysis, the economics of climate change, competition policy, monetary policy, productivity growth, taxation policy, the social and ecological economics of well-being, and socio-cultural issues of indigenous people. The topics discussed in the course in semester one 2013 and the corresponding link to the digital curation activities are show in Table 1.

There are four learning outcomes for this course:

1. Describe and explain key economic issues facing the Australian economy;
2. Evaluate economic policies;
3. Apply economic theory and empirical analyses to address policy issues; and
4. Research, structure and present policy analysis in both written form and orally.

Learning outcome four, 'research, structure and present policy analysis in both written form and orally', is main outcome assessed for the digital curation activities. More specifically, students are required to submit their three best activities at the end of the semester, and are evaluated (out of 10) on the extent to which they demonstrated the following skills: a) ability to think critically about the policy *issue*(s); b) having a *perspective* that takes into account various aspects of the issue; and c) presents and evaluates policy *alternatives*. In short, developing the students' critical thinking skills is a key learning outcome vis-à-vis the digital curation activities.

PROFESSIONAL DEVELOPMENT SUPPORT

For many university lecturers, educational technologies are becoming available at such a rapid pace that lecturers often feel incompetent in dealing with these new technologies. This challenge is further confounded with institutions requiring lecturers to adopt new tools and techniques whilst at the same time there is a lack of professional development support (Johnson et al., 2013).

There is a need for more training before being asked to teach, and for more professional development opportunities once in the profession. This key challenge is underscored by the widespread belief that most academics are not leveraging emerging technologies for their own work, whether that be in the classroom or in support of their own research. (p. 3)

In response to this need, Lefoe and colleagues (2009) identified five strategies to support professional development for university lecturers in the implementation of learning technologies:

1. Development of a shared understanding of the theoretical frameworks and philosophies of the approach;
2. Development of understanding of the affordances of the technologies at hand, and having a significant amount of time to develop these skills before using with students;
3. Participation in authentic tasks which model the practices to assist the move from theory to practice;
4. Development of a shared language, knowledge and understanding of new pedagogies and the implications for practice and teaching role;
5. Cycles of reflection on the implications for the development of new pedagogies (Lefoe, Olney, Wright, & Herrington, 2009, p. 25).

In the case presented in this chapter, the implementation team had the opportunity to develop the digital curation tasks over a period of four months prior to the course being offered to students. This preparation time allowed for many of the strategies Lafoe and colleagues described to be utilized. As a result, when the learning activities were presented in the fourteen-week course, the lecturer was well prepared to implement and support the activity structure.

The professional development activities, which took place over the four-month period, required careful thought and consideration due to the assessment requirements of the course. As the course had an established assessment pattern and requirements, the activities needed to result in particular assessable artifacts. Despite this restriction, the lecturer fully engaged in the process as a learner and collaborator with a team of two educational design academics. The driving motivation for the review and integration of a technology enhancement into the course came about as the result of a strategic plan focusing on employing the use of blended learning strategies and learning technologies to further enhance courses in that faculty.

The educational design process involved a series of meetings, research, and design sessions to accomplish the development of the learning design centered on a series of digital curation activities. Key to the initiation of the design was the lecturer's willingness to explore the possibilities offered by incorporating educational technology in the course. As the need for lecturer buy-in with the process was understood to be critical, the university department also provided a small incentive to lecturers willing to embed learning designs utilizing learning technologies in their courses.

The educational design process included the following:

1. The design team of two educational designers and the lecturer met on three occasions to discuss what the course was composed of in terms of resources, topics, and learning activities. This also included an audit of the learning technologies that were already in use and overall discussions about the kinds of educational technologies the university had available. One key criterion was that the existing course assessments and learning outcomes were set within a fixed framework and therefore the learning activities needed to reflect this framework and no change to these aspects of the course were possible.
2. The design team worked through the course activities and explored potential technologies that would engage students in peer-peer discussion. Online-based tools such as Twitter and Purdue's Hotseat were considered. As these meetings progressed, it was determined that a pattern of activities which would support the numerous guest presenter topics – in advance of the guest presentation, as well as following the presentation – could greatly aid students in their preparation and understanding of the topics presented.
3. The team identified that the following learning activity tasks were most likely to add value to the course: reflection, sharing of online materials (URLS), and the production of an assessable artifact. The assessable artifact would allow the lecturer to be able to assess students' critical thinking skills and understanding of the topics presented. Critical analysis of relevant topics presented in the course materials was one of the key learning outcomes.
4. Another meeting and a review of the literature in business education and use of blended or online technologies supported the discussions. The sequence of learning activities was drafted taking into account the requirements and learning outcomes to be achieved in the course. This sequence refers to the organization of the activities over the term of the course. For example, in this case it meant planning that in week 3 the lecturer would introduce digital curation activity 2, in week 4 have the guest presentation, and in week 5 students would complete the reflection and critical analysis component of the activity.
5. After developing the sequence of digital curation activities for the semester, the lecturer prepared a set of support materials for students describing the goals, outcomes of the activities, and provided detailed instructions for completing the digital curation tasks. The design team reviewed and revised the digital curation instructions and support materials for students and these were finalized for distribution to students prior to the course start date.

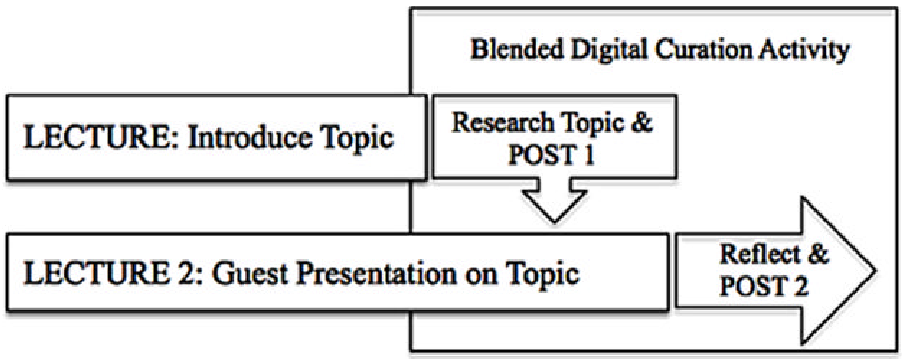
This design process took place over several months, and some of the outcomes of this collaborative design process included a deeper understanding of blended models of education, a critical analysis of the curation literature, and exposure to new technologies supportive of active learning. The result of the process was a learning sequence of digital curation activities that were implemented into an economics course and according to students resulted in beneficial learning activities.

BLENDED DIGITAL CURATION SEQUENCE

The blended learning sequence presented in this chapter is informed by literature, designed to engage students with technology enhanced learning activities, and intended to support critical analysis skill development. Figure 1 presents the details and structure of a single digital curation activity.

During the first week of the digital curation activity the topic being curated was briefly in-

Figure 1. Blended digital curation activity sequence



troduced at the end of the first seminar. In this economics course, the seminar session is divided into two segments, a 1.5-hour guest lecture and then a 'tutorial' session for 1.5 hours. The tutorial component involved students discussing and presenting their analysis of the guest presenter topic. In addition to briefly announcing the digital curation activity at the end of the seminar, a more detailed announcement was posted to the course LMS site shortly after the seminar.

The digital curation activity sequence presented in Figure 1 incorporates three key student tasks: research, questioning, and recuration. The three tasks were described to students as the following sequence of activities they were to participate in:

1. ***Before* Lecture Day:** Research and make Bb post. (research)
2. **Lecture Day:** Listen and engage with the presenter. (questioning)
3. ***After* Lecture Day:** Reflect and make the second post. (recuration)

In order for students to be able to follow and benefit the most from the digital curation activities in the course, an orientation document was developed. This document supported the lecturer's introduction of the digital curation activity sequence at the first orientation session of the course. Additional explanations and support relating to the structure of activities were provided during the course; however, the topic most inquired about by students related to the marking aspect of the activity. In order for readers of this chapter to be able to utilize the experience of the authors in presenting a digital curation activity sequence to students, the complete orientation document for students is provided in the following section.

CONCLUSION

As stated previously, there can be multiple benefits in incorporating digital curation activities into a university course. Some of these that have been reported in the literature include: the provision of meaningful blended learning activities, support of peer learning, preparation for flipped classroom style activities, and critical analysis skill development. Stanoevska-Slabeva and colleagues (2012) also note that digital curation is now also evident in journalism in the form of timely news information validation:

Social media curation is based on the basic concept of media curation proposed by Rosembaum (2011) and deals with large corpora of content from diverse sources and connotes the activities of identifying, selecting, verifying, organizing, describing, maintaining, and preserving existing artifacts as well as integrating them into a *holistic resource (Stanoevska-Slabeva, Sacco, & Giardina, 2012).*

The authors take this as a sign that digital curation is becoming one way in which networked or connectedness and sharing is also occurring in the workplace and is a valuable means for building common understanding of topics and issues supported by a current and reviewable evidence base. As one goal of university business degrees is workplace skill development, for the third year economics students, digital curation provides an authentic activity and an authentic assessment relevant to their future employment.

According to the lecturer, several lessons and key benefits of this digital curation activity became evident over the course term. Anecdotally, students reported that they enjoyed the learning activities. The lecturer of the course reported that, as the person being responsible for inviting the guest lecturer, it was good to see that the students were already familiar with the topic – having completed the Post 1 activity prior to the guest lecture. The lecturer noted that students seemed more able to participate, in terms of the questions and discussions during the digital curation weeks as compared to weeks when there were no digital curation activities embedded. The lecturer also stated that it was a positive outcome that students were ready to ask informed questions, as that in turn made the expert presenter more interested in returning in the future. In summary, the preparation aspect of the activity had real benefits for the classroom activity and resulted in an excellent outcome of a blended design structure.

Some other aspects of the digital learning activity were noted by students. When asked about the value of the digital curation activities students commented:

- The DC (digital curation) exposed me to different policy resources prior to class, which enabled me to be less restricted to participation (views) on different policies presented
- Going to class and actually knowing whats being discussed, DC (digital curation) forced prior reading meant we could engage in discussions and understand presentations

Students further indicated that the digital curation activities also supported the development of their critical thinking skills, analysis skills and research skills. Overall, the benefits of the digital curation design supported student learning outcomes both internal to the course as well as more global skill development.

The intention of this chapter has not been to provide a fixed step-by-step description of the digital curation process and its incorporation into courses. Indeed, we do not prescribe to the view that there is a single way of achieving these kinds of learning outcomes. Nor do we hold the belief that technology should simply be ‘added’ to a pedagogical approach to make learning more up-to-date. Instead, we have presented one example of a learning sequence, supported in the literature, on how to incorporate a blended digital curation activity into a course design.

In conclusion, the authors recognise the professional learning curve can be a steep one for many university lecturers seated with the important task of preparing a workforce for the future. This is especially true in a world in which rapid change is likely to continue and whole ranges of technologies embedded in the workplace are yet to be developed. As described by Sharples, Taylor and Vavoula (2007): “A world in which children own powerful multimedia communicators and where they practice new skills of online file sharing and informal text communication does not fit easily with traditional classroom schooling” (p. 241). Lecturers in universities need to be encouraged to continue to engage with technology enhanced learning activities, in order to prepare students for the challenges of their future workplace.

REFERENCES

Antonio, A., Martin, N., & Stagg, A. (2012) Engaging higher education students via digital curation. In *Proceedings of the 29th Annual Conference of the Australasian Society for Computers in Learning in Tertiary Education* (ASCILITE 2012) (pp. 1-5). Australasian Society for Computers in Learning in Tertiary Education (ASCILITE).

Armbruster, P., Patel, M., Johnson, E., & Weiss, M. (2009). Active Learning and Student-centered Pedagogy Improve Student Attitudes and Performance in Introductory Biology. *CBE Life Sciences Education*, *8*(3), 203–213. doi:10.1187/cbe.09-03-0025 PMID:19723815

Baker, R. (2010). *Pedagogies and Digital Content in the Australian School Sector.* Retrieved 29th April, 2010, from http://www.thelearningfederation.edu.au/verve/_resources/Pedagogies_Report.pdf

Beagrie, N. (2008). Digital curation for science, digital libraries, and individuals. *International Journal of Digital Curation*, *1*(1), 3–16. doi:10.2218/ijdc.v1i1.2

Bergmann, J., & Sams, A. (2012). Flip Your Classroom: Talk To Every Student. In *Every Class Every Day*. ISTE.

Berrett, D. (2012). How ‘flipping’ the classroom can improve the traditional lecture. *The Chronicle of Higher Education*, 19.

Campbell, C. (2010). *Education students use of The Le@rning Federation’s digital curriculum resources*. Paper presented at the 5th International LAMS and Learning Design Conference. Sydney, Australia.

Chen, W., & Looi, C. (2007). Incorporating online discussion in face to face classroom learning: A new blended learning approach. *Australasian Journal of Educational Technology*, *23*(3), 307–326.

Gadot, R., & Levin, I. (2012). Digital Curation as learning activity. In *Proceedings of EDULEARN12*, (pp. 6038-6045). EDULEARN.

Garrison, R. (2006). Online collaboration principles. *Journal of Asynchronous Learning Networks*, *10*(1), 25–34.

Garrison, R., & Akyol, Z. (2013). Toward the development of a metacognition construct for communities of inquiry. *The Internet and Higher Education*, *17*, 84–89. doi:10.1016/j.iheduc.2012.11.005

Good. R. (2012). *Re: Why curation will transform education and learning: 10 Key reasons* [Web log message]. Retrieved from http://www.masternewmedia.org/curation-for-education-and-learning/

Johnson, L., Adams, S., & Cummins, M. (2012). *The NMC Horizon Report: 2012 Higher Education Edition*. Austin, TX: The New Media Consortium.

Johnson, L., Adams Becker, S., Cummins, M., Freeman, A., Ifenthaler, D., & Vardaxis, N. (2013). *Technology Outlook for Australian Tertiary Education 2013-2018: An NMC Horizon Project Regional Analysis*. Austin, TX: The New Media Consortium.

Johnson, L., Smith, R., Willis, H., Levine, A., & Haywood, K. (2011). *The 2011 Horizon Report*. Austin, TX: The New Media Consortium.

Lefoe, G., Olney, I., Wright, R., & Herrington, A. (2009). Faculty development for new technologies: Putting mobile learning in the hands of the teachers. In J. Herrington, A. Herrington, J. Mantei, I. Olney, & B. Ferry (Eds.), *New technologies, new pedagogies: Mobile learning in higher education* (pp. 15–27). Wollongong: UOW.

Meyers, C., & Jones, T. B. (1993). *Promoting Active Learning. Strategies for the College Classroom*. San Francisco, CA: Jossey-Bass Inc., Publishers.

Mihailidis, P., & Cohen, J. (2013). Exploring Curation as a core competency in digital and media literacy education. *Journal of Interactive Media in Education*, *0*(0).

Miller, A. (2012). Five best practices for the flipped classroom. *Edutopia*. Retrieved from: http://www.edutopia.org/blog/flipped-classroom-best-practices-andrew-miller

Ostashewski, N. (2013). *Networked Teacher Professional Development: Assessing K-12 Teacher Professional Development within a social networking framework*. Dissertation available at http://hdl.handle.net/10791/26

Ostashewski, N., & Reid, D. (2011). An Instructional Design Model utilizing Social Networking Groups; Articulating the Networked Learning Framework. In *Proceedings of World Conference on E-Learning in Corporate, Government, Healthcare, and Higher Education 2011* (pp. 2057-2065). Chesapeake, VA: AACE.

Ravitz, J., & Hoadley, C. (2005). Supporting change and scholarship through review of online resources in professional development settings. *British Journal of Educational Technology*, *36*(6), 957–974. doi:10.1111/j.1467-8535.2005.00567.x

Sharples, M., Taylor, J., & Vavoula, G. (2007). A theory of learning for the mobile age. In R. Andrews & C. Haythornthwaite (Eds.), *The Sage handbook of elearning research* (pp. 221–247). London: Sage.

Sinha, H., Rosson, M. B., Carroll, J., & Du, H. (2010). Toward a Professional Development Community for Teachers. In D. Gibson & B. Dodge (Eds.), *Proceedings of Society for Information Technology & Teacher Education International Conference 2010* (pp. 2390-2397). Chesapeake, VA: AACE.

Stanoevska-Slabeva, K., Sacco, V., & Giardina, M. (2012) Content Curation: a new form of Gatewatching for social media? In *Proceedings of the International Symposium on Online Journalism*. Austin, TX: Academic Press.

Verhaart, M. (2012). Curating digital content in teaching and learning using wiki technology. In *Proceedings of Advanced Learning Technologies (ICALT), 2012 IEEE 12th International Conference* (pp. 191-193). IEEE.

Wenger, E., Trayner, B., & de Laat, M. (2011). *Promoting and assessing value creation in communities and networks: A conceptual framework*. The Netherlands: Ruud de Moor Centrum.

Wolff, A., & Mulholland, P. (2013, May). Curation, curation, curation. In *Proceedings of the 3rd Narrative and Hypertext Workshop* (p. 1). ACM.

Yakel, E., Conway, P., Hedstrom, M., & Wallace, D. (2011). Digital Curation for Digital Natives. *Journal of Education for Library and Information Science*, *52*(1), 23.

KEY TERMS AND DEFINITIONS

Blended Learning: Face-to-face learning that incorporates some online-based activities as part of the educational experiences.

Digital Curation: In general is about "maintaining and adding value to, a trusted body of digital information for current and future use" (Beagrie, 2006, p. 3). For education "the online or digital curation of content for education can be understood as the sharing and reviewing of online resources using websites" (Good, 2012).

Educational Design: The sequence of instructional activities planned to be delivered in an educational or learning event.

Educational Technologies: technologies that can support learning or learners during educational events.

Flipped Classroom: Classroom activities requiring students to prepare for discussions and presentations by engaging with course topics prior to the classroom activities.

Resource Sharing: Sharing and curation of online resources using communication technologies.

Technology Enhancement: An enhancement, extension, or addition of technology intended to further support learning activities.

This work was previously published in Models for Improving and Optimizing Online and Blended Learning in Higher Education edited by Jared Keengwe and Joachim Jack Agamba, pages 256-268, copyright year 2015 by Information Science Reference (an imprint of IGI Global).

Chapter 59
Co-Constructed Curricula:
An Adult Learning Perspective

Vivian W. Mott
East Carolina University, USA

Kathy D. Lohr
East Carolina University, USA

ABSTRACT

This chapter describes an adult learning perspective toward effective co-constructed curriculum, beginning with an overview of three distinct models, theories, or concepts felt to be seminal in the field of adult and continuing education. Following the presentation of these constructs, the chapter continues with a discussion of implications for learning involvement and then moves to an explanation of how curricula can be co-constructed. Detailed in this application section are the involvement of learners in the process of co-construction, the ways in which content and design are derived with learners' involvement, and the various roles of co-constructed assessment. The chapter concludes with three case studies as practical examples of co-constructed curriculum initiatives and a closing summary.

INTRODUCTION

One strategic approach to curriculum development is to derive programs, courses, and syllabi from adult learners themselves. Whether for formal or informal education, for credit or leisure learning, traditional curriculum development can be adapted to support significant learner involvement in a wide variety of learning contexts and environments.

Today's learners, in particular, respond positively to having input into their learning opportunities, and embrace assisting in design, development, and evaluation phases as well. This chapter considers not just the models and theories that support stronger learner involvement in the curriculum development process but also provides the rationale for doing so and suggests ways to enrich and ensure success in these endeavors.

There are numerous concepts, models, and theories common to the field of adult and continuing education that support the involvement of learners in co-constructing curricula. This chapter begins with an overview of three prominent adult learning concepts: andragogy, transformative learning, and social learning. Affiliated with each of these concepts is a practice that connects to adults learning

DOI: 10.4018/978-1-4666-8246-7.ch059

in an environment with a co-constructed curricula. These practices include self-directed learning, reflection, and collaboration. These constructs and their associated practices are then recast and summarized in three categories of implications for learner involvement: (a) tapping into and sharing experience; (b) relevancy, practicality, and goal orientation; and, (c) self-direction, internal motivation, and control.

The second part of this chapter describes the various aspects that support a co-constructed curriculum including involvement by students (curriculum co-constructors), curriculum content and design, and curriculum assessment. The chapter then presents three case studies as exemplars and concludes with a summary and implications for more significant learner involvement in co-construction of curriculum of adult and continuing education.

Models, Concepts, and Related Practices

Do adults learn differently than children? In 1968, Malcolm Knowles, a central figure in the history of adult education, claimed they did, and during the second half of the twenty-first century, wrote and taught extensively on the concept, practice, and implications of andragogy. Knowles' model of andragogy is described below along with several other concepts that have shaped the models/ concepts and practice of adult education.

Andragogy and Self-Directed Learning

Nearly half a century ago, Malcolm Knowles proposed the concept of andragogy to explain how teaching adults could – and should be – differentiated from teaching children. While Knowles (1990) did not actually coin the term *andragogy*, meaning the "art and science of helping adults learn" (p. 43), he is responsible for the popularization of the concept in North America. Knowles told of first using the term *andragogy* "in an article in *Adult Leadership* in 1968" (p. 42), after learning of the concept from a Yugoslavian adult educator.

Knowles described assumptions about adult learners that originally included four distinct adult characteristics or predispositions; a fifth and sixth characteristic were later added. These six assumptions that follow are key to the practice of adult and continuing education:

1. **Self-Directedness:** Adults approach their learning in a more independent and self-directed manner as opposed to being dependent on a teacher for one's learning, resources, strategies, and evaluation of outcomes. Knowles went on to explain that self-directedness is always present on a continuum – that all learners, children and adults alike, are more or less self-directed depending on maturity, preexisting knowledge, motivation, and risk involved in the learning experience.
2. **Rich Reservoir of Experience:** As adults mature, "they accumulate an increasing reservoir of experience that becomes an increasingly rich resource for learning" (Knowles, 1990, p. 45). According to Knowles, our experience is important not only as a basis for more meaningful learning, but in providing links and connections teachers can use in instruction.
3. **Readiness to Learn:** Learning in adulthood is often prompted by some real-life need, such as a life transition, developmental change, personal challenge, crisis, or opportunity. So, adults most frequently pursue their learning on a need-to-know basis rather than being ready to learn based on age or developmental stage (as with children), or advancement in a standard or prescribed school curriculum.
4. **Problem or Performance-Centered Orientation:** For adults, learning is a process or endeavor aimed at enhancing competencies or skills needed for a job, life stage, or

encountered challenge. Therefore, adults want their learning to have immediate application and relevance. Children, on the other hand, more frequently engage in subject-centered learning, sequenced according to some prescribed curriculum, some of which will only be applicable at some future time in their lives.

5. **Internal Motivation:** Adults are more often internally or intrinsically motivated to learn. Even though virtually all education includes some external motivation in the form of grades, better jobs, or higher salaries, adults understand that learning is valuable and often its own reward, that the learning will add value to their lives, and that it will improve their tomorrows.
6. **Reason for Learning:** Closely tied to assumptions three and four and the need for relevancy and application, this sixth assumption was added by Knowles based on his belief that adults need to know *why* they are learning something.

Knowles later revised his original assumptions after listening to critics of the construct. He began to visualize pedagogy and andragogy on a continuum of preferences and characteristics found in students in various contexts and at different stages of development. Cyril Houle (1988), one of Knowles' mentors, believed that "education is fundamentally the same wherever and whenever it occurs ... but that andragogy remains the most learner-centered of all patterns of adult education programming" (p. 29). For this reason, we introduce this chapter on co-constructed curricula – an integral tool in the learner-centered classroom – with andragogy.

Before Knowles identified self-directedness as one of the assumptions on which andragogy was based, Tough (1971) and then Houle (1988) were studying and reporting on how adults undertook learning projects on their own. Houle's landmark study of 22 adult learners in 1961 resulted in his now classic *Houle's typology*, a classification scheme that outlines learners' motivation to participate as learning orientation, goal orientation, or activity orientation. In other words, according to Houle, learning was sought solely for either learning's sake, as a means to some end, or merely for the social activity or engagement, respectively.

Self-directed learning (SDL) describes the propensity and ability for adult learners to conceive, orchestrate, implement, and evaluate their own learning. The massive and varied SDL literature differentially characterizes self-directed learning either as an instructional method, a process or approach to learning, or as a learner preference, characteristic, or personality trait. Though the work on the concept began many years prior, in 1994, Hiemstra defined SDL as "any study form [of learning] in which individuals have primary responsibility for planning, implementing, and even evaluating the effort" (para. 5).

In 1977, Guglielmino constructed a Self-Directed Learning Readiness Scale (SDLRS) to determine the degree to which learners could successfully engage in self-directed learning. Her SDLRS is still used to measure self-directedness in adult learners with correlations made to learning style, learning outcomes, self-concept, occupation, and career advancement, to name only a few.

Brockett and Hiemstra (1991) created a synthesized model they termed the Personal Responsibility Orientation (PRO) model based on learner autonomy and the degree to which learners took active control and responsibility for their own learning. Also in 1991, Grow theorized that learners developed self-directed learning abilities in four stages differentiated by the degree of independence and ability. These brief explanations highlight only some of the major contributions to the SDL literature; many other scholars, educators, and practitioners have contributed to the literature as well.

As stated earlier self-directed learning can be characterized as an instructional method, an approach to learning, or a learner characteristic.

Transformative learning, on the other hand, is associated with a substantive change within the learner. The next section elaborates on the principal aspects of transformative learning and reflection.

Transformative Learning and Reflection

Unlike informational learning, in which an individual internalizes news, facts, instructions, or guidance, transformative learning is about change – "dramatic, fundamental change in how we see ourselves and the world in which we live" (Merriam, Caffarella, & Baumgartner, 2007, p. 130). Mezirow is credited with introducing the theory of transformative learning to the adult education field in 1978 (Merriam et Al., 2007). In his text, *Learning as transformation: Critical perspectives on a theory in progress,* Mezirow (2000) articulates this transformation of learning as "the process by which we transform our taken-for-granted frames of reference (meaning schemes, habits of mind, mindsets) to make them more inclusive, discriminating, open, emotionally capable of change, and reflective so that they may generate beliefs and opinions that will prove more true or justified in guiding action" (p. 8).

Over the past 30 years, Mezirow has refined his conception of transformative learning, which has been criticized for its emphasis on the individual's process without regard to context. However, scholars continue to redefine this learning model. Taylor (2008), described seven transformative learning perspectives in addition to Mezirow's psycho-critical conception. These perspectives include psycho-analytical, psycho-developmental, social-emancipatory, neurobiological, cultural-spiritual, race-centric, and plantetary. Even with this abundance of research, Taylor notes that not much is known about, "the student's role in fostering transformative learning. What are the students' responsibilities in relationship to the transformative educator" (p. 13). A look into reflective practice might help understand the student's perspective. Reflection is widely used in educational settings to help a student demonstrate, and the facilitator evaluate, learning.

Integral to many transformative learning constructs is the practice of critical reflection, a process often attributed to Mezirow (2000) and Brookfield (2000) but defended and defined in other fields and practices outside of adult education. According to van Woerkom (2010), "all conceptualizations of critical reflection have a normative character, indicating 'good thinking' rather than describing or observed ways of thinking," (p. 344).

A common criticism of critical reflection is its lack of acknowledgement of other ways of knowing such as through emotion or intuition. Dirkx (2006) is one scholar contributing to our understanding of emotions and learning. Cranton (2006), in her work on transformative learning, has described three types of reflection: premise reflection, which closely aligns with critical reflection; content reflection; and, process reflection. Cranton reminds us, "current definitions of reflection do not differ substantially from Dewey's understanding" (p. 33). In 1933, Dewey described reflective thought as "active, persistent, and careful consideration of any belief or supposed form of knowledge in the light of the grounds that support it and the further conclusions to which it tends" (p. 118).

In addition to Dewey's early work, Donald Schön's (1983, 1987) work on reflection and reflective practice is widely cited. Schön (1983) maintained that reflective practice is grounded in the complex intersection of the "high, hard ground of technical rationality" (p. 49) and the metaphorical *swamp* of professional practice – practice often filled with ambiguous, ill-defined, and conflicting situations. Schön maintained that the "artistic, intuitive processes that some practitioners bring to situations of uncertainty, instability, uniqueness, and value conflict" (p. 49) help mediate such unsettling conditions and "account for practical competence in divergent situations" (p. 49).

Reflective practice is a "developmental process in which practitioners first learn a system of rules and procedures, recognize their appropriate application within particular situations, and then develop and verify new forms of knowing in actual practice situations" (Mott, 2000, p. 28). One's capacity to engage in reflective practice is based on experience, tacit and explicit knowing, knowledge of formal theories and theories-in-use, and critical thinking. Mott (1994) further described reflective practice as the capacity for thinking about … actions while engaged in the midst of practice. This active consideration of one's knowledge and behavior aids in reframing the challenges of practice, and enables the professional to cope more successfully with novelty and uncertainty of practice for a more appropriate response (p. 12).

Reflective practice involves a deliberate quieting or pause that allows practitioners to consider not only their formal knowledge and espoused theories about any given situation, but also their tacit knowing, theories-in-use, and practical knowledge or intelligence about the issue. Such introspection should also provide for the examination of assumptions, consideration of alternative and multiple perspectives, and the deliberation about one's actions in the circumstance. The outcome of our reflection should be the improvement of practice in terms of more reasoned thought and action.

According to Schön (1983), for most practitioners, such quieting and introspection occurs after the fact, or perhaps in the midst of paused action – when a problem has already occurred and we're thinking about it after the fact. Schön referred to this as *reflection-on-action* and suggested that such reflection carries a past orientation to it, in that it cannot affect the action being reflected upon, but only that which may occur in some future time (1983, 1987). Some of the time, however, expert practitioners engage in reflection in the midst of action – what Schön referred to as *reflection-in-action* (1983, 1987), occurring as it does without pause or before the cessation of our action.

In contrast to reflection-on-action, reflection-in-action has a present or even future orientation to it, in which "no interruption of action occurs, thinking and doing occur simultaneously while our reflection and reframing can still make a difference" to the current situation (Mott, 1994, p. 35). According to Schön, reflection-in-action is often unconscious and may occur spontaneously when we sense that some aspect of our actions is no longer working or could be improved. While examples of reflection-in-action are often cited in the arts – such as impromptu jazz sessions or theater scenes, or the painting that emerges differently than planned – examples can also be found in medicine, education, counseling, law enforcement, and other contexts of professional practice in which expert practitioners engage (Mott, 1994, 1996, 2000; Schön, 1983, 1987).

Some reflective practice, if not most, is a personal turning inward to think, consider, and analyze; learning often occurs, however, within relationship to others. Our third set of concepts, social learning and collaboration, reviews such interactions.

Social Learning Theory and Collaboration

Even though the origins of social learning theory can be found in both behavioral and cognitive orientations (Merriam et al., 2007), the cognitive and social aspects of the theory grew in prominence as an organizing framework and explanation of how learning may occur. Social learning theory suggests that learning occurs when people observe others' behavior (a cognitive process) and then follow suit to mimic or amend that behavior – all of which takes place in a social setting. According to Schunk (1996), "people acquire knowledge, rules, skills, strategies, beliefs, and attitudes" (p. 102) by observing others, thus learning the rules, adaptations, and resulting consequences of what was observed. Some theorists maintain that imitative behavior must follow as a result in order for learning to actually occur, while others advocate that learning can occur from observation alone (Bandura, 1976, 1986; Hergenhahn & Olson, 2005; Lefrancois, 1999).

Bandura's (1976, 1986) conceptualization of social learning theory focused primarily on three factors central to an understanding of how the theory works – the social context, self-regulation, and self-efficacy. That learning through observation must obviously occur in some sort of social environment may be an overstatement, but it has given rise to numerous other related constructs about how and where learning occurs. By self-regulation, Bandura proposed that people monitor, control, and adapt their behavior based on the anticipated consequences. Secondly and consequently, adoption and adaptation of observed behavior are assessed and further controlled as a function of their self-efficacy, or people's beliefs about their capacity to produce desired outcomes in their lives based on their behavior. Bandura summarized his understanding of social learning as a three-way interactive model in which the personal, behavioral, and environmental determinants of any learning formed a "triadic reciprocity."

Collaboration is a focused and interactive endeavor, often marked by experimentation, but with the use of shared rules and work on a common "problem" or situation. The hallmark and central advantage of collaboration is that it frequently leads to innovative outcomes that could not have been achieved otherwise (Peters & Armstrong, 1998; Saltiel, 1998; Wood & Gray, 1991). When collaborators come together, a kind of synergy results in which the outcome "cannot be reduced to what either … contributed or knew … [and] is more than the individual contributions added together" (Peters & Armstrong, 1998, p. 75). Collaborative learning is collaboration with the express goal of knowledge acquisition or creation, often utilized in many contexts such as higher education, the workplace, non-formal and informal learning initiatives, and grassroots education efforts. Moreover, proponents of collaborative learning, scholars, organizers, and others have maintained that collaborative learning is most valuable in meeting the needs of less advantaged adults. Among the many noted collaborative learning initiatives have been those that facilitated empowerment and social change. Many such efforts have first been in service of a shared vision of social justice and civic participation, transcending race, class, gender, and other dimensions of human difference (Horton & Freire, 1990; Kadel & Keehner, 1994; Knox, 2003).

Two *masters* of collaborative learning were Myles Horton of the Highlander Research and Educational Center in east Tennessee and Paulo Freire of Brazil. Peters and Armstrong (1998) described how Horton and Freire, working as "teachers/facilitators were able to achieve a delicate balance between bringing out the knowledge of people while going beyond the people's knowledge… while co-constructing knowledge" (p. 75). Research and practice-based experience as well suggest that collaborative learning groups are "more likely to generate creative solutions to complex problems,… [in ways that] actively engage the learner, build community and consensus, and honor the diversity of voices" (Will, 1997, p. 33) of those involved. Effective collaborations require mutual respect, effective communications, understanding of group dynamics, establishment of ground rules, clarification of expectations, and consideration for group size and structure, as well as learning and interaction styles (Cranton, 1996; Kadel & Keehner, 1994; Will, 1997).

To demonstrate how the above learning models and concepts and the affiliated practices can be converted to, or made more relevant for learner-centered environments, we provide the following implications for learner involvement. Included are tapping into and sharing experience; relevancy, practicality, and goal orientation; and, self-direction, internal motivation, and control.

Implications for Learner Involvement

Translating theory into practice is difficult at best, but necessary. To be transparent in the conversion of these above adult learning concepts into practical application within co-constructed curriculums, we provide the following synthesis.

Tapping into and Sharing Experience: Adults and our self-identity are largely defined by our experiences. As Knowles noted, "adults *are* what they have *done*" (1990, p. 50, original emphasis). Although the following example is undoubtedly more culturally specific and common to the United States than in other countries of the world, almost any communication between newly introduced people typically turns to where we work, or what we do for a living, for example. Because of this significant investment in an experientially defined self-identity, adults want to talk about, to share, what they have done, where they have lived and worked, and what they have learned and accomplished. To dismiss this information, to trivialize it, is to dismiss not just the experiences, but the very self.

The rich store of adults' experiences enables learners to connect new knowledge to earlier experiences, thereby anchoring the learning, making it meaningful and immediately relevant. It also allows adults to contribute to others' learning and opens the door for co-creating knowledge.

Collaborative outcomes are more meaningful because of the relationships and synergy produced by collective efforts, by the tapping into and sharing of experiences. Engagement, or the degree of active involvement in collaborative efforts, has a multitude of beneficial effects on those involved, affecting the success of the collaboration as well as ensuring buy-in from those participating.

Relevancy, Practicality, and Goal Orientation: Knowles (1990) maintained that adults pursue learning in problem-centered or performance-centered ways, rather than the subject-centered approach that children are exposed to. That is, learning in adulthood is best related to some real-world situation, opportunity, or problem that needs to be addressed through education or training. Consider these examples: Learning to diagram sentences in grammar school or memorizing algebraic theorems in high school. Even if we dared question the application value of such knowledge and skill as adolescents, we accepted this mandate for accumulated knowledge as part of the schooling experience or something that would somehow show its utility at some later date. Adults rarely settle for such explanations and disembodied knowledge; learning must have applicability in helping solve some current life situation. In Knowles' (1990) words, adults "engage in learning largely in response to pressures they feel from their current life situation … education is a process of improving their ability to cope with life problems they face now" (p. 53). McCombs and Whistler (1997) concur, noting that an increase in motivation, actual learning, and performance is often found when students focus on topics relevant to their interests, needs, and lives.

Many of our current life pressures and our need to learn are tied to what has been termed the "New World Order" brought about by complex and rapid social, technological, and global change, by quickening knowledge obsolescence, and increased ambiguity. Adults must make educated decisions in an environment "characterized by uncertainty, flexibility and incongruities…this contrasted with past ideas of certainty, fixture, and information located with experts" (Pillay & Elliott, 2001, p. 8). Information is overwhelmingly abundant and knowledge constantly changing. As Harris and Cullen (2009) note, "When the focus is on knowledge rather than learning, obsolescence is inevitable" (p. 55). What adults need to know is how to learn, how to think critically, and how to question the status quo – often without the ready assistance or facilitation of an educator.

Self-Direction, Internal Motivation, and Control: According to the SDL model, adults engage in significant learning in which they determine their own learning goals, locate learning partners, determine resources, and monitor the duration and ultimate success of their learning experience. Self-directed learning does not mean learning without a plan; nor does it occur in isolation. SDL can occur in formal and non-formal, as well as informal settings. In Grow's (1991) model of SDL, teachers take on different roles depending on the readiness of their learners. Brockett and Hiemstra's (1991) PRO model similarly suggested that "an educational agent or resource often plays a facilitating role" (p. 24) in the SDL process depending on the learning context.

Self-directedness on the part of any learner must be considered on a continuum. Adults, as well as children, can be self-directed to a minor or significant degree – depending on the maturity of the learner, depth of desire and motivation toward the learning endeavor, sophistication in locating learning resources and evaluating the merit of Web-based and other resources, level of previous experience with the content or skill to be learned, and risk of the learning involved.

Reeve and Jang (2006) discovered several instructional behaviors "correlating positively with student's experiences of autonomy including listening, creating time for independent work, giving the student opportunities to talk … and acknowledging the student's perspective and experiences" (p. 215). Their study involved pre-service teachers in a role-model exercise, recording teacher-role and student-role interactions then analyzing these for autonomy-supportive versus controlling behaviors. Although this role-play exercise was designed to demonstrate a primary education classroom, the student-role players, either consciously or subconsciously, drew on their adult experiences and responsibilities.

Regardless of the placement of individual learners on the continuum of self-directedness, adult learners' ability and desire to plan and carry out their own learning and, consequently, the value of their involvement in curriculum development initiatives are without question. Scholars, practitioners, and learners have long challenged the assumption that adult learning requires the guidance or even presence of an instructor; the same can be said of curriculum development whether one considers SDL an instructional method, learning process, or learner characteristic.

Although Knowles' is attributed most often with assumptions about learners themselves, including self-directedness, within Knowles' writings are suggestions regarding relationships between learner and facilitator. As Pratt (1993) found in his monograph, *Andragogy After Twenty-Five Years*, Knowles came to believe "that the essence of facilitation lies not in one's approach as much as in the relationship that exists between learner and facilitator…. Andragogical approaches require a psychological climate of mutual respect, collaboration, trust, support, openness, authenticity, pleasure, and humane treatment" (p. 19). These same attributes, as well as the previous considerations outlined, are the hallmarks of effective co-constructed curriculum development.

Co-Constructed Curricula

If one of the goals of higher education is the development of critically reflective practitioners who know how to continue their own learning, then the involvement of learners in the development of that learning is crucial. Outside of preparatory education, much of the learning that takes place in one's profession, and even home life, comes about in response to the problems of the practice itself through the processes Schön described as reflection in- or on-action. Hence, the more involvement the learner can have in the curriculum development process, the stronger the learning and resulting link and relevance to practice.

Weimer's thought-provoking treatise on learner-centered teaching offers guidance and rationale for including learners in the creation and development of their own learning experiences. In her landmark 2002 text, *Learner-Centered Teaching: Five Key Changes to Practice*, Weimer proposes changes to teaching practice that creates a learner-centered classroom or experience, changes that can also be integral to co-constructed curriculum development.

Curricula Co-Constructors

Weimer suggests that the role of the teacher change from lecturer to facilitator or coach. To accommodate this, the balance of power needs to shift, with the facilitator sharing decision making about the learning with the students. An adult learner's propensity toward self-direction, internal motivation, and control makes this shift to a co-constructor of curriculum much easier than with younger learners. Still, in order to facilitate a group of adult learners located at various places along the self-direction continuum, the student's current knowledge must be explored. Such exploration may take the form of student-to-instructor sharing as with learning journals, or in peer-to-peer activities such as small group discussions, or through student-to-class presentations. The process of discerning prior experience may be formal (prior learning assessment tools) or informal (life histories). Regardless of the method of 'mining,' what emerges from these activities is not just knowledge. As Ahmed (2013) found, in learner-centered environments "learners' experiences, perspectives, backgrounds, talents, interests, capabilities, and needs come into focus" (p. 24), all of which furthers exploration and collaboration.

A student's perspectives and beliefs become relevant in co-constructing a curriculum, helping the facilitator meet students where they are. This may be as specific as jargon or terminology relative to the field, or as broad as worldview. How students view knowledge impacts the learning process. For example, learners who conceptualize knowledge as dualistic – fixed and existing in discrete units – will find it difficult, if not impossible to "see the need to reflect on and search for connections that integrate elements within the given information and existing prior knowledge" (Pillay, 2002, p. 96).

An instructor's epistemology, or view of knowledge, can also hinder the success of the learner-centered curriculum. As Mott (1998) noted, failure to actively involve learners may be due to a "centuries-old positivist paradigm in which knowledge is thought to be an external commodity, a paradigm in which most of us are not taught to be creators of knowledge used in practice, but merely consumers" (p. 672). Eraut (1994) further argued that the "barriers to practice-centered knowledge creation and development … are most likely to be overcome if higher education is prepared to extend its role from that of creator and transmitter … to that of enhancing the knowledge creation capacity of individuals" (p. 57). Scholars and practitioners alike affirm that the knowledge generated in practice is as valuable, if not more so, than knowledge learned in formal pre-professional education.

When students become co-constructors of curricula, their needs as well as their understandings enter the process. Forrest and Peterson (2006) recommend, "allowing adult learners in a management class to pick their own readings based on the competence they want to develop during the semester" as just one example of self-directed learning (p. 117).

Once the learner-centered instructor moves beyond purveyor of subject matter to designer and coach of the learning process and the associated strategies, the resulting strategies are often infused with critical thinking and reflection, collaboration and cooperation, and discovery and innovation. This addresses another of Weimer's changes required to adopt learner-centered practice: the need to view content as integrally connected to the learning strategy. Intertwining learning skills and learner awareness with content further drives learner autonomy and the learning community to center stage. This is discussed in the following section.

Co-Constructed Curricula Content and Design

As shown in the adult learning models discussed earlier, adults seek learning that is relevant and applicable in the present or near future. This might involve solving a problem, resolving a conflict, learning a skill, or working through a dilemma. Regardless, the teacher trades the role of delivering content for that of facilitating learning. Good facilitators create environments that encourage students to discover and construct knowledge for themselves and in community with other learners.

Cornelius-White (2007) suggests several activities that reflect a co-constructed learning environment. These include learning groups, peer tutoring, community outreach, learning contracts, as well as, solving relevant and real problems. Cercone (2008), who demonstrated a connection between adult learning theories and online instructional strategies also recommends problem-based learning (PBL) and case-based learning (CBL) along with role playing, simulations, and student portfolios.

Morrone and Tarr (2005) offer several practical examples of strategies that acknowledge learners' prior understandings and attitudes, develop self-regulation, and ultimately give the learner more control. These include one-minute papers, class discussions of complex issues, case study analysis, simulations, and collaborative projects. In Birzer's (2004) review of criminal justice programs integrating andragogical principles, he similarly described the use of learning contracts with students defining objectives, detailed plans and resources needed, evidence for evaluation, and method of evaluation.

The instructor, as co-constructor of the learning process, adopts a more complex role including watching and directing this fluid, active learning process. The observant facilitator captures and maximizes teachable moments (Havighurst, 1952). Examples of this would be an impromptu demonstration of how to approach a dilemma from multiple perspectives or how to critically analyze contradictory information, using the learners' experiences and thus building on both self-efficacy and knowledge built. The learner-centered instructor is then modeling situated cognition, a construct that ties learning intricately to "participation in the immediate situation" (Fenwick, 2003, p. 25).

As with traditional teacher-centered curricula, co-constructed curricula show cohesion between content, learning activities, learning objectives, and outcome assessment tools. The learner-centered facilitator as director is responsible for ensuring that students' learning objectives align with the instructional strategies which have been defined to produce clear outcomes that will be accurately assessed by appropriate evaluation tools. Assessment in the co-constructed curriculum, as with content and design, looks different from traditional teacher-directed evaluation, as is outlined below.

Co-Constructed Curricula Assessment

Within teacher-centered curricula, assessment has typically involved summative evaluations such as end-of-term testing. In a learner-centered environment, formative evaluation becomes equally valued. Learning is assessed throughout the term by the facilitator, by the learner, and by the learners' peers. Such assessment takes many forms and ranges from formal to informal. What is consistent, regardless of the assessment tool, however, is that learning versus rote memorization is evaluated.

In the co-constructed classroom, the facilitator assesses deep learning (Marton & Saljo, 1976; Tagg, 2003), and in some cases learning that transforms one from novice to expert (Mott, 2000; Schön, 1983). As discussed earlier, the transformation of learners from novice to expert often involves reflective practice. Reflective practice begins to occur naturally when learners see and practice reflection. As Rogers explained:

Faculty need to let their students see and hear them reflecting both in the classroom and in individual meetings. To the degree that reflection is often a personal process, modeling requires the willingness and ability to self-disclose and to make oneself vulnerable. (2001, p. 53)

Loughran (1996) further demonstrated reflection by thinking out loud and keeping a reflective journal available to students and interspersed coursework with learning journals and writing portfolios.

Critical thinking and associated reflections are often captured in verbal and written forms. Writing assignments are standard in most graduate education programs. Bean's (2001) premise that writing is closely linked with thinking supports the activity of writing as reflective of understanding. "The most intensive and demanding tool for eliciting sustained critical thought is a well-designed writing assignment on a subject matter problem" (p. xiii).

In reference to information systems education, Saulnier, Landry, Longenecker, and Wagner (2008) suggested that learning be "assessed directly/authentically through papers, performances, portfolios, and the like depending on the fit between the activity and the outcome" (p. 171). Engineering education also revealed formative evaluation tools with deeper learning as the goal. "A clear proof that comprehension has been achieved is when the individual can articulate concepts in language, written or oral, therefore, a curriculum that emphasizes learning is both writing- and speaking-intensive" (Harris & Cullen, 2009, p. 60).

In the management literature, Gray (2007) described storytelling and critical incident analysis as useful activities in engaging learners in reflection. Critical incidents are integral to Mezirow's transformative learning theory and the idea of a disorienting dilemma as a catalyst to transformation. Brookfield (1995) uses a Critical Incident Questionnaire, and Angelo and Cross (1995) created a Recall, Summarize, Question, Comment, and Connect (RSQC2) tool, both written of earlier to prompt reflection.

Evaluation in general, and reflection specifically, are not always formal. In a study of engineering students in a first-semester general chemistry class, Lewis (2011) found that incorporating a peer-led team learning (PLTL) process, improved student retention and student performance. Instructors, peer-leaders, and students, received on-going feedback based on observations and reflections including a weekly peer-leader reflective journal. Lewis cited PLTL sources in suggesting, "It is possible the motivational aspects of cooperative learning, such as self-concept, are responsible for the improved gains in retention" (p. 706).

Kane and Lawler (1978) studied student peer evaluations within group work. Lee and Lim (2013), following on Kane and Lawler's work, performed their own study of student evaluations of group work. In an instructional methods and educational technology class, they found that peer assessments contribute a complementary strategy to that of the instructor's. While teachers are typically unable to access the learning process internal to the group, students focus on and evaluate their peers' social competencies such as organizing, coordinating, and moving projects forward.

As demonstrated above, the purpose of evaluation in a co-constructed curriculum is as much about promoting learning as it is assessing learning. To limit evaluation to grading exclusively by the instructor is to diminish the role this process can play in developing self- and peer assessment skills and learner autonomy.

Students who co-construct their own curriculum are resurrected into active learners. Once moved out of the lecture hall – full of inactive bodies and minds passively receiving information – and into a fluid, dynamic classroom, students can begin to construct knowledge is relevant, practical, and multi-dimensional.

Exemplary Case Studies from Formal, Non-Formal, and Informal Education

Case studies are an effective way to demonstrate, as well as clarify and elaborate, how the constructs, models, and theories of adult and continuing education described above reinforce the potential contribution of adult learners in co-construction of curriculum. The following three examples are drawn from formal, non-formal, and informal educational settings. In the first example, a combined Executive Masters of Business Administration and Masters of Public Health degree program involved students admitted to the program as members of a steering committee charged with redesign of the program, course, and syllabi. The second example demonstrates the significant and invested learner involvement of displaced workers enrolled in an outplacement training program for a textile manufacturing facility. And, the third case study details the collaborative curriculum development efforts of several faith communities, human service agencies, and a local technical/community college as they work with adult learners to enhance the reading levels, employability, and quality of life of the residents.

Formal Education

This case study describes an *Executive Masters of Business Administration/Masters of Public Health degree program.* In the mid-western United States, a comprehensive state university is home to five colleges and schools; the university offers more than 30 separate undergraduate and graduate degree programs and is the academic home for approximately 1,000 faculty and just under 20,000 students. The university is a major employer and sole higher educational institution in a relatively small, but vibrant, urban area of approximately 100,000 citizens with an extended metropolitan area of nearly 300,000. Within the city and 25 mile radius are a wide variety of businesses and industry, two hospitals, and a full complement of social services and nonprofit agencies, all of which enjoy a healthy economic outlook.

In response to critical emerging community health issues, requests from practitioners, and pressure from credentialing agencies, two of the colleges and schools in the university decided to collaborate on a unique, interdisciplinary pre-professional degree initiative to serve healthcare practitioners and administrators who would ultimately also be required to demonstrate effective business management acumen. Limited university funding to support development and implementation of the new degree was supplemented by funding from three external grant sources, and a coalition of community healthcare partners. The resulting new degree was a 60-semester hour joint Masters of Business Administration (MBA) and Masters of Public Health (MPH). The joint *Executive MBA/MPH* degree was housed in the College of Business and School of Allied Health, collectively home to 120 faculty. Requirements for admission to the executive degree program included current employment in an administrative capacity in a healthcare practice, hospital, nursing or other community healthcare facility, public health agency, or healthcare-related nonprofit agency. While some of the external funding provided tuition support, much of the cost incurred was covered by the participants' employers.

After completion of two academic semesters of the expensive and specialized joint degree, a formative assessment was initiated by the two academic units – with assistance from the funding agencies, contributing healthcare providers and agencies, and the degree candidates themselves. Through survey, in-depth individual interviews, and focus groups, the evaluation process determined significant dissatisfaction with the program on the part of both those enrolled and their employers. In fact, in only one academic year, the program had lost nearly one-quarter of the original 50 entering candidates. Specifically, the assessment found (a) a lack of awareness and consideration of candidates' competencies upon entering the program, (c) insufficient advising and counseling regarding scheduling, field experiences, and other student concerns, (c) lack of relevance in course content relative to job responsibilities, and (d) ineffective instructional and evaluation strategies.

Following the evaluation, the assessment team, which was originally comprised of instructional designers and subject matter experts, was reformulated to now include contributing employers, and representatives from the degree candidates themselves. The newly comprised assessment team began an intensive redesign and development process of the entire degree – including admission requirements, course sequence, content and texts, instructional strategies and in-class activities, and the field internship and applied project required for graduation. The most valuable insights provided in the co-constructed curriculum redesign of the degree and related course development came from the remaining 38 candidates who were in the early stages of their degree program and the 12 newly entering participants. Specifically, a competency assessment was designed by one group of degree candidates and shared with the instructors for use in building on participants' knowledge base, thus furthering their learning and developmental opportunities by building on existing experiential knowledge. Core and elective course selections were paired to the requisite competencies in their administrative roles. Suggestions were implemented to assign mentors from partner agencies and organizations, and counseling teams were formed with members from both the university programs and contributing healthcare providers. Expert administrators and practitioners from the contributing healthcare agencies were contracted to teach or co-instruct some of the course sections, thus providing current *real-world* applied relevance in the course content. And, applied projects and field experiences were redesigned to be more developmental, aligned with the employers' strategic plans and community needs, and which would build on the candidates' existing knowledge, growing comprehension, and career goals.

Following the second academic year of the three-year joint degree, the continuing formative self-assessment revealed significantly improved satisfaction with the degree program in general, improved course content and outcomes, and enhanced counseling services. As the degree candidates entered their third year of the new joint *Executive MBA/MPH* degree, only 2 additional candidates had withdrawn and the original candidates began their final year of applied projects and internship placements. The second cohort of new candidates is planned with applicants anxiously waiting to begin the redesigned and improved joint degree – made possible in part by the involvement of adult learners in the co-construction of innovative, relevant, and immediately applicable curriculum.

Non-Formal Education

This case study describes non-formal *out-placement training in textile manufacturing*. In a small city in the southeastern United States, a textile manufacturing facility employing approximately 200 workers was recently sold to a larger competitor. During the negotiations, economic developers hoped the sale might mean an expanded facility, new jobs, and a higher tax base for the community with few other industries. Unfortunately, the new owners announced that the facility would be sold and the manufacturing process moved to an off-shore location where lower wages could be paid, thus reducing manufacturing costs. Upper level management team members were offered lucrative relocation packages to other facilities; the 200 line employees, however, were told they would receive 6 month severance packages of incrementally reduced wages and health care/insurance benefits, and be eligible for an outplacement training and job-skills assessment program that should help them secure other local employment. The affected employees ranged in age from mid-20s to early 60s, and some had worked for the company for more than 30 years. For many of the men and women, this was the only paid employment they had known. The majority of the displaced workers had either graduated from high school or had completed their general education diploma through an educational assistance program offered through technical/community college system in the state. Approximately 30 percent of the mid-level line managers, foremen, quality assurance personnel, and technicians had either associate degrees or some college.

A consultant was hired by the parent company to coordinate and implement an outplacement training assistance program. In cooperation with the local technical college and career counselor from company headquarters, the consultant was charged with three objectives: developing and conducting a job skills assessment and interest inventory for all displaced workers who requested it; planning and implementing a training curriculum to prepare workers for available jobs in the region; and evaluation measures that would assess the success of the outplacement initiative. The approach employed by the consultant and career counselor was a collaborative one that included the displaced workers in all aspects of the initiative according to their interest and willingness to engage.

Although some of the displaced workers were involved in administering the early assessments and inventories to their coworkers, it was in the planning process of the various retraining curricula that they were most instrumental. The outplacement team embraced an interactive and collaborative development approach and involved the workers themselves in virtually every step of the curriculum process. The displaced workers certainly assumed a problem-centered approach to the situation. Since what they needed to learn would eventually enable them to find perhaps even more advantageous employment, their interests were not in random content, but in solving the problem of their impending unemployment. The workers also brought their rich store of experience and knowledge to bear on the curriculum development and even subsequent team-oriented training for one another. Given the short time frame in which the consulting team worked to prepare the displaced workers for new employment, building on what the workers already knew and collaborating with them to develop new competencies were crucial. Following the thorough skills assessments and interest inventories, co-construction of curricula that drew on the shared knowledge and experience of the workers enabled the training to be more interactive and dynamic, more relevant, and applicable in their new positions. The involvement of the displaced workers in this example of outplacement training ensured worker buy-in, success in the development and implementation of training, enhanced job skills for the workers, and increased potential for success in their new positions.

Informal Education

The focus of this case study is c*ommunity-based literacy education*. In one south-central U.S. state, literacy rates hover between 35-40%; many residents (both immigrants and native-born) struggle with literacy and numeracy in their own language, not to mention the English necessary to engage sufficiently in daily life. This case study explores the curriculum development efforts of several faith communities, social service agencies, and the local community college as they worked with adult learners to enhance the reading levels, employability, and quality of life of the residents.

In the center of this south-central state lies a sparsely populated, but large county of approximately 250,000 residents. The primarily rural county is a mix of numerous small unincorporated communities, three small towns, and one small city of approximately 50,000. The residents work in agriculture, light manufacturing, and service industries throughout the county; the median family income is approximately $30,000 annually. The unemployment rate, by contrast, is more than 10% and nearly twice the state average; additionally, seasonal employment represents much of the county residents' employment patterns. While many of the county residents, aged 18-65, have high school diplomas, the high school non-completion rate for the public school system in the county is nearly 40%. And, according to the literacy council based in the county seat, the illiteracy rate in the county is over 25%, while the national average ranges between 5-10%. In contrast to the working age residents, the county is also home to a growing senior population; many of these older residents have long-standing literacy needs as well. Because of the depressed rural economy in the county, some of these seniors are also faced with the need for retraining for continued or new employment.

A state technical and community college system serves the higher and continuing education needs of those residents with education beyond high school, as well as for those in jobs with continuing education benefits or requirements. In concert with several faith communities and the county literacy council, the technical/community college system offers a variety of training opportunities to county residents. One model literacy and employment education program is the result of broad interagency collaboration, is supported by a variety of external funding agencies, and enjoys full classes and frequent waiting lists.

The collaboration effort to serve the literacy and employability needs of the county residents was the brainchild of the county's technical/community college system. Following their participation in a county "Workers' Resource Fair," college personnel became aware of the many duplicative but limitedly successful efforts being undertaken by the county's literacy council and several faith communities throughout the county. Leaders discovered multiple literacy initiatives, employability training, computer classes, and career counseling sessions often being conducted throughout the county – each with marginal enrollment and nearly prohibitive costs to each small agency or organization in terms of both actual monetary resources and volunteer capacity. The technical/community college personnel quickly engaged leaders from various agencies, organizations, and faith communities to examine their respective efforts, compare challenges and successes, and discuss how they could collectively improve services to their county residents. In an innovative and responsive manner, representatives from several faith communities, senior and social service agencies, and the technical/community college began to better coordinate the services offered.

The turning point in the team's success was the literacy council's insistency on the involvement of active learners in the process. Thus, the large steering committee including consumers of the various programs was convened to assist with the coordination of the new training and education efforts. Despite their literacy challenges, the invested group of adult learners gathered comprehensive information about the variety of programs being offered in the county – enrollment numbers, costs, locations, course duration, and completion rates. They helped revise a needs assessment survey, including the translation into three languages that would support outreach to even more residents. Also with the assistance of an intern from a nearby university campus, these adult learners contributed significantly to the redesign and development of existing programs and the creation of new advantageous programs as well.

Approximately 36 months following the initiation of this collaborative team and the co-constructed redesign of a variety of programs, a team of evaluators from all of the agencies, organizations, faith communities, the technical/community college, and learners reconvened to consider the success of their collaboration. Their report indicated literacy and English as a second language (ESL) classes had served a total 2,700 residents; GED and adult basic education classes had successfully prepared 135 men and women to pass the state high school equivalency test; a streamlined variety of employability classes, including resume-writing, interviewing skills, and business communication classes had resulted in 350 individuals either securing employment or promotion; and more than 200 residents had completed a variety of computer classes. The report also noted the involvement of nearly 50 underemployed residents, those with literacy challenges, and participants of former and current training sessions as among the key factors in the success of the new programs.

Conclusion and Implications for Education and Practice

This chapter suggests that curriculum development initiatives can and should involve the learners for whom programs are planned. Adult learning constructs and models such as andragogy, transformative learning, and social learning were briefly outlined to provide guiding tenets and justification for such involvement. These conceptual constructs and associated practices were followed by their implications for learner-centered environments, and finally application within co-constructed curricula.

While it may seem intuitive for learners to be included in curriculum development, this chapter provided support and justification for doing so. Given the complexity and dynamics of today's world of work, the quickened rate of knowledge obsolescence, technological innovation, interdependent world political and economic contexts, such collaboration between educators and learners just makes *good sense*. More examples, similar to those provided earlier in this chapter, abound describing the use of master teachers as clinical curriculum specialists, expert nurse educators as subject matter experts, and those in areas such as business management, computer sciences, and medical education (to name only a few) serving in a variety of contributing roles in successful curriculum design and improvement initiatives. Adult learners who are not only capable, but who also have a vested interest in the process and product of curriculum development must be at the table with program planners, instructional design specialists, and subject matter experts.

Implications for involving adult learners in curriculum development processes are significant for both education and professional practice. For formal education, actively involving learners in curriculum development initiatives can result in improved programs of study, course availability and focus, and class activities; it also increases buy-in of potential and existing program participants. Co-constructed programs may also be more innovative, learner-centered, relevant, immediately applicable, and more authentically assessed. In non-formal and informal educational programming, the same can certainly be true, and additional value accrues in the cost savings from involving volunteer learners and community partners. The implications for practice are numerous as well, including increased collaboration and partnerships, enhanced pre-professional education and training, more pragmatic internships and field experiences, among others. From the standpoint of all stakeholders – educational institutions, credentialing and professional agencies, practitioners, and learners themselves, involving learners in co-construction of curriculum is not only legitimate and prudent, it is the wise course of action.

REFERENCES

Ahmed, A. (2013). Teacher-centered versus learner-centered teaching style. *The Journal of Global Business Management*, *9*(1), 22–34.

Angelo, T., & Cross, K. (1995). *Classroom assessment techniques: A handbook for college teachers* (2nd ed.). San Francisco, CA: Jossey-Bass.

Bandura, A. (1976). Modeling theory. In W. S. Sahakian (Ed.), *Learning: Systems, models, and theories* (2nd ed., pp. 391–409). Skokie, IL: Rand McNally.

Bandura, A. (1986). *Social foundations of thought and action: A social cognitive theory*. Englewood Cliffs, NJ: Prentice Hall.

Bean, J. (2001). *Engaging ideas: The professor's guide to integrating writing, critical thinking, and active learning in the classroom*. San Francisco, CA: Jossey-Bass.

Birzer, M. (2004). Andragogy: Student centered classrooms in criminal justice programs. *Journal of Criminal Justice Education*, *15*(2), 393–411. doi:10.1080/10511250400086041

Brockett, R. G., & Hiemstra, R. (1991). *Self-direction in learning: Perspectives in theory, research, and practice*. London, UK: Routledge.

Brookfield, S. (1995). *Becoming a critically reflective teacher*. San Francisco: Jossey-Bass.

Cercone, K. (2009). Characteristics of adult learners with implications for online learning design. *AACE Journal*, *16*(2), 137–159.

Cornelius-White, J. (2007). Learner-centered teacher-student relationships are effective: A meta-analysis. *Review of Educational Research*, *77*(1), 113–143. doi:10.3102/003465430298563

Cranton, P. (1996). Types of group learning. In S. Imel (Ed.), *Learning in groups: Exploring fundamental principles, new uses, and emerging opportunities* (pp. 25–32). San Francisco, CA: Jossey-Bass.

Cranton, P. (2006). *Understanding and promoting transformative learning: Guide for educators of adults* (2nd ed.). San Francisco, CA: Jossey-Bass.

Dewey, J. (1933). *How we think*. New York, NY: D.C. Heath.

Dirkx, J. (2006). Engaging emotions in adult learning: A Jungian perspective on emotion and transformative learning. In E. W. Taylor (Ed.), *Teaching for change* (pp. 15–26). San Francisco, CA: Jossey-Bass. doi:10.1002/ace.204

Eraut, M. (1994). *Developing professional knowledge and competence*. Washington, DC: Falmer.

Fenwick, T. (2003). *Learning through experience: Troubling orthodoxies and intersecting questions*. Malabar, FL: Krieger.

Forrest, S., & Peterson, T. (2006). It's called andragogy. *Academy of Management Learning & Education*, *5*(1), 113–122. doi:10.5465/AMLE.2006.20388390

Gray, D. (2007). Facilitating management learning: Developing critical reflection through reflective tools. *Management Learning*, *38*, 495–517. doi:10.1177/1350507607083204

Grow, G. (1991). Teaching learners to be self-directed: A stage approach. *Adult Education Quarterly*, *41*(3), 125–149. doi:10.1177/0001848191041003001

Guglielmino, L. M. (1977). *Development of the self-directed learning readiness scale.* (Unpublished doctoral dissertation). College of Education, University of Georgia, Atlanta, GA.

Harris, M., & Cullen, R. (2009). A model for curricular revision: The case of engineering. *Innovative Higher Education*, *34*, 51–63. doi:10.1007/s10755-008-9090-z

Havighurst, R. (1953). *Human development and education*. New York, NY: Longmans, Green.

Hergenhahn, B. R., & Olson, M. H. (2005). *An introduction to theories of learning* (7th ed.). Englewood Cliffs, NJ: Prentice Hall.

Hiemstra, R. (1994). Self-directed learning. In T. Husen & T. N. Postlethwaite (Eds.), *The international encyclopedia of education* (2nd ed.). Oxford, UK: Pergamon. Retrieved from http://www-distance.syr.edu/sdlhdbk.html

Horton, M., & Freire, P. (1990). *We make the road by walking: Conversations on education and social change*. Philadelphia, PA: Temple University Press.

Houle, C. O. (1988). *The inquiring mind* (2nd ed.). Madison, WI: University of Wisconsin Press.

Kadel, S., & Keehner, J. A. (1994). *Collaborative learning: A sourcebook for higher education* (Vol. 2). Washington, DC: National Center on Postsecondary Teaching, Learning, and Assessment.

Kane, J., & Lawler, E. (1978). Methods of peer assessment. *Psychological Bulletin*, *85*(3), 555–586. doi:10.1037/0033-2909.85.3.555

Knowles, M. S. (1990). The modern practice of adult education: From pedagogy to andragogy. New York, NY: Cambridge.

Knox, A. B. (2003). Future directions for collaborative strategies. *Adult Learning*, *14*(2), 29–30.

Lee, H., & Lim, C. (2012). Peer evaluation in blended team project-based learning: What do students find important? *Journal of Educational Technology & Society*, *15*(4), 214–224.

Lefrancois, G. R. (1999). *The lifespan* (6th ed.). Belmont, CA: Wadsworth.

Lewis, S. (2011). Retention and reform: An evaluation of peer-led team learning. *Journal of Chemical Education*, *88*, 703–707. doi:10.1021/ed100689m

Lindeman, E. C. (1926). *The meaning of adult education*. New York, NY: New Republic.

Loughran, J. (1996). *Developing reflective practice: Learning about teaching and learning through modeling*. Washington, DC: Falmer Press.

Marton, F., & Saljo, R. (1976). On qualitative differences in learning: Outcomes and process. *The British Journal of Educational Psychology*, *46*(1), 4–11. doi:10.1111/j.2044-8279.1976.tb02980.x

McCombs, B., & Whistler, J. (1997). *The learner-centered classroom and school: Strategies for increasing student motivation and achievement*. San Francisco, CA: Jossey-Bass.

Merriam, S. B., Caffarella, R. S., & Baumgartner, L. M. (2007). *Learning in adulthood* (3rd ed.). San Francisco, CA: Jossey-Bass.

Mezirow, J. et al. (2000). *Learning as transformation: Critical perspectives on a theory in progress*. San Francisco, CA: Jossey-Bass.

Morrone, A., & Tarr, T. (2005). Theoretical eclecticism in the college classroom. *Innovative Higher Education*, *30*(1), 7–21. doi:10.1007/s10755-005-3290-6

Mott, V. W. (1994). *A phenomenological inquiry into the role of intuition in reflective adult education practice.* (Unpublished Doctoral Dissertation). Department of Adult Education, University of Georgia, Atlanta, GA.

Mott, V. W. (1996). Knowledge comes from practice: Reflective theory building in practice. In R. W. Rowden (Ed.), *Workplace learning: Debating five critical questions of theory and practice* (pp. 57–63). San Francisco, CA: Jossey-Bass. doi:10.1002/ace.36719967209

Mott, V. W. (1998, March). Professionalization and reflective theory building in HRD. In *Proceedings of the Academy of Human Resource Development* (pp. 671-676). Washington, DC: AHRD.

Mott, V. W. (2000). The development of professional expertise in the workplace. In V. W. Mott & B. J. Daley (Eds.), *Charting a course for continuing professional education: Reframing professional practice* (pp. 23–31). San Francisco, CA: Jossey-Bass. doi:10.1002/ace.8603

Peters, J. M., & Armstrong, J. L. (1998). Collaborative learning: People laboring together to construct knowledge. In I. M. Saltiel, A. Sgroi, & R. G. Brockett (Eds.), *The power and potential of collaborative learning partnerships* (pp. 75–85). San Francisco, CA: Jossey-Bass. doi:10.1002/ace.7908

Pillay, H. (2002). Understanding learner-centeredness: Does it consider the diverse needs of individuals? *Studies in Continuing Education*, *24*(1), 93–102. doi:10.1080/01580370220130468

Pillay, H., & Elliott, B. (2001). Emerging attributes of pedagogy and curriculum for the new world order. *Innovative Higher Education*, *26*(1), 7–22. doi:10.1023/A:1010982303618

Pratt, D. (1993). *Andragogy after twenty-five years*. San Francisco, CA: Jossey-Bass.

Reeve, J., & Jang, H. (2006). What teachers say and do to support students' autonomy during a learning activity. *Journal of Educational Psychology*, *98*(1), 209–218. doi:10.1037/0022-0663.98.1.209

Rogers, R. (2001). Reflection in higher education: A concept analysis. *Innovative Higher Education*, *26*(1), 37–57. doi:10.1023/A:1010986404527

Saltiel, I. M. (1998). Defining collaborative partnerships. In I. M. Saltiel, A. Sgroi, & R. G. Brockett (Eds.), *The power and potential of collaborative learning partnerships* (pp. 5–11). San Francisco, CA: Jossey-Bass.

Saulnier, B., Landry, J., Longenecker, H., & Wagner, T. (2008). From teaching to learning: Learner-centered teaching and assessment in information systems education. *Journal of Information Systems Education*, *19*(2), 169–174.

Schön, D. A. (1983). *The reflective practitioner*. San Francisco, CA: Jossey-Bass.

Schön, D. A. (1987). *Educating the reflective practitioners: Toward a new design for teaching and learning in the professions*. San Francisco, CA: Jossey-Bass.

Schunk, D. H. (1996). *Learning theories: An educational perspective*. Englewood Cliffs, NJ: Prentice Hall.

Tagg, J. (2003). *The learning paradigm college*. Boston, MA: Anker.

Taylor, E. (2008). Transformative learning theory. In S. B. Merriam (Ed.), *Third update on adult learning theory* (pp. 5–15). San Francisco, CA: Jossey-Bass.

Tough, A. (1971). *The adults' learning projects: A fresh approach to theory and practice in adult learning*. Toronto, Canada: Ontario Institute for Studies in Education.

van Woerkom, M. (2010). Critical reflection as a rationalistic ideal. *Adult Education Quarterly*, *60*(4), 339–356. doi:10.1177/0741713609358446

Weimer, M. (2002). *Learner-centered teaching: Five key changes to practice*. San Francisco, CA: Jossey-Bass.

Will, A. M. (1997). Group learning in workshops. In J. A. Fleming (Ed.), *New perspectives on designing and implementing effective workshops* (pp. 33–40). San Francisco, CA: Jossey-Bass.

Wood, D. J., & Gray, B. (1991). Toward a comprehensive theory of collaboration. *The Journal of Applied Behavioral Science*, *27*(2), 139–162. doi:10.1177/0021886391272001

KEY TERMS AND DEFINITIONS

Andragogy: The art and science of helping adults learn; a set of assumptions that guide adult learning and teaching popularized by Malcolm Knowles in the mid 20th century.

Co-Constructed Curriculum: Learning content developed in partnership or collaboration between two or more individuals or parties.

Collaborative Learning: Learning in which the responsibilities for content, design and development, instructional strategies, learning outcomes, and assessment are shared.

Learner-Centered Instruction: A model of instruction authored and developed by Mary Ellen Weimer in the late 20th century that focuses responsibility for learning on the student, rather than the instructor. The work is based on Weimer's five key concepts of the role of the learner, balance of power, the function of content, responsibility for learning, and the purposes and processes of evaluation.

Self-Assessment: The process of appraisal, evaluation, or examination performed on the learning, outcomes, or performance by the learner.

Self-Directed Learning (1972): A model of learning drawn from the principles of andragogy in which "individuals take the initiative, with or without the assistance of others, in diagnosing their learning needs, formulating learning goals, identify human and material resources for learning, choosing and implement appropriate learning strategies, and evaluating learning outcomes.". Knowles, Principles of Andragogy.

This work was previously published in Andragogical and Pedagogical Methods for Curriculum and Program Development edited by Victor C. X. Wang and Valerie C. Bryan, pages 81-100, copyright year 2014 by Information Science Reference (an imprint of IGI Global).

Chapter 60
Teaching of Fluid Mechanics in Engineering Course: A Student-Centered Blended Learning Approach

Ataur Rahman
University of Western Sydney, Australia

Md Al-Amin
Monash University, Australia

ABSTRACT

In undergraduate engineering courses, fluid mechanics is regarded as a challenging subject. This is particularly the case for students who do not possess a strong mathematical background. This chapter reviews the issues related to the teaching of fluid mechanics with an emphasis on how e-technology can enhance student learning. It uses the data of 462 students studying the second year engineering course at the University of Western Sydney (UWS) in Australia. The UWS fluid mechanics course, in its past ten years, has undergone significant changes in its content and delivery. It has been found that teaching based on a "student-centered approach" is more effective in teaching fluid mechanics than a "lecturer-centered approach." Further enhancements are proposed in UWS through a blended learning approach involving both e-technology and traditional teaching methods to teach fluid mechanics. The method can also be adapted to other universities.

INTRODUCTION

The delivery of engineering education has traditionally been made via face-to-face teaching aided by a significant component of physical laboratory tasks for most of its core subjects. Engineering curricula have focused to equip students with 'problem-solving skills'. However, it has been reported that lecturing is not a very effective medium to advance problem-solving skills and it does not require much critical thinking, and moreover may not prepare students for the types of problems they face as professional engineers (Johnson, 1999). In recent years, collaborative

DOI: 10.4018/978-1-4666-8246-7.ch060

problem-based learning and use of on-line sources have become popular in engineering education similar to many other disciplines.

In engineering courses, problem-based learning has been used for some years at many institutions which employ real-world problems to introduce new concepts of a subject to students. Johnson (1999) presented the use of a combination of problem-based learning and cooperative learning to revise and teach a hydraulic engineering course. The goal of cooperative learning is that students study in teams so that they can learn from the lecturer as well as from each other. The online courses have not been that popular in core engineering subject-delivery till date in most engineering schools in Australia. This may be due to the fact that engineering subjects have a strong laboratory component and due to the lack of interactive responses that can be provided by a lecturer during solving complex design type problems on writing board.

In recent years, the student profiles in many engineering schools have changed significantly from past years. In the past, the engineering student cohorts were represented by top performing high school graduates (often from top 5% of high school students) with strong mathematical backgrounds. Furthermore, in the past, many students were not in paid employment (part-time or near full time) during the semester. In recent years, students in engineering courses in many universities are not from the top 10% of the high school students; rather they are from the top 20% to 30% range. Some of these students have done only general mathematics in high schools, and most often have not done any physics. When these students are enrolled in engineering courses, in particular, with higher commitment to paid work, it presents a challenge to engineering lecturers to equip these students with the necessary problem solving skills in fluid mechanics they would often require in a professional career. For these students, it is argued that a blended learning approach is likely to be more effective where a number of different approaches are put in place such as face-to-face lectures, tutorial and lab classes, online lecture notes, tutorial solutions, peer mentoring, 'help day' by tutors/lecturers and selection of textbooks having interactive solutions of numerical problems.

This chapter focuses on the teaching of fluid mechanics, which is regarded as one of the most challenging subjects in the engineering curricula. This uses data from fluid mechanics teaching over a three-year period in the University of Western Sydney (UWS) in Australia. This identifies the challenges in the teaching of fluid mechanics generally and then proposes a blended learning approach which might be adopted in the near future to enhance students' learning in this subject in UWS.

BACKGROUND

Catalano et al. (1999) compared aspects of engineering education with several case studies for a variety of subjects from a number of institutions. Comparisons were focused on teacher-centered and student-centered learning methods to identify the effectiveness of learning. They found that the student-centered model is more effective than the teacher-centered one when academic depth is considered. Crouch (2001) reported a ten years' teaching experience with peer instruction in introductory physics courses. Student performance was found to improve in quantitative problem solving skills by this method. They took a number of different approaches such as, the replacement of in-class reading quizzes with a writing report on the topic beforehand and group learning combined with traditional lectures. This paved the way for students developing an increased understanding of the courses.

There have been some previous researches on various aspects of learning and teaching of fluid mechanics and similar subjects. For example, Brohus & Svidt (2004) presented Information and Communication Technology (ICT) for effective learning in fluid mechanics education. They presented an education model with high efficiency learning environment using ICT and showed how the combined effect of physical and virtual knowledge could play an important role in improving the learning platform. It started with ventilation technology combining teacher performance using blackboard and student exercises using paper and pencils. Then it applied past experiences and lessons from ICT to make it possible to achieve the goal of effective learning.

Carlson & Sullivan (1999) dynamically introduced an integrated teaching and learning (ITL) program with a team of faculty and students and used it as a model for the undergraduate engineering education. This program integrated theory and practice that adapts creative ideas and group-based problem solving skills. It described different experimental module features and facilities as an online system. They, in essence, combined the old engineering curriculum with the new ITL program like a living laboratory with the help of online teaching facilities.

Sharp et al. (1999) presented four different proven writing strategies for engineering classes including assignments. The strategies include job related web-based finding approach, peer editing assignments, writing reports using journals and finally, how to write instructions using paper airplanes. These test strategies established that using journal papers assisted students learning of fluid mechanics more effectively.

Litzinger et al. (2011) stated that engineering education should encompass a set of learning experiences that would allow students to construct deep conceptual knowledge to develop the ability to apply key technical and professional skills fluently, and to engage in a number of authentic engineering projects. This implies that students should be engaged with real engineering projects in their final year of study in maturing their learning in the university, which could pave the way for them to become 'expert engineers' in future.

From the experience of the second author of the chapter of this book in delivering a number of medical subjects at Monash University in Australia, it has been found that in addition to traditional lecture notes and text books, e-technology and blended learning involving pre-lab preparation task with real life data, oral presentation on population health and ethics and online quizzes greatly assist student learning. In these courses, students get regular feedback through tutorial/lab-classes and via online modes. In the oral presentation, students are highly encouraged to present issues arising from media and journal articles in public health and medical research area. Through online participation, students discuss many exciting real-life issues, fellow students put their valuable comments and lecturers get involved to enhance student learning experiences. All these methods can be applied to teach fluid mechanics unit in engineering schools.

Leal (1991) addressed some of the challenges of teaching in fluid mechanics and noted that critical attention is needed to solve problems in the areas of teaching and research related to fluid mechanics. Baldock & Chanson (2006) presented a combined work of problem-based and project based learning where physical model data were compared in the areas of fluid flow modeling. This method enabled students to prepare high quality professional reports on fluid mechanics. Chanson (2004) reported that the influence of fieldwork on learning hydraulics courses in an Australian university was very strong. He pointed out that a combination of lectures and field works for these courses enabled students to have better learning outcomes demonstrated by a very positive feedback from students.

Johnson (1999) discussed the weaknesses of only traditional lectures in the areas of hydraulic engineering. Two different effective teaching techniques were presented by him, firstly, the problem-based learning to enable students to take responsibility on assigned work and prepare them to take an active role in learning. The second approach was cooperative learning that prepares students to work in a small team environment consisting of students and an instructor using small project based work and assignments.

Alam et al. (2004) presented development of a teaching and learning process that is cost-effective and user-friendly by integrating hands-on practical experiments, video images of real-world laboratory experiments and computational simulations, which could be useful to on-campus and off-campus students. Furthermore, Alam et al. (2007) proposed a three-step teaching method in fluid science that can greatly enhance students' learning outcomes, be cost effective, user-friendly and attractive. The method consisted of a real laboratory video clip, conduction of a real laboratory and a computer simulation.

Gotler (2006) presented a new approach to teach students in Washington State University where students work in structured groups with hands-on problem-based learning in the areas of fundamental fluid mechanics and heat transfer without the need of formal lectures. This approach increased communication and life-long learning skills of the students involved. It became a successful 'soft skill' for the students without the need of a laboratory space typically used in a standard classroom environment.

Fluid engineering subjects are taught in a number of undergraduate engineering courses such as Civil, Environmental, Mechanical, Aeronautical and Chemical Engineering. Teaching and learning of fluid science is always challenging due to its complex nature and the mathematics involved (Alam et al., 2004). Most of the students find these subjects difficult due to the facts that many students struggle to differentiate the concepts between solid and fluid mechanics; in the former, there is no internal frictional resistance and there is no issue of internal flow characteristics such as viscosity, turbulence and vortex unlike fluid mechanics. Furthermore, many students do not have a strong pre-requisite mathematical background to understand the concepts involved.

Fluid mechanics courses generally involve the use of a large number of variables and constants along with many equations. The new lectures are built heavily on previous ones, and hence students missing a few lectures often struggle to catch up. Depending on the new e-generation's learning habits, the delivery of fluid mechanics and similar heavy subjects needs a complete overhaul, which is still being delivered in the old-fashioned way in Australian universities (Hadgraft, pers. comm., 2013).

FLUID MECHANICS TEACHING IN UWS

Fluid mechanics is a 2nd year 1st semester subject in UWS with 10 credit points; this is one of the four subjects a full time student studies during the autumn semester. It is a core subject for Bachelor of Civil, Environmental and Mechanical Engineering students. It has two pre-requisite subjects, Mathematics 1 and Physics 1. Also, this subject is a prerequisite to a number of subjects in later years of studies e.g. hydraulics, hydrology and fluid dynamics. The subject content of fluid mechanics at UWS consists of fluid properties, fluid statics, energy equations, momentum, dimensional analysis and similitude, flow in conduits, introductory boundary layer concepts, introduction to open channel flow and flow measurements. The subject content of this subject in UWS is very similar to other Australian universities.

The current fluid mechanics subject content in UWS is different to its predecessor subject called water engineering which was heavier in its content. A few years ago, as a part of course restructuring in UWS, the water engineering subject was divided into two separate subjects, fluid mechanics and hydraulics, so that students can focus on individual topics in greater depth. The class size of fluid mechanics in UWS is about 175 on average at the beginning of semester, which falls to about 165 towards the end of the semester due to withdrawal by some students from the subject in the later part of the semester. The fluid mechanics class in UWS in 2013 comprises of 92% male students and 8% female students, with 82% students are domestic and the remaining 18% are international. The bulk of the domestic students have high school rankings in the range of 70% to 85%.

Table 1 lists some of the learning-related observations of the students enrolled in fluid mechanics in UWS based on the last ten years of experiences of teaching this subject in UWS by the first author. It can be seen that students who are better engaged with the lecturers and tutors and who take the advantage of the learning facilities and take their own responsibility in learning using all the available means, do better than the students who are too shy or slack to be engaged in the class activities. Also, the poor performance in the prerequisite subjects is generally highly linked with the poor performance in the fluid mechanics subject in UWS.

From the assessment tasks in UWS, it was found that the common mistakes students do in fluid mechanics include: (a) Students are not comfortable with the units of measurement of various variables defining a system; (b) Students cannot conceptualize a design problem and the break-up steps involved to arrive at the final solution. (c) Students cannot solve the basic set of equations indicating their weakness in high school level mathematics; (d) Students are not fast enough to solve problems in an examination situation that indicate a lack of preparation for the final examination; and (e) Students who do not

Table 1. Fluid mechanics student learning experience in UWS

Students Who Struggle	Students Who Do Well
Students starting the subject after week 2.	Students who engage better with the lecturers and tutors by asking questions and seeking help as needed.
Students who are too shy to ask questions in and outside the class.	Students working in active groups.
Students who often avoid lectures.	Students reading text book on the top of lecture notes.
Students who scored poorly in prerequisite subjects e.g. Mathematics 1 and Physics 1.	Students who did better in prerequisite subjects e.g. Mathematics 1 and Physics 1.
Students who do not keep up with the learning every week and attempt to catch up after mid-semester.	Students who keep up their progress of learning up-to-date every week and seek the assistance from lecturers and tutors immediately when they face problem on particular concept.
Students who do poorly in class quiz tests do also poorly in the final examination.	Students who solve the past examination papers.
Students who do not get familiar with various new variables, their symbols and correct units of measurements.	Students who solve additional problems outside the class and tutorial problems.
Students who are not very good in conceptualizing the problem and do not attempt to make a working diagram/sketch in solving the problem.	Students who show more interest in lab classes and take an active role in the experimentation.
Students who lack in self-confidence and try to pass the subject with the help from other students i.e. those who do not take their own responsibility in learning.	Students who do not blame others for their failure but take their own responsibility in learning using all the available facilities.
Students who are mainly interested in passing by somehow without understanding the concept of the subject.	Students who provides honest feedback to improve the delivery of the subject during the semester rather than waiting for the end of semester feedback.
Students who often provide medical certificates on the day of compulsory assessment tasks, and this generally happens for a particular group of students who do this across most of their enrolled subjects in UWS.	Students who utilize various the online tools of learning e.g. PowerPoint lecture notes, electronic discussion and telephone.

take care of double checking initial calculations, which if wrong often make the remaining part of the solution unrealistic.

From the students feedback on the fluid mechanics subject in UWS, few points are worth noting: (a) Only a handful of students return their feedback forms or complete online feedbacks (rate is about 25%); (b) Two diverse groups, one being highly satisfied with the subject delivery and the other are too unhappy; these are often linked with the top performing and low performing student groups, respectively; (c) Students do not buy and/or read the textbook rather depend on lecture PowerPoint slides which often provide only the synopsis of the lecture materials; (d) There are a few students who attempt to blame all the aspects of the subject; and (e) The overall student feedbacks in fluid mechanics subject is under the average UWS score. This is generally linked to the challenging nature of this subject, as this has not been changed even with the engagement of highly experienced and high-profile lecturers teaching in this unit in the past.

Figure 1 shows the results of the fluid mechanics subject in UWS during the last three-year period. There are a number of interesting observations that can be made from these results. In year 2013, the number of high-performing students (i.e. receiving high distinction (HD), distinction (D) and credit (C)) are notably higher as compared to the previous two years. This might be attributed to the more student-centered approach of teaching that was adopted in 2013 as compared to the previous two years. It should be noted that in 2013, students were asked to solve problems in the class before other students, which assisted the student who was solving the problem as well as the fellow students. Also, students were working on small groups to solve the problems and consulting with the lecturer with their difficulties in greater numbers in year 2013 as compared to the previous two years. It should be noted that in year

Figure 1. Student performances in a three-year period in the fluid mechanics subject in University of Western Sydney, Australia

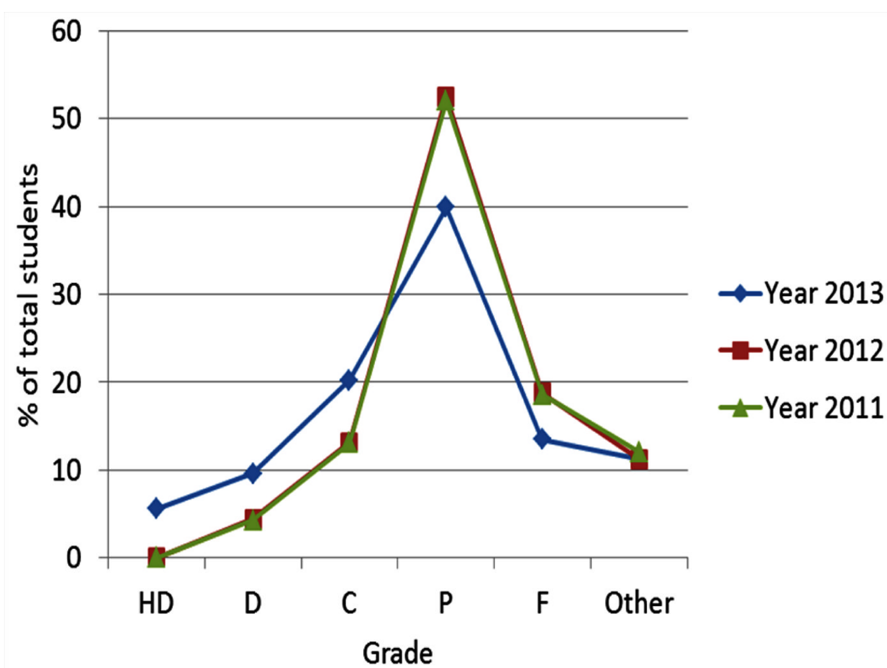


Table 2. An enhanced student-centered approach to deliver fluid mechanics subject in UWS in future years

For Students	For Subject Coordinator	For Lecturers/Tutors	For Lab Teachers
Show genuine interest in self-learning by forming peer groups and working together throughout the semester.	Set up a large practical project such as a catchment where water is to be managed for ensuring sustainable water use e.g. supply for drinking, environment, flood control and electricity generation, and identify different sub-tasks which can be solved after every two weeks using the knowledge gained in the preceding two lectures.	Help the student peer groups to solve the problems in each tutorial class.	Provide clear direction how to write a good lab report. Show examples of the best and poorest lab reports from previous years.
Prepare an equation notebook to put all the new equations from each lecture and their variables and units.	Organize periodic feedbacks from students e.g. in weeks 3, 6 and 9 and identify students with learning difficulties much earlier and offer these students special assistance.	Set up optional two-hour block every week for helping struggling students.	Encourage students to ask more questions on the experiment they are doing.
Work out in a group to derive units of measurements of all the adopted variables.	Change the text book so that the new book has interactive tutorial solution facility such as Wiley-Plus book.	Organize on-line quiz tests on very basic materials of the subject.	Discuss with the subject coordinator about possible questions the students might ask to build a lab question bank.
Overcome the shyness in asking questions to lecturers by various means e.g., using twitters, emails and face-to-face sessions.	Put practice questions beyond tutorial problems. Also put practice class test and final examination questions in the web.	Organize information day on the 'common mistakes done by previous students'.	Know students by names and befriend with them.
Befriend with lecturers by knowing each other and removing barriers in communication.	Organize 'help-out day' before the test weeks.	Know students by names and befriend with them.	Encourage student to take photographs of the experiments and to put these in student portfolios.
Know subject coordinator, lecturers, tutors and lab teachers by name.	Know students by names and befriend with them.	Check student tutorial solution books and see where the students are struggling and help the students accordingly.	Select 'catch-up day' for those who missed the labs for genuine reasons.
Buy and read the text book when a concept cannot be understood from lecture notes.	Reward students who perform better by certificates and engaging them in peer mentoring.	Post tutorial solution immediately after the tutorial day.	
Utilize free on-line learning materials in YouTube e.g. Khan's academy on-line materials.	For students missing the class test, organize alternative tests.		
Understand and discuss with peers about various assumptions and how some of these assumptions are relaxed in solving a complex problem.	Make recorded lectures available to students.		
Diary in the key dates e.g. class tests and labs.	Organize peer feedback from fellow lecturers.		

2013 only one lecturer delivered all the 12 lectures; however, in years 2012 and 2011, there were two lecturers each delivering 50% of the lectures. The results of years 2011 and 2012 are very similar, which might be due to the fact that lectures and the method of subject delivery were very similar in these two years. The percentage of failure in 2013 is about 5% smaller than the previous two years. Interestingly, the number of students who received absent/fail or incomplete grade are very similar in all the three years.

These results in Figure 1 suggest that an enhanced student-centered approach of delivering fluid mechanics is preferable to the more traditional lecturer-centered approach. It is thus argued that fluid mechanics subject delivery should be updated with a blended learning approach which is likely to offer increased student learning in the future years. In this regard a number of strategies could be adopted as summarized in Table 2.

The major thrust of the proposed student-centered approach is to introduce new components in the subject that would encourage students to be more proactive in learning e.g. taking active parts in class and on-line activities, identification of student's own weaknesses in the subject and seeking early help from the tutors/lecturers/unit coordinator to overcome his/her own learning difficulties. Also, the students should engage themselves in solving the practice questions so that their performances during formal examinations are improved.

To introduce the proposed new student-centered approach of teaching fluid mechanics, the subject outline will be modified and the assessment tasks will be redesigned to suit the on-line learning and assessment requirements. The effectiveness of this new learning method will be monitored via a number of student surveys to be conducted throughout the semester.

CONCLUSION

This chapter provides a review of teaching and learning of fluid mechanics in the undergraduate engineering courses using various methods of teaching and learning. From the literature, it has been found that teaching of fluid mechanics and similar subjects would be more effective when different online and project-based sources/methods are adopted. Based on three years of data from University of Western Sydney (UWS) in Australia, it has been shown that an approach supported by student-centered methods of learning is more effective in teaching fluid mechanics contents as compared to a lecturer-centered approach. Based on this finding, an enhanced student centered and blended learning method and associated strategies are formulated that would be examined in the near future for their effectiveness in delivering fluid mechanics subject in UWS. The approach can also be adapted to other universities in Australia and other countries.

ACKNOWLEDGMENT

The authors would like to acknowledge the University of Western Sydney (UWS) for the data used in this book chapter, to Professor Simeon Simoff, Dean of the School, for encouragement, to Associate Professor Surendra Shrestha for guidance on fluid mechanics teaching at UWS, Associate Professor Firoz Alam for his encouragement and Tarek Rahman and Sumya Rahman for editorial assistance.

REFERENCES

Alam, F., Dilla, E., Subic, A., & Tu, J. (2007). A three-step teaching and learning method in laboratory experiments for a thermal fluids course. *World Transactions on Engineering and Technology Education*, *6*(1), 13–16.

Alam, F., Tang, H., & Jiyuan, T. (2004). The development of an integrated experimental and computational teaching and learning tool for thermal fluid science. *World Transactions on Engineering and Technology Education*, *3*(2), 249–252.

Baldock, T. E., & Chanson, H. (2006). Undergraduate teaching of ideal and real fluid flows: The value of real-world experimental projects. *European Journal of Engineering Education*, *31*(6), 729–739. doi:10.1080/03043790600911837

Brohus, H., & Svidt, K. (2004). Application of ICT supported learning in fluid mechanics. *Electronic Journal of Information Technology in Constriuction Itcon*, *9*, 229–256.

Carlson, L. E., & Sullivan, J. F. (1999). Hands-on engineering: Learning by doing in the integrated teaching and learning program. *International Journal of Engineering Education*, *15*(1), 20–31.

Catalano, G. D., & Catalano, K. (1999). Transformation: From teacher-centered to student-centered engineering education. *Journal of Engineering Education*, *88*(1), 59–64. doi:10.1002/j.2168-9830.1999.tb00412.x

Chanson, H. (2004). Enhancing students' motivation in the undergraduate teaching of hydraulic engineering: Role of field works. *Journal of Professional Issues in Engineering Education and Practice*, *130*(4), 259–268. doi:10.1061/(ASCE)1052-3928(2004)130:4(259)

Crouch, C. H., & Mazur, E. (2001). Peer instruction: Ten years of experience and results. *American Journal of Physics*, *69*(9), 970–977. doi:10.1119/1.1374249

Golter, P. B. (2006). *Combining modern learning pedagogies in fluid mechanics and heat transfer*. (Unpublished Masters of Science Thesis). Washington State University, Seattle, WA.

Johnson, P. A. (1999). Problem-based, cooperative learning in the engineering classroom. *Journal of Professional Issues in Engineering Education and Practice*, *125*(1). doi:10.1061/(ASCE)1052-3928(1999)125:1(8)

Leal, L. G. (1991). 4 challenges and opportsubjecties in fluid mechanics and transport phenomena. *Advances in Chemical Engineering*, *16*, 61–79. doi:10.1016/S0065-2377(08)60145-3

Litzinger, T. A., Lattuca, L. R., Hadgraft, R. G., & Newstetter, A. C. (2011). Engineering education and the development of expertise. *Journal of Engineering Education*, *100*(1), 123–150. doi:10.1002/j.2168-9830.2011.tb00006.x

Sharp, J. E., Olds, B. M., Miller, R. L., & Dyrud, M. A. (1999). Four effective writing strategies for engineering classes. *Journal of Engineering Education*, *88*(1), 53–57. doi:10.1002/j.2168-9830.1999.tb00411.x

This work was previously published in Using Technology Tools to Innovate Assessment, Reporting, and Teaching Practices in Engineering Education edited by Firoz Alam, pages 12-20, copyright year 2014 by Engineering Science Reference (an imprint of IGI Global).

Chapter 61
The Role of Blogging in a Changing Society: Theory, Practice, and Implications

Efi A. Nisiforou
Cyprus University of Technology, Cyprus

Nikleia Eteokleous
Frederick University, Cyprus

EXECUTIVE SUMMARY

Educational blogs have remained a noteworthy component, even in an age of rapid technological development. The chapter makes an in-depth description of the blogging phenomenon as it tackles the most important findings of the international literature. It provides insights into the connection between teacher identity, within the context of higher education, by incorporating aspects of theory and practice. The practical tone reports on three case studies on the use of blogs in education. A set of evaluation criteria on blogging for educational purposes and a theoretical framework for utilizing blogging as a problem solving approach are addressed. Moreover, it stresses necessity for the development of a pedagogical framework that will guide blog integration as a learning-cognitive tool in achieving specific learning outcomes. The results underscore the importance of essential training for the effective implementation of educational blogging in teaching and learning environments. A compendium of terms, definitions and explanations of concepts are clearly explained.

INTRODUCTION

The chapter focuses on the use of Blogs in Higher Education, and blogging as a Web 2.0 activity. Blogging was chosen because of its unique affordances, which are further explained in a subsequent section. It provides a synthesis of the literature in the field alongside two illustrative examples of how this tool is being used to support evidence-based practices. It draws out the benefits and potential that this appears to offer as an instructional and research tool in the frame of learning and teaching, and highlights the challenges and future implementations on teacher education. The review provides three case studies, which are reported elsewhere (Nisiforou & Eteokleous,

DOI: 10.4018/978-1-4666-8246-7.ch061

2012; Eteokleous & Nisiforou, 2013) and serve as the illustrative examples of the chapter. The case studies focus on the evaluation of blogging criteria on a basis of educational practice, which facilitate the online teaching and learning process. The contextual examples explore the extent to which blogs facilitate the educational practice by promoting communication, discussion, sharing of ideas, reflections on learning and teaching and the potential of blogs to be employed as pedagogical tools in higher education. The locomotive objective of the chapter is to draw on the existing body of background literature in this domain and synthesize empirical evidence on the usage of blogging in pre-service teachers' education.

The use of computer technologies in education is not a new research field, however due to the technological growth it has changed its shape and become more sophisticated in supporting the teaching and learning process (Cakir, 2013). While a wealth of literature focuses on learners' experiences regarding the benefits of blogs in higher education, this work is adding to this field from a less-reported angle; that of examining and defining blogs evaluation criteria from an educational perspective. This perspective lacks real evidence of empirical pedagogical blogging with reference to pre-service teachers' experiences within the framework of educational blogging, showing facts of their perceptions towards the affordances of blogs in teachers' practice and experience within today's educational milieu. The in-depth case studies that follow provide more specific indicators of the extent to which blogs can promote and facilitate the development of blended collaborative learning environments, by proposing the design of a possible valuable theoretical framework. Specifically, the practical part of the chapter seeks to examine blogs' potential to be integrated as tools that will provide a forum to share, discuss, reflect, exchange ideas and opinions, argue, provide feedback, and experience; essential ingredients of real learning. In doing so this serves the dual purpose of building and strengthening the identities of both learners and teachers. Furthermore, the stages of development in the formation of online identities are the same in blogging as the steps found in the use of Virtual Learning Environments with those stages presented in the form of a pyramid in Salmon's (2000; Wallace, 2003) work on the five stages of development in online socialization. There is insufficient theoretical background on the framework to guide the identification and evaluation of blogs' content, activities and purposes when developed for educational use. Due to the lack of previous studies, the current chapter aims to provide its audience with adequate information regarding the possible guidelines and indicators (criteria); an attempt to develop a pedagogical framework in identifying the real benefits of blogging for educational purposes.

BACKGROUND: WELCOME TO THE NEW WORLD WIDE WEB

Computers have played a variety of roles in classrooms for over five decades, and their use evolved from "learning from computers," to "learning about computers," to "learning with computers," or in other words "computers as mindtools" (Dexter, Ronald & Becker, 1999; Jonassen, 2003; Eteokleous,2008). With the rapid diffusion of the Internet, new approaches to learning were created (Crosta, 2004), and as a result, the steady increase towards the interest in the development and use of online learning (Dabbagh & Kitsantas, 2004) to provide anytime and anywhere learning. Specifically, the technological advancement in information technology and telecommunications resulted in the development of the Web 2.0 and created the appropriate framework for user participation. In Web 2.0, users are Contributing, Collaborating, and Creating; the three key factors known as the 3C's (Ala-Mutka et al., 2009). Various online tools have emerged such as blogs, wikis, discussion forums, online collaborative documents, online sharing of documents, pictures and videos, podcasts, RSS feed etc. Millions of people use a selection of social and professional networks that are not limited to Facebook, MySpace, Twitter, Delicious, Flickr, LinkedIn and Live Journal. All of these tools have helped shape an interaction and interplay of identities between the worlds of online and offline realities, so that the borders have almost become blurred between them.

Nowadays, with the advent of Web 2.0, the internet has become truly interactive. The aforesaid tools and networks are outstanding examples of how definitions, ideas, photographs, videos and general multimedia tools can be shared over a powerful Web 2.0. Technology offers a realistic, visually compelling, and motivating interactive environment for developing the life skills and knowledge needed for today's globalized, hi-tech environment (Goddard, 2002). Additionally, technology serves for the enhancement of the 21st century's skills; vital abilities for individuals' success in the today's world, such as critical thinking, problem solving, communication and collaboration. Web 2.0 technologies have become essential tools of daily life and a crucial part of students' personal knowledge tools (Lee, Miller & Newnham, 2008). Consequently, the Web 2.0 tools can be educationally exploited for teaching and learning purposes towards achieving educational objectives, thus transforming social to educational networking.

The era of Web 2.0 technologies has harnessed social networking (O'Reilly, 2005) and became an important tool of daily life and a crucial part of students' personal knowledge tools (Lee et al., 2008). It is notable that working with Web 2.0 tools in general, and these features in particular, require specific knowledge (Baumgartner, 2006) as a part of individuals' continuous professional development.

DEFINITIONS OF KEY TERMS: INTRODUCING BLOGS

The origins of the blog (Blood, 2004) have emerged from the short term of "web log;" an online chronological collection of personal commentary and links that was first used by Barger (1997) and then by Merholz (2002). A blog is a website that is maintained by an individual or a group where readers can comment on blog posts to supply more information and discuss various issues (Allen, 2011). A person who owns a blog is called a blogger and the actions communicating within its environment are known as blogging (Hill, 2004). Most blogs are mainly textual, but there are also audio, video and photo blogs. There are many different categories of blogs: personal, professional and educational. Blogs are considered as one of the most important and popular tools of the Web 2.0 toolbox (Richardson, 2009) and blogging has become one of the most popular Web 2.0 activities. Blogs contain text, graphics, images, videos, and hyperlinks to other websites. Bloggers comment on the posts, discuss, argue and provide their opinions. Blogs create conditions for interaction, reflection, ideas' exchange and discussion (Zawilinski, 2009; Sim & Hew, 2010; Petko, 2011).

Even though they were around for years, they recently emerged as popular means of communication, discussion, collaboration and information sharing; affecting public opinion and mass media. It is supported that blogs have educational value given their characteristics and the opportunities provided to users (Richardson, 2010). They provide teachers and students an interactive platform where text, images, and links to other blogs, or web pages, are posted, mostly focusing on a particular subject. Blogs are most popular among students since they are virtual, and can be worked at any time and place (Richardson, 2010). It is extremely beneficial to integrate Web 2.0 tools; in this case blogs, as learning-cognitive tools, to add value, enhance the teaching and learning process and promote the development of higher-order thinking skills. Given that 64% of the teenagers that use the Internet are considered "content creators" (Lenhart et al., 2007), there is a potential argument that we should take advantage of this and transform "fun" into learning. Therefore, being part of our students' digital world might be more possible to raise their interest, motivate them, transform the classroom environment, and properly prepare them for the rapidly changing information society's needs and demands (Eteokleous & Nisiforou, 2013). Based on the aforementioned and the extended use of blogs in various educational levels and subjects, numerous concerns arise in regards to pre-service teachers' appropriate preparation to design learning environments enhanced by blogs, where real blogging is achieved. While different categories of blogs (e.g. personal, professional and educational) comprise particular characteristics that serve diverse purposes and mostly for the achievement of specific learning goals, in the next paragraph we focus in particular on a delineate description of four types of blogs; Blog as Online Course Tool, Blog as Discussion Forum, Blog as a Research Tool, and Blog as cognitive-learning tool.

Blog as Online Course Tool

This type of blog aims to support class work in both formal and non-formal ways. The instructor from the one side posts assignments, announcements, information, and summaries of lessons. On the other side, students share their learning experiences and post their thoughts to the instructor and peers through course blogs. Therefore, this is helping to develop and solidify their identity as learners, bringing the learning experience outside of the classroom, which is in turn changing teacher identity. The teacher's role is no longer restricted to the traditional classroom in this digital age. As a consequence of learning technologies such as blogs, teachers have become practitioners of blended learning.

Students post examples and exercises related to course essays as well as discussing reflections on course materials. Additionally, blogs of this kind could facilitate extended discussions beyond the classroom sessions. In a study conducted by Lin and Yuan (2006) a blog was used as a reflective learning platform by engineering students.

Blog as Discussion Forum

The blog acts as a forum where students discuss and exchange information related to the course's subject, lectures, assignments, announcements, and readings (Makri & Kynigos, 2007). Additionally, students can share and exchange information, thoughts and ideas on their learning; thus developing their metacognitive skills (Nisiforou, 2009). Yang (2009) reports that student-teachers (in other words pre-service teachers) made use of the blog as a platform to discuss about teaching theories and to critically reflect on their learning processes, whereas Deng and Yuen (2010) have proposed an empirically grounded framework for educational blogging that highlights self-expression, self-reflection, social interaction, and reflective dialogue. Ebner, Lienhardt, Meyer, and Rohs (2010) examined the use of microblogs (blogs via web interfaces and mobile devices) and come up with the finding that microblogging should be seen as a completely new form of communication that can support informal learning in places other than classrooms.

Blog as a Research Tool

Appropriately designed blogs can be used as a powerful tool for supporting academic research and can constitute a platform for literature review for academic purposes (Mejias, 2006). Paulus and Spence (2010) used blogging groups to promote student learning and conceptual change through reflection and interaction in blog conversations. They found that the blog conversations were very useful to the instructors as a source of data on students' understandings and misconceptions of course topics. These misconceptions could then be addressed with further instruction. Some studies examined students' thinking skills or level of reflection by analyzing the contents of their blogs (Hall & Davison, 2007; Loving, Schroeder, Kang, Shimek & Herbert, 2007; Stiler & Phileo, 2003). Thus, this allows for teacher research and academic identity to be shaped by the informal needs analysis or highlighting of needs that occurs through analysis of blogs.

Blog as Cognitive-Learning Tool

Eteokleous and Nisiforou (2013) attempted to define blogs as cognitive -learning tools and examine their role in the teaching and learning process as well their effectiveness in achieving specific learning objectives. Specifically, they suggest that when blogs are successfully integrated as learning-cognitive tools within the teaching and learning process, they have a significant role and promote the achievement of specific learning objectives. The current chapter presents examples of blogs' integration as learning tools and their contribution in achieving specific learning objectives where blogs provide a practical online platform for discussions that hastens the acquisition of knowledge and learning (Liu & Chang, 2010). Along the same lines, blogs give space to students to reflect and publish their thoughts and understandings, opportunities for feedback, scaffolding of new ideas, as well as collaborative learning. Blogs also promote the development of higher-order thinking skills (Nisiforou & Eteokleous, 2012) and improve flexibility in teaching and learning. According to Oravec (2002) blogs encourage self-expression and collaboration, which in turn are reflected in enhanced critical thinking skills (Eteokleous & Nisiforou, 2013). In line with these, the findings of another study indicated how blogging can promote higher order thinking (Zawilinksi, 2009). Additionally, a blog offers extended interactivity, increasing students' involvement and motivation (Eteokleous & Pavlou, 2010). Finally, students can receive instant feedback from the instructor, peers, and other visitors, which enhances learning efficiency (Kaplan, Piskin & Bol, 2010).

THE CHALLENGE OF BLOGS IN EDUCATION: TEACHING AND LEARNING

Given the educational potential of blogging and the positive impact on teacher identity, numerous educators have already started using blogs in the classroom. Blogs can be integrated as educational tools across the curriculum, from primary to higher education, achieving collaboration among students and educators even in different schools and countries. Many studies have explored the features and educational benefits that blogging offers to students, and discussed the major uses for blogs in education (Downes, 2004; Siemens, 2005; Richardson, 2006; Churchill, 2009). Specifically, these studies have examined blog integration in the teaching and learning process evaluating the learning value of blogging (Chen, Cannon, Gabrio & Leifer, 2005; Makri & Kynigos, 2007), i.e. for group teaching (Hanson & Dent, 2011), collaborative learning (Bartolome, 2008) and web-based collaboration (Grassley & Bartoletti, 2009).

Additionally, blogs feature hyperlinks, which help students understand the relational and contextual basis of knowledge, knowledge construction, meaning making and the experience of connective writing (Penrod, 2007; Richardson, 2009; Liu & Chang, 2010). Blogs' integration in higher education is growing rapidly (Weller, 2007), having a remarkable potential to transform the teaching and learning process (Williams & Jacobs, 2004, Maheridou, Antoniou, Tsitskari & Kourtessis, 2012). According to Oravec (2002) blogs encourage self-expression, reflection processes, and collaboration, which in turn are reflected in enhanced critical thinking skills and writing skills, as well as the opportunity of building an strengthening a learning community (Brahm, 2007). A blog offers extended interactivity, increasing students' involvement and motivation (Eteokleous & Pavlou, 2010). Students can receive instant feedback from the instructor, peers, and other visitors, which enhances learning efficiency (Kaplan, Piskin & Bol, 2010). Blog participants perform connective writing since they need to read carefully and critically, and develop context that is clear, organized, and convincing. There is a synthesis of ideas, self-evaluation, and reflection. Experiencing blogs writing promotes critical, analytical, relational and creative thinking. It also combines collegiality and social interaction, developing working and social relationships among teachers, educators and professionals (Davis, 2005; Richardson, 2010).

Another study (Eteokleous, 2011),clarifies how students become educational content creators by the development of student-centered environments, having an increased role in the teaching and learning process when blogs are used as educational tools, while highlighting the importance of the instructor's role in a blog learning environment. Glogoff (2005) underlines that the instructors should be aware of the delicate balance between the synchronicity of time and place on the one hand and the need to keep discussions focused on the topic. Kim (2008) points out that the success of the system relies on teachers' capability in providing the appropriate resources. Thus, one can suggest that although teaching and reflecting through blogs constitutes an effective medium for teaching, it must be applied in a proper way with the direction of the instructor as a means of fostering the best teaching practices (Karaman, 2011).

Several researchers have shown blogs' potential to be used as effective social teaching and learning methods in the classroom environment. Williams and Jacobs (2004) examined the potential of blogs in higher education and concluded that blogs can provide students with a high level of independence. Another study conducted by Ellison and Wu (2008; Top, 2012) analyzed student perceptions of blogging in the classroom and came up with the finding that students enjoyed certain aspects of blogging. Moreover, Goktas (2009) analyzed pre-service teachers' perceptions and experiences in blog-supported ICT lessons. The results demonstrated that pre-service teachers believed that blogs can be used as an effective instructional tool (Top, 2012).

VALUE, IMPORTANCE AND USEFULNESS: EDUCATIONAL BLOGGING

Blogs are open, interactive and user friendly having many hallmarks incorporated such as organization of posts and commentaries, permanent links etc. which have dominated the discussion about educational blogs and their potential for teaching and learning. Educational blogs are currently gaining popularity in schools and higher education institutions and they are widely promoted as collaborative tools in supporting students' active learning. Educational blogs have become a noteworthy component of many web-based learning environments as they provide a practical online platform for discussions that hastens the acquisition of both knowledge and learning. Therefore, integrating such a web-related communication tool as blogs for enhancing the teaching and learning process is a great challenge for educators.

Additionally, well-designed educational blogs can empower and motivate both tutors and learners. Blogs can therefore act as powerful personal learning portals (Angelaina & Jimoyiannis, 2012) and can work both as personal and group platform-publishing areas in which participants can exchange thoughts, share ideas and opinions, insights, comments, feedback and recommendations with fellows.

Angelaina and Jimoyiannis (2012) reported blogs' pedagogical affordances:

- Enhance participation and interactive communication opportunities (Angelaina &

Jimoyiannis, 2012, promoting both individualized (Cottle, 2009; Pinkman, 2005; Shifflet, 2008) and group reflection on learning experiences.
- Promote critical thinking and increases learner autonomy (Richardson, 2006).
- Motivate students to engage positively in the writing process (Barrios, 2003; Cottle, 2009; Shifflet, 2008; Trammel & Ferdig, 2004).
- Facilitate student collaboration within a community of learners (Nardi et al., 2004; Nelson & Fernheimer, 2003; Stanley, 2006).
- Support authentic learning tasks through peer assessment and formative evaluation of student work (Angelaina & Jimoyiannis, 2012).
- Encourage and support blended learning activities by effectively changing formal and informal learning.

Due to the above features, educational blog becomes a significant element of many web-based learning environments since it provides a useful online platform for discussions that accelerates the acquisition of both, knowledge and learning. Therefore, integrating such a web-related communication as blogs for enhancing the teaching and learning process is a great challenge for educators. Due to the lack of theoretical frameworks on the evaluation criteria of educational blogs, this chapter will serve as a frontrunner in investigating and analyzing the effectiveness of blogs as an instructional tool and distinguishing this from the other forms of blogging; an endeavor to provide some possible indicators towards this new promising challenge.

BLOGS EVALUATION CRITERIA

In the literature sundry criteria are given in order to identify and evaluate real blogging. Specifically, in Gill's (2006) taxonomy of asynchronous discussion board technologies, there are some indicators presented to rely on when assessing the effectiveness of discussion boards for pedagogical purposes. These include: (a) kind of participation (whether is voluntary or not), (b) student satisfaction, (c) measures of educational outcomes, and (d) the degree to which a discussion group meets its desired objective. In addition, McCowan, Harper and Hauville (2005) refer to accessibility, insight into the cognitive ability (thinking processes of students), greater ownership of learning and self-empowerment, self-assessment, as features provided by blogging. Conole's (2007) Learning Activity Taxonomy identifies 72 possible learning tasks including: analyzing, creating, explaining, listing, refining and summarizing. Other researchers' ideas for evaluating blogs focus on measuring students skills (Valenza, 2004), cognitive abilities (EET, 2005), blog's content quality (Schrock, 2006) and the Community of Inquiry (CoI) model in educational blogs (Garrison et al. 2000, 2001) to blogging activities by comparing blogs' features with those of threaded discussions.

Studies conducted by Angelaina and Jimoyiannis (2012) and Eteokleous and Photiou (2012) employed the CoI framework in relation to blogs integration in the teaching and learning process. The results revealed the role of blogs in developing and promoting a CoI within a blended learning environment in primary and higher educational settings. Additionally, the efficacy and the applicability of the CoI model in educational blogs were revealed; showing that the students actively participated by creating a CoI learning environment exploiting blogs affordances. The outcomes of a study conducted by Nisiforou and Eteokleous (2012) reveal blog's potential to be integrated as a learning tool since real pedagogical blogging has been accomplished on a satisfactory level based on Bloom's Digital Taxonomy (EET, 2005). The findings have also showed that students' blogging behaviors were varied and depended upon the way in which they addressed each of the elements of the Bloom's taxonomy. It is noteworthy to understand the differentiation between writing and blogging as well as the degree of blogging (simple, real and complex) and the types of blogging activity (no blogging, simple blogging, real blogging, and complex blogging) as Richardson (2009) mentioned, in order to be able to define and therefore appraise the educational blogging.

The following activities cannot be characterized as blogging rather than writing: publishing exercises, keeping journals and adding / placing links online, or even placing links with descriptive annotation. Simple blogging is characterized by the types of activities that include "placing/ posting links with analysis that gets into the meaning of the content being linked" (Richardson, 2009, p. 31). Simple blogging (but complex writing) includes activities involving "reflective, metacognitive writing on practice without links" (Richardson, 2009, p. 31). Real blogging can be achieved through activities where "links with analysis and synthesis that articulate a deeper understanding or relationship to the content being linked and written with potential audience response in mind" (Richardson, 2009, p. 31). Finally, complex blogging is defined as the "extended analysis and synthesis over a longer period of time that builds on previous posts, lists and comments" (Richardson, 2009, p. 31).

DEVELOPING A BLOG

There is a selection of blog providers some of which are: LiveJournal (free), Blogger (free), Bravenet (free), WordPress.com (free), EduBlogs and TypePad. Blogger (www.Blogger.com) is an online service owned by Google and is one of the easiest methods of creating and publishing a blog.. For the purposes of the current chapter Blogger will serve as the preferred example choice among the others. This site publishes single or multi-user blogs created entirely by the user, and has quickly become the preferred option of many novice bloggers. If you are unfamiliar with the service this part of the chapter provides basic guidelines on how to set up an account and create a blog on Blogger. A step-by-step guide for launching your own blog is provided in Table 1.

BLOGS IN PRACTICE: CASE STUDIES

Rationale

Educational blogging turn out to be a significant element of several web-based learning environments as it serves as a useful online platform where discussions, exchange of ideas and thoughts can be formed. In that event, a blog can stand as an accelerator for both learning and knowledge acquisition. For the purposes of the practical session of the chapter, a case study approach was selected as the most appropriate method, because of the discursive nature of blogs which makes them suitable for this approach. Therefore, "a case study is a specific instance that is frequently designed to illustrate a more general principle; it is the study of an instance in action" (Cohen, Manion & Morrison, 2007 p. 253). Case studies strive to portray what is like to be in a particular situation, to catch the close up reality and thick description (Geertz, 1973b; Cohen et al., 2007). The two studies were concentrated on pre-service primary school teachers in Cyprus and the third study on PhD students retrieved from various fields of the technology enhanced learning domain. Therefore, the case study method was selected as the general model of the study, and is being presented thoroughly. The research studies that shape the scientific part of the chapter will provide adequate information for the research community, in the area of teacher

Table 1. Step blogging guide

1. Navigate to www.blogger.com using your web browser of choice.
2. Sign in using your Google Account to get started.
3. Create a Google Account, if you do not have one.
4. Verify and activate your account.
5. Enter a "Display Name" to be used to sign your blog posts and click "Continue."
6. Click "Create Your Blog Now."
7. Select a "Blog title" and an available URL for your blog. You can check if the URL you are considering is available by clicking "Check Availability."
8. Enter the word verification and click "Continue."
9. Choose a starter template, which will act as the basic design/layout of your blog.
10. Click "Start Blogging."
11. Use Dashboard to manage your blog.
12. Create new blog posts, edit posts, and edit pages using the "Posting" tab.
13. Create a Text Post (The "Posting" Tab).
14. Click on "The Settings" Tab.
15. Insert Gadgets - The "Layout" Tab.
16. Choose, adjust and format templates - The "Layout" Tab.
17. Edit Text Post - The "Posting" Tab.
18. Create an Image Post - The "Posting" Tab.
19. Go in the text box next to "Title" to find the title of your post.
20. Access basic text editor functions such as font size, text color, and the ability to insert links the "Compose" text editor.

education, on how primary school teachers experience a blog instrument as learning and teaching tool and from researchers' point of view as an instructional and research tool.

The three case studies employed are descriptive and evaluative (Yin, 1984; Cohen et al., 2007), in terms of their outcomes and fall under the umbrella of the educational blog use since they seek to explain as well as judge if real educational blogging is achieved throughout the tested evaluation criteria. A significant hallmark of this kind of method is that it offers to the researchers an insight into the real dynamics of situations and people (Cohen et al., 2007).

Acknowledging the nature of the inquiries and the objectives of this study which seeks to investigate how educators experience the use of blogs as an educational tool and evaluate a set of criteria in defining its pedagogical role, the case study was selected as the most appropriate method. Three different but closely related case studies were designed for the requirements of the phenomenon under investigation. The following sections take a research approach and present a summary of three published studies on educational blogging (Nisiforou & Eteokleous, 2012; Eteokleous & Nisiforou, 2013).

CASE STUDY 1: BLOGS AND COGNITIVE ABILITIES

Methodology

A sample of fourth year university students (n=63) retrieved from the Department of Primary Education of a private University in Cyprus participated in the current research study. Observations of the usage of blogs were employed as the main method for collecting the qualitative data of the study (Creswell, 2003). The pre-service teachers that were enrolled in the spring semester elective course, "Educational Technology," participated in the asynchronous online discussion and formed the basis for the study. Within the requirements of the aforementioned course, a blog focusing on the use of online social networks for educational purposes was set up. The research instrument and educational tool remained active for 5 weeks and included six questions regarding social media networks that were posted in the blog, allowing students to address the questions by posting their entries online as part of the course grading requirements. Yin (2009) suggested that when one is posting "how" questions it makes the case study method particularly appropriate.

Therefore, the study was aiming to address the following research questions:

- How can blogs be integrated as learning tools?
- How can Bloom's taxonomic levels be used in assessing students' learning process?
- How can Bloom's model be applied to evaluate and define educational blogging?

Results

For the purposes of the current study, the discussions developed in the first and second question were used. Students were also provided with the instructional practice evaluation guidelines and the participation criteria of the online discussion. The data were analyzed in regards to the blog's content with the use of the MonoConc Pro 2.0 Software and the Bloom's revised digital taxonomy. The blog's potential to be integrated as a learning tool was revealed; since real pedagogical blogging has been accomplished on a satisfactory level. The findings have also showed that students' blogging behaviors were varied and depended upon the way students addressed each of the elements of the Bloom's taxonomy. Despite the fact that the results have revealed students' positive attitude toward blogging, pre- and in-service teachers must develop fundamental knowledge and skills in order to appropriately design and develop educational blogs, fully exploiting their added value, and usefulness. Hence, effective learning will only occur if educators can rely on criteria in setting up an educational blog and therefore be able to effectively evaluate its content. This can be achieved through the university programs of study (for pre-service teachers) and continuing professional development (for in-service teachers).

CASE STUDY 2: BLOGS AS A COGNITIVE TOOL

Methodology

Introducing blogs as cognitive tools in the learning process is a great challenge for both instructors and students. The purpose of this study was to examine how blogs can be integrated as cognitive tools within a learning environment in order to achieve specific learning objectives. A case study approach was employed mainly collecting qualitative data from a sample of 40 blogs and lesson plans developed by 63, 4th year pre-service teachers (composed of 12 male and 42 female) attending the elective course entitled Educational Technology, during spring 2012. The pre-service teachers were requested to develop lesson plans for 6th graders, where blogs are integrated as tools within the teaching and learning process in order to achieve specific learning objectives. In particular, the theme of the exercises was Internet Safety. Analysis of the data was conducted using the MonoConc Pro 2.0 Software and the Bloom's digital taxonomy.

Therefore, the research objectives that shaped the study are:

- How blog can be employed in the teaching as a learning-cognitive tool
- How blog characteristics are exploited for educational purposes
- How "learning with real blogging," and "learning with technology" can be achieved
- How Bloom's taxonomic levels can be applied to evaluate and define educational blogging

Results

The findings revealed a twofold necessity in terms of educators' essential training and the importance for the development of a pedagogical framework that will serve as a guide for blogs integration as cognitive tools within the teaching and learning process (Eteokleous & Nisiforou, 2013).

Pre-service teachers developed interesting and motivating exercises for students to address, however those exercises did not educationally exploit blog characteristics. The exercises developed were grouped in three categories: blog-based, computer-based and in-classroom based. Categorizing the blog-based exercises developed based on Richardson's (2009) categories; the majority was classified as non-blogging and simple blogging activities. This was mainly revealed from examining the types of activities in comparison to the directions given to students. The pre-service teachers were providing simple directions to students as if they were requesting them to address an in-classroom or a computer-based activity. Moreover, through some of the designed activities, the blog was directed to be used as a forum to provide and publish students' opinions and views (Eteokleous & Nisiforou, 2013) although no opportunities were given to students to educationally exploit the tools and features of the blogs. Through the exercises designed, teachers promoted "blog journaling," that refers to the verb "understanding" of the Bloom's taxonomic level (lower order skills) and within the educational practice can be characterized as non-blogging (Anderson & Krathwohl, 2001; Richardson, 2009).

In short, the blog was integrated within the teaching and learning process as an educational tool to achieve the learning objectives, however its added educational value and benefits were not fully exploited. Specifically, the pre-service teachers did not manage to appropriately design exercises that exploit the characteristics and functions of the blog within the educational practice in order to reach learning with real blogging and higher order skills. This could only be achieved, if the appropriate directions and guidelines were developed for the students to follow (Eteokleous & Nisiforou, 2013).

CASE STUDY 3: BLOGS AS A PROBLEM SOLVING TOOL

Methodology

Based on the two aforementioned case studies, this study acknowledges the great potential of blogging and made an attempt to employ the interdisciplinary approach for problem solving through a blog-based environment. This methodological approach addressed a specific problem through blogs integration as tools that will enhance the development of blended collaborative learning environment. The proposed method was pilot tested in May 2013 during the 9th Joint Technology Enhanced Learning Summer School workshop on a sample of twelve PhD students from 6 different European countries before its implementation in Fall 2013. Following Hutchison's and Wang's (2012) directions for further research, students were classified into blogging groups based on their background rather than leaving them to comb through all blog responses. In an effort to determine how students might view the commentary added to their posts, they were asked to rate the paramount idea(s) on the given problem. A case study methodology was employed, mainly collecting qualitative data through blogs' observations (Creswell, 2003). The participants were split into 5 groups based on their educational discipline. The qualitative data collected was analyzed based on the method of continuous comparison of data (Maykut & Morehouse, 1994) employing MonoConc Pro 2.0 software. The blogs' observations were analyzed employing Susan Herring's Computer-Mediated Discourse Analysis (CMDA).

The research questions driven the study were as follow:

- How the blogs developed can be employed as tools in achieving:
    - Interdisciplinary problem solving process?
    - Collaboration in a blended learning environment?

Pilot Study and Preliminary Results

The findings were in line with the expected results since students posted their thoughts and ideas in their personal blogs regarding the problem given, based on their educational background and research fields. Both in the personal and team blogs the participants managed to present their ideas in an interesting and motivating way, integrating a variety of modes such as: multimedia tools, text, and links to other websites. An emerged result was that blogs were not employed to the desired degree, as more online discussions were expected to take place. The effective and successful exploitation of various blog's tools, functions and settings by the participants, facilitated the problem solving process. The participants expressed their personal views, thoughts discussions, and opinions firstly in a face to face mode and then posted online, where each team commented on the other team's posts. The workshop instructors were verbally encouraging and motivated the participants to discuss and post their ideas online (Eteokleous & Nisiforou, 2013). Through the suggested methodology approach (problem solving through the interdisciplinary approach) the study aimed to reveal the great potential of blogging in research as well as in teaching and learning into practice. Additionally, it was observed that the collaborative blended learning environment developed through the use of blogs, created the appropriate environment for students' interaction, dialogue and discussion. The preliminary findings determined the need for the instructor's further online active involvement in order to avoid the reputation of the aforesaid phenomenon (Eteokleous & Nisiforou, 2013). Finally, a remarkable finding was the development of a theoretical framework that provides visual information on how blogging and collaborative learning can lead to a solution in a given problem.

PROPOSED THEORETICAL FRAMEWORK

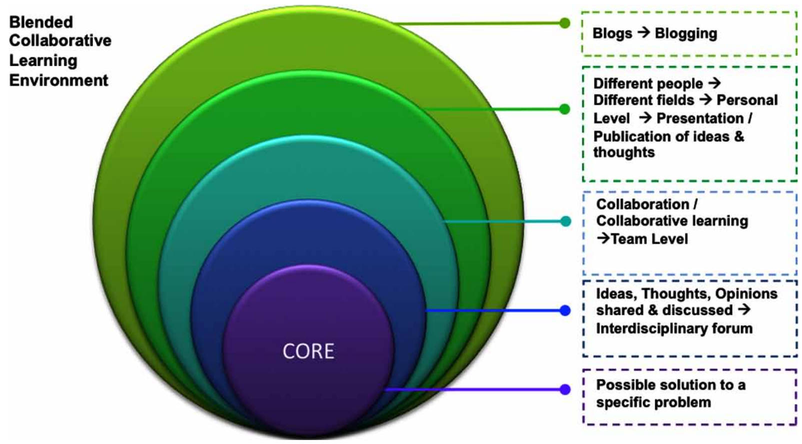
The theoretical framework (see Figure 1) presents the proposed methodological approach that aims to examine blogging as a problem solving process. Particularly, it suggests that the blog facilitates the development of a blended collaborative learning environment where the interdisciplinary approach is being employed. Moreover, it assists participants to move from the personal level to the team level in collaborating, discussing, sharing, interacting exchanging opinions and ideas as a mean to address a specific problem. The blended learning environment facilitates the progress of the development of an interdisciplinary forum, as it brings together people from various disciplines (interdisciplinary approach). Since a unique feature of blogs is that they enable both individual reflection and peer interaction, the proposed framework uses a blended learning approach as a mean to design and implement blog-based learning and teaching activities in the context of higher education. It is hoped that the suggested framework can support online learning environments and will help educators and instructional designers to determine effective teaching practices. Finally, establishing the current framework in the context of mobile technologies is of great challenge to today's educational milieu.

MAIN FOCUS OF THE CHAPTER

The three research studies of the chapter have stressed the need for:

1. A pedagogical framework to guide the development of blogs integration as learning-

Figure 1. Framework leading to a problem solving via blogging, collaborative learning and interdisciplinary approach



cognitive tools in the teaching and learning process aiming to achieve specific objectives. The existence of criteria and parameters to guide blog integration;

2. University programs of study (for pre-service teachers) and continuing professional development (for in-service teachers) that develop the necessary knowledge and skills to teachers/ educators to integrate blogs as cognitive-learning tools in the teaching and learning process to achieve specific learning objectives;
3. Blog' potential to be integrated as tools that promote and facilitate the development of blended collaborative learning environments where the interdisciplinary approach is being employed to address a specific problem.

Along the same lines, concerns are raised as to whether pre-service teachers are appropriately prepared to integrate and educationally exploit the blogs to achieve specific learning objectives and the development of higher order skills. If they are not in a position to design exercises that promote learning with technology, would they be able to put them into practice?

SOLUTIONS AND RECOMMENDATIONS

Overall, the target audience of the research studies of the chapter (pre-service teachers and PhD students) managed to successfully design blended learning environments combining in-classroom, computer-based and blog-based activities. It is therefore suggested that in order to fully exploit blogs' characteristics as effective educational tools in the teaching and learning process, educators and students should first realize its value and usefulness in their lives. The goal is to transform blogs into tools that will promote individuals' higher order skills (e.g. critical thinking, collaboration, communication, creativity and problem-solving) so they can freely express themselves and build upon other opinions and ideas. For the above to be achieved, appropriate training courses and seminars for different target groups need to take place in order to understand blogs' pedagogical value, usefulness and benefit to the teaching and learning environment. Finally, having been made aware of these essential features one will be able to appropriately design and integrate blogs as educational tools in their teaching and learning practice.

FUTURE RESEARCH DIRECTIONS

The chapter revealed blog potential to be integrated as an educational tool and its effectiveness in developing different levels of thinking skills. Specifically, the research section of the chapter highlights the potential of blogs as effective learning tools since real pedagogical blogging has been accomplished on a satisfactory level suggesting a set of criteria for educators to follow to set up a pedagogically valuable blog. Even though the study has concentrated on the practical affordances of blogs and their use as a platform for improved knowledge and practice, there could be further work done on how use of blogging impacts on teacher and student identity.

However, further analysis is needed in order to refine the parameters, criteria and indicators that distinguish the different types of blogging. Future research work needs to analyze blog content with the use of different content analysis tools such as Nvivo software. It is of paramount importance to examine educator's role as well as interview participants in order to gain insights on their perceptions regarding their blogging experiences and blogs potential to be integrated as collaborative content sharing spaces to support project-based learning activities. Furthermore, it will be interesting to conduct social networking analysis (SNA) by identifying the connection patterns between the bloggers, and therefore understand whether real collaborative learning has been achieved. Finally, an emerging trend within the domain of the examined topic is to establish the proposed framework in terms of educational blogging, in the context of mobile technologies. This is a challenge for other researchers to take into consideration as the implementation and the outcomes of such studies will contribute to our society's educational milieu.

CONCLUSION: EDUCATIONAL AND SCIENTIFIC SIGNIFICANCE

The research in this chapter has important educational, theoretical and research significance. Firstly, it reveals the pedagogical value of blogs and how effective real blogging can be achieved through a set of key evaluation criteria. The analysis of students' cognitive presence, ideas sharing and debating showed that educational blogs could be effective tools to support collaborative construction of knowledge. Consequently, this facilitates a crossover of teacher and student knowledge. Through better knowledge of students the teacher is more aware of what is needed in their own practice, and can shape their practice around the needs of students. Thus blogs also serve as a diagnostic tool, a research tool, and a source of classroom knowledge. Moreover, it proposes a methodological approach for problem solving where blogs are employed, to develop a blended interdisciplinary collaborative learning environment. Additionally, it adds to the body of literature related to blogs as tools within the teaching and learning process. Through the suggested theoretical framework it aims to reveal the great potential of blogging in research as well as in teaching and learning practice. This potential will help students to understand how these different disciplinary perspectives managed to create a collaborative spirit that encompasses their interdisciplinary backgrounds and research fields.

The challenge for educators is to determine how to appropriately integrate blogs into curricula to best meet their students' needs, as well as incorporate these new learning technologies into their own pedagogic identities. If teachers want to help and guide their students to achieve simple and real blogging it is extremely important to design and develop the appropriate exercises beyond facilitating the teaching and learning process. Practice is necessary to help them gain knowledge of how to design and integrate blogs effectively into new educational settings. Due to the lack of previous studies on the evaluation criteria of blogs as educational and cognitive tools, the research part of the chapter serves as a frontrunner in investigating and analyzing blogs through a pedagogical spectrum. The results of the case studies suggest that understanding the importance of implementing blogs in higher education will be a key topic for further research especially in the age of mobile technologies.

REFERENCES

Ala-Mutka, K., Punie, Y., & Ferrari. (2009). Review of Learning in Online Networks and Communities. In U. Cress, V. Dimitrova, & M. Specht (Ed.), *EC-TEL 2009,* (LNCS), (vol. 5794). Berlin: Springer.

Allen, A. (2011). Categorization of social mediabarnes. *Human Relations*, *7*, 39–58.

Anderson, L. W., & Krathwohl, D. (2001). *A Taxonomy for Learning, Teaching and Assessing: A Revision of Bloom's Taxonomy of Educational Objectives*. Longman.

Angelaina, S., & Jimoyiannis, A. (2012). Educational blogging: Developing and investigating a students' community of inquiry. In *Research on e-Learning and ICT in Education* (pp. 169–182). New York: Springer. doi:10.1007/978-1-4614-1083-6_13

Barger, J. (1997). *Robot Wisdom Weblog for December 1997*. Retrieved June 2, 2012, from http://www.robotwisdom.com/log1997m12.html

Barrios, B. (2003). The year of the blog: Weblogs in the writing classroom. *Computers and Composition Online*. Retrieved July 1, 2012, from http://www.bgsu.edu/cconline/barrios/blogs/index.html

Bartolomé, A. (2008). Web 2.0 and New Learning Paradigms. *E-Learning Papers, 8*. Retrieved May 11, 2011 from: http://www.elearningeuropa.info/files/media/media15529.pdf

Baumgartner, P. (2006). Social Software & E-Learning. *Computer & Personal*, *14*(8), 20–22.

Blood, R. (2004). How Blogging Software Reshapes the Online Community. *Communications of the ACM*, *47*(12), 53–55. doi:10.1145/1035134.1035165

Brahm, T. (2007). Blogs: Technische Grundlagen und Einsatzszenarien an Hochschulen. In Ne(x)t Generation Learning: Wikis, Blogs, Mediacasts & Co.- Social Software und Personal Broadcasting auf der Spur, Themenreihe I zur Workshop-Serie (pp. 70-89). St. Gallen: SCIL, Universität St. Gallen.

Cakir, H. (2013). Use of Blogs in Pre-Service Teacher Education to Improve Student Engagement. *Computers & Education*, *68*, 244–252. doi:10.1016/j.compedu.2013.05.013

Chen, H. L., Cannon, D. M., Gabrio, J., & Leifer, L. (2005). *Using Wikis and Weblogs to Support Reflective Learning in an Introductory Engineering Design Course*. Paper presented at the 2005 American Society for Engineering Education Annual Conference & Exposition. Portland, OR.

Churchill, D. (2009). Educational applications of Web 2.0: Using blogs to support teaching and learning. *British Journal of Educational Technology*, *40*(1), 179–183. doi:10.1111/j.1467-8535.2008.00865.x

Cohen, L., Manion, L., & Morrison, K. (2007). *Research Methods in Education* (6th ed.). London: Routledge.

Conole, G. (2007). *Describing Learning Activities: Tools and Resources to Guide Practice' in Rethinking Pedagogy for a Digital Age*. Oxford, UK: Routledge Falmer.

Cottle, A. (2009). Integrating 21st century skills in schools using a class blogging project. *West Virginia Online Action Research Journal*. Retrieved July 1, 2012, from http://www.wvcpd.org/PLAJournal/ActionResearch-BloggingProject/ActionResearch-BloggingProject/BloggingProject.html

Creswell, J. W. (2003). *Research Design: Qualitative, Quantitative and Mixed Methods Approaches* (2nd ed.). London: Sage Publications.

Crosta, L. (2004). Beyond the use of new technologies in adult distance courses: an ethical approach. *International Journal on E-Learning*, *3*(1), 48–61.

Dabbagh, N., & Kitsantas, A. (2004). Supporting self-regulation in student-centered web-based learning environments. *International Journal on E-Learning*, *3*(1), 40–48.

Davis, A. (2005). *The write weblog: Who says elementary students can't blog?* Retrieved February 15, 2011, from http://itc.blogs.com/thewriteweblog/2004/11/who_says_elemen.html

Deng, L., & Yuen, A. H. K. (2010). Towards a framework for educational affordances of blogs. *Computers & Education*, *56*, 441–451. doi:10.1016/j.compedu.2010.09.005

Dexter, S. L., Ronald, E. A., & Becker, H. J. (1999). Teacher's views of computers as catalysts for changes in their teaching practice. *Journal of Research on Computing in Education*, *31*(3), 221–232.

Downes, S. (2004). Educational Blogging: Blogtalk. *EDUCAUSE Review*, *39*, 14–26.

Ebner, M., Lienhardt, C., Rohs, M., & Meyer, I. (2010). Microblogs in Higher Education – A chance to facilitate informal and process-oriented learning? *Computers & Education*, *55*(1), 92–100. doi:10.1016/j.compedu.2009.12.006

EET. (2005). *Bloom's Revised Taxonomy, published by the Encyclopedia of Educational Technology*. Retrieved September, 12 2012 from http://coe.sdsu.edu/eet/Articles/bloomrev/index.html

Ellison, N. B., & Wu, Y. (2008). Blogging in the classroom: A preliminary exploration of student attitudes and impact on comprehension. *Journal of Educational Multimedia and Hypermedia*, *17*(1), 99–122.

Eteokleous, N. (2011). *Integrating Blogs and Wikis as Educational Tools to Develop Student-Centered Environments: Is it possible?* Paper presented at Frederick University Cyprus. Limassol, Cyprus.

Eteokleous, N., & Nisiforou, E. (2013). *Interdiscplinarity Achieved through Blogs Development*. Paper presented at the 9th JTEL Workshop. Limassol, Cyprus.

Eteokleous, N., & Pavlou, V. (2010). *Digital Natives and Technology Literate Students: Do teachers follow?* Paper presented at the Conference of the Cyprus Scientific Association of Information and Communication Technologies in Education. Limassol, Cyprus.

Eteokleous, N., & Photiou, S. (2012). Integrating Blogs as Educational Tools: Development of a Community of Inquiry in Primary Education. In *Proceedings of the 8th Panhellenic Conference with International Participation Information and Communication Technologies in Education.* University of Thessalia. Retrieved from: http://www.etpe.eu/new/custom/pdf/etpe1911.pdf

Eteokleous-Grigoriou, N., & Nisiforou, E. (2013). *Integrating Blogs as Cognitive Learning Tools: Designing and Evaluating Real Blogging*. Paper presented at Society for Information Technology & Teacher Education International Conference. Chesapeake, VA.

Garrison, D. R., Anderson, T., & Archer, W. (2001). Critical thinking, cognitive presence and computer conferencing in distance education. *American Journal of Distance Education*, *5*(1), 7–23. doi:10.1080/08923640109527071

Garrison, R., Anderson, T., & Archer, W. (2000). Critical thinking in a text-based environment: Computer conferencing in higher education. *The Internet and Higher Education*, *2*(2-3), 87–105. doi:10.1016/S1096-7516(00)00016-6

Gill, G. (2006). Asynchronous discussion groups: A use-based taxonomy with examples. *Journal of Information Systems Education*, *17*(4), 373.

Glogoff, S. (2005). Instructional blogging: Promoting interactivity, student- centered learning, and peer input. *Journal of Online Education*, *1*(5).

Goddard, M. (2002). What do we do with these computers? Reflections on technology in the classroom. *Journal of Research on Technology in Education*, *35*(1), 19–26. doi:10.1080/15391523.2002.10782367

Goktas, Y. (2009). Incorporating blogs and the seven principles of good practice into pre-sservice ICT courses: A case study. *The New Educational Review*, *19*(3–4), 29–44.

Grassley, J. S., & Bartoletti, R. (2009). Wikis and blogs: Tools for online interaction. *Nurse Educator*, *34*, 209–213. doi:10.1097/NNE.0b013e3181b2b59b PMID:19726963

Hall, H., & Davidson, B. (2007). Social software as support in hybrid learning environments: The value of the blog as a tool for reflective learning and peer support. *Library & Information Science Research*, *29*(2), 163–187. doi:10.1016/j.lisr.2007.04.007

Hanson, K., & Dent, J. (2011). *Blog enabled peer-to-peer learning, 85*, 6-12.

Herring, S. C. (2004). Computer-mediated discourse analysis: An approach to researching online behavior. In S. A. Barab, R. Kling, & J. H. Gray (Eds.), *Designing for Virtual Communities in the Service of Learning*. New York: Cambridge University Press. doi:10.1017/CBO9780511805080.016

Hill, J. (2004). *The voice of the blog: the attitudes and experiences of small business bloggers using blogs as a marketing and communications tool*. (Unpublished Master's Thesis). University of Liverpool, Liverpool, UK.

Hutchinson, A., & Wang, W. (2012). Blogging within a social networking site as a form of literature response in a teacher education course. *Educational Media International*, *49*(4), 263–275. doi:10.1080/09523987.2012.741197

Jonassen, D. H. (2003). *Computers as mind tools for schools: engaging critical thinking*. Prentice-Hall.

Kaplan, M. D., Piskin, B., & Bol, B. (2010). Educational Blogging: Integrating Technology into Marketing Experience. *Journal of Marketing Education*, *32*(1), 50–63. doi:10.1177/0273475309335652

Karaman, T. (2011). *Use of blogs in teacher education to reflect on teaching practices.* Paper presented at the5th International Computer & Instructional Technologies Symposium. Elazig, Turkey.

Kim, H. N. (2008). The phenomenon of blogs and theoretical model of blog use in educational contexts. *Computers & Education*, *51*, 1342–1352. doi:10.1016/j.compedu.2007.12.005

Lee, M. J. W., Miller, C., & Newnham, L. (2008). RSS and content syndication in higher education: subscribing to a new model of teaching and learning. *Educational Media International*, *45*, 311–322. doi:10.1080/09523980802573255

Lenhart, A. (2007). *Teens and Social Media*. Pew Internet & American Life Project.

Lin, H. T., & Yuan, S. M. (2006). *Taking blog as a platform of learning reflective journal*, 38-47.

Liu, E. Z. F., & Chang, Y. F. (2010). Gender differences in usage, satisfaction, self-efficacy, and performance of blogging. *British Journal of Educational Technology*, *41*(3), E39–E43. doi:10.1111/j.1467-8535.2009.00939.x

Loving, C. C., Schroeder, C., Kang, R., Shimek, C., & Herbert, B. (2007). Blogs: Enhancing links in a professional learning community of science and mathematics teachers. *Contemporary Issues in Technology & Teacher Education*, *7*(3).

Maheridou, M., Antoniou, P., Tsitskari, E., & Kourtessis, T. (2012). Network and Content Analysis in a Blog. *Training Course*, *2*(2), 2227–2393.

Makri, K., & Kynigos, C. (2007). The Role of Blogs in Studying The Discourse And Social Practices of Mathematics Teachers. *Journal of Educational Technology & Society*, *10*(1), 73–84.

Maykut, P., & Morehouse, R. (1994). *Beginning Qualitative Research, A Philosophic and Practical Guide*. London: The Falmer Press.

McCowan, C., Harper, W., & Hauville, K. (2005). Student e-portfolio: The successful implementation of an e-portfolio across a major Australian university. *Australian Journal of Career Development*, *14*(2), 40–52. doi:10.1177/103841620501400208

Mejias, U. A. (2006). *The blog as dissertation literature review?* Retrieved October 26, 2012 from http://blog.ulisesmejias.com/2006/01/25/the-blog-as-dissertation-literature-review

Merholz, P. (2002). *Play With Words*. Retrieved January 3, 2012 from http://www.peterme.com/archives/00000205.html

Nardi, B., Schiano, D., Gumbrecht, M., & Swartz, L. (2004). Why we blog. *Communications of the ACM*, *47*(12), 41–46. doi:10.1145/1035134.1035163

Nelson, T., & Fernheimer, J. (2003). Welcome to the blogosphere: Using weblogs to create classroom community. *Computer Writing and Research Lab*, *1*, 1–15.

Nisiforou, E. (2009). *Metacognition and Learning styles: Teachers', Parents'' and Pupils' views*. (Unpublished Master Thesis). University of Manchester, Manchester, UK.

Nisiforou, E., & Eteokleous, N. (2012). *Defining Evaluation Criteria in Blogging and Non Blogging: A Case Study from a Pedagogical Perspective*. Paper presented at the International Technology, Education and Development Conference. Valencia, Spain.

O'Reilly, T. (2005). *What is Web 2.0 design patterns and business models for the next generation of software*. Retrieved September 6, 2012 from http://www.oreillynet.com/pub/a/oreilly/tim/news/2005/09/30/what-isweb-20.html

Oravec, J. A. (2002). Bookmarking the World: Weblog Applications in Education, Weblogs Can Be Used in Classrooms to Enhance Literacy and Critical Thinking Skills. *Journal of Adolescent & Adult Literacy*, *45*(5), 616–621.

Paulus, T., & Spence, M. (2010). Using blogs to identify, misconceptions in a large undergraduate nutrition course. *TechTrends*, *54*(5), 62–68. doi:10.1007/s11528-010-0438-8

Penrod, D. (2007). *Using blogs to enhance literacy: The next powerful step in 21st-century learning*. Lanham, MD: Rowman & Littlefield Education.

Petko, D. (2011). *Writing Learning Journals with Weblogs: Didactic Principles and Technical Developments*. Paper presented at the World Conference on Educational Multimedia, Hypermedia and Telecommunications. Chesapeake, VA.

Pinkman, K. (2005). Using blogs in the foreign language classroom. *The JALT CALL Journal*, *1*(1), 12–24.

Richardson, W. (2006). *Blogs, wikis, podcasts, and other powerful web tools for classrooms*. Thousand Oaks, CA: Corwin Press.

Richardson, W. (2009). Becoming Internet Wise: Schools can do a far better job of preparing students for their connected futures online. *Educational Leadershsip*, 26-31.

Richardson, W. (2010). *Blogs, Wikis, Podcasts and other powerful Web-tools for classrooms*. Corwin Press.

Salmon, G. (2000). *E-moderating: The key to teaching and learning online*. London: Kogan Page. doi:10.4324/9780203465424

Schrock, K. (2006). *Kathy Schrock's Guide for Educators.* Retrieved October 11, 212 from http://school.discovery.com/schrockguide/eval.html

Shifflet, R. (2008). *Instructional use of blogs and wikis for K-12 students*. (Unpublished Doctoral Dissertation). Illinois State University, Normal, IL. Retrieved June 8, 2011, from http://www.scribd.com/doc/7522034/Instructional-Use-of-Blogsand-Wikis-Shifflet

Siemens, G. (2005). Connectivism: A learning theory for the digital age. *International Journal of Instructional Technology and Distance Learning*, *2*(1), 3–10.

Sim, J. W. S., & Hew, K. F. (2010). The use of weblogs in higher education: A review of empirical research. *Educational Research Review*, *5*(2), 151–163. doi:10.1016/j.edurev.2010.01.001

Stanley, G. (2006). *Blogs, wikis and podcasts (and second life): Message posted to Blog-EFL: Observations and comments on the use of Web 2.0 tools for English language teaching and learning*. Retrieved May 24, 2012 from http://blog-efl.blogspot.com/2006_11_01_archive.html

Stiler, G. M., & Philleo, T. (2003). Blogging and blogspots: An alternative format for encouraging reflective practice among pre-service teachers. *Academic Research Library*, *123*(4), 789–798.

Top, E. (2012). Blogging as a social medium in undergraduate courses: Sense of community best predictor of perceived learning. *Social Media in Higher Education*, *15*(1), 24–28.

Trammel, K., & Ferdig, R. (2004). Pedagogical implications of classroom blogging. *Academic Exchange Quarterly*. Retrieved June 10, 2013 from http://findarticles.com/p/articles/mi_hb3325/is_4_8/ai_n29148968/?tag=content,col1

Valenza, J. (2006). Web 2.0 Meets Information Fluency. *Joyce Valenza's Never Ending Search*. Retrieved September 2, 2013 from http://joycevalenza.edublogs.org/tag/informationfluency/

Wallace, R. M. (2003). Online learning in higher education: A review of research on interactions among teachers and students. *Education Communication and Information*, *3*(2), 241–280. doi:10.1080/14636310303143

Weller, M. (2007). *Virtual Learning Environments: Using, Choosing and Developing your VLE*. London: Routledge.

Williams, J. B., & Jacobs, J. (2004). Exploring the use of blogs as learning spaces in the higher education sector. *Australasian Journal of Educational Technology*, *20*(2), 232–247.

Yang, S. H. (2009). Using blogs to enhance critical reflection and Community of Practice. *Journal of Educational Technology & Society*, *12*(2), 11–21.

Yin, R. (1984). *Case study research: Design and methods*. Beverly Hills, CA: Sage Publishing.

Yin, R. (2009). *Case Study Research: Design and Methods* (4th ed.). Thousand Oaks, CA: Sage Publications.

Zawilinski, L. (2009). HOT Blogging: A framework for blogging to promote higher order thinking. *The Reading Teacher*, *62*(8), 650–661. doi:10.1598/RT.62.8.3

ADDITIONAL READING

Bauer, P. (2011). Weblogs and Wikis: Potentials for Seminars at University. In T. Bastiaens & M. Ebner (Eds.), Proceedings of World Conference on Educational Multimedia, Hypermedia and Telecommunications 2011 (pp. 2360-2365). Chesapeake, VA: AACE.

Bennett, S., Bishop, A., Dalgarno, B., Waycott, J., & Kennedy, G. (2012). Implementing Web 2.0 technologies in higher education: A collective case study. *Computers & Education*, *59*(2), 524–534. doi:10.1016/j.compedu.2011.12.022

Blackstone, B., & Harwood, C. (2011). Pedagogical Blogging for University Courses. In Global Perspectives, Local Initiatives: Reflections and Practice in ELT (Selected Papers from the Third CELC Symposium for English Language Teachers), Centre for English Language Communication.

Boulos, M., Maramba, I., & Wheeler, S. (2006). Wikis, blogs and podcasts: a new generation of Web-based tools for virtual collaborative clinical practice and education. *BMC Medical Education*, *6*(1), 41. doi:10.1186/1472-6920-6-41 PMID:16911779

Chu, S. K., Chan, C. K., & Tiwari, A. F. (2012). Using blogs to support learning during internship. *Computers & Education*, *58*(3), 989–1000. doi:10.1016/j.compedu.2011.08.027

Conole, G., & Alevizou, P. (2010). A literature review of the use of Web 2.0 tools in Higher Education. *A report commissioned by the Higher Education Academy*.

Eid Neurolearning Blog. (2005, March 2). *Brain of the blogger*. Retrieved February 15, 2011, from http:// eiderneurolearningblog.blogspot/ com/2005/03/brain-of-blogger.html

Farmer, B., Yue, A., & Brooks, C. (2008). Using blogging for higher order learning in large cohort university teaching: A case study. *Australasian Journal of Educational Technology*, *24*(2), 123–136.

Hargadon, S. (2009).*White Paper on Educational Networking: The important role Web 2.0 will play in education.* Retrieved April 22, 2013 from www.elluminate.com

Harris, A. L., & Rea, A. (2009). Web 2.0 and virtual world technologies: A growing impact on IS education. *Journal of Information Systems Education*, *2*(2), 137.

Haynes, C. (Ed.). (2002). *Innovations in Interdisciplinary Teaching.Wesport*. Oryx Press.

Hourigan, T., & Murray, L. (2010). Using blogs to help language students to develop reflective learning strategies: Towards a pedagogical framework. *Australasian Journal of Educational Technology*, *26*(2), 209–225.

Kerawalla, L., Minocha, S., Kirkup, G., & Conole, G. (2009). An empirically grounded framework to guide blogging in higher education. *Journal of Computer Assisted Learning*, *25*(1), 31–42. doi:10.1111/j.1365-2729.2008.00286.x

Klein, J. T., & Newell, W. H. (1997). Advancing interdisciplinary studies. In J. G. Gaff & J. L. Ratcliffe (Eds.), *Handbook of the undergraduate curriculum: A comprehensive guide to purposes, structures, practices and change* (pp. 393–415). San Francisco: Jossey-Bass.

Luo, L. (2010). Web 2.0 integration in information literacy instruction: an overview. *Journal of Academic Librarianship*, *36*(1), 32–40. doi:10.1016/j.acalib.2009.11.004

Myers, G. (2010). *The discourse of blogs and wikis*. Continuum International Publishing Group.

Tripathi, M., & Kumar, S. (2010). Use of Web 2.0 tools in academic libraries: a reconnaissance of the international landscape. *The International Information & Library Review*, *42*(3), 195–207. doi:10.1016/j.iilr.2010.07.005

KEY TERMS AND DEFINITIONS

Blog: A Website allowing users to reflect, share opinions, links to other sites and discuss various topics in the form of an online personal journal. It is one of the most popular Web 2.0 tools.

Blogger: A person who keeps and updates a blog.

Blogging: The act of posting content or comments within a blog environment.

Educational Blogging: Blogging which is mainly focused on the educational process and educational interests.

Web 2.0: The transition from static Web pages to a more dynamic and organized Web with an emphasis on user collaboration, open sharing of information online, and social networking.

This work was previously published in Cases on Teacher Identity, Diversity, and Cognition in Higher Education edited by Paul Breen, pages 342-370, copyright year 2014 by Information Science Reference (an imprint of IGI Global).

Chapter 62
Successful Cases in Technology-Enabled Active Teaching and Metacognitive Learning Strategies in Blended Learning for Globalization

Mohan Gurubatham
HELP University, Malaysia

ABSTRACT

This chapter draws from actual accredited graduate programs. It is essentially a reflection piece drawn from actual experience of successful teaching and blended action learning practices and principles that utilized online discussion forums. The classes were in Malaysia, the USA, and South Africa. The experience of teaching and learning involving metacognition and active online discussion internationally is described in terms of the cognitive literacy value chain developed by the author. Active discussion was seen as part and parcel of the process to nudge insights, critical thinking, and other expressions of higher order thinking that also facilitated peer bonding in very short, six-week semesters. The critical role of fluid intelligence in higher order thinking in a globalized knowledge economy is discussed in terms of the development of wisdom through the experience of transcending conventional thinking while sustaining refined thought processes and cultural values through metacognition. Sample comments and reflection journals are presented.

DOI: 10.4018/978-1-4666-8246-7.ch062

INTRODUCTION

The Need for Novel Thinking and Capitalizing the Opportunity in Education

In my experience as a professor from academia bridging the corporate consulting space I appreciate the need to highlight the emergent learning trends that have resulted from globalization and technology. A recurrent complaint from CEOs as friends, and students in my graduate programs is that MBA's and for other graduate management graduates the mere competency to comprehend texts, articles, and subject matter is inadequate. What then is deemed paramount and urgent? Perhaps the importance is the ability to connect pertinent business and industry themes inductively in order to effectively respond to global and industry drivers. Given a rapid obsolescence of knowledge it is no longer enough that learners comprehend texts, articles, and concepts. The ability to *learn how to learn;* to reflect and synthesize critically, and to process unfamiliar content is the future. Such intelligence is dubbed *fluid intelligence*. Metacognition is mindful thinking often involving fluid intelligence with reflection leading to wisdom. This chapter aims to highlight the salience of higher order thinking as an emergent theme in terms of the various strategies deployed to invoke reflection and metacognition. It is as such a *position paper* and not a specific controlled study partitioned into a one-to-one linear particularistic tracking of a specific methodology. In short, it is drawn from a constructivist paradigm of over 50 classroom cases of immersion into a *milieu* of teaching and learning procedures where online discussion is a major reinforcing component albeit not the only component in the process of active learning. The conclusions and samples are drawn from several classes over 4 years in 3 countries. The samples of refection and discussion selected represent the typical content. A formal systematic content analyses of each component and the coding of responses beyond rubrics is of course welcome. Nonetheless the overall emergent theme represents the prominence of discussion that occurs as an expressive opportunity from personal metacognition along with meditation in short 2-6 week time frames. The real world case based discussion may be difficult to control for in pre-and-post-tests because of social facilitation effects in any specific methodology with control groups. In addition. These classes presented themselves as rare and valuable international classroom settings with intact, formally enrolled learner populations on actual accredited courses.

THE SCIENCE OF INTELLIGENCE AND WISDOM

Fluid intelligence is the critical ability to learn new content and consider novel conditions. *Crystallized intelligence* is the retrieval or recall, and acquisition of prior content (Cattell, 1963). In the knowledge economy, fluid intelligence involves processing data into information and then into knowledge through to higher order cognitive activity results in both knowledge and wisdom (Gurubatham, 2005a). In cognitive psychology, wisdom may be operationalized into higher order and wider intelligence (Sternberg, 1985). Sternberg defines wisdom as creativity synthesized with intelligence, and empathy. Sternberg's balance theory of wisdom (Sternberg, 1998b, 2001), defines wisdom "as the application of intelligence, creativity, and knowledge as mediated by positive ethical values toward the achievement of a common good through a balance among self-interests (intrapersonal) with the interests of others (interpersonal) and of other aspects of the context in which one lives (extrapersonal), such as one's city or country or environment or even God" (Sternberg, 2009). Interestingly Sternberg's long and distinguished career in psychology began with his poor test taking abilities including conventional IQ tests, as he described, and the deleterious effects of the rote learning environments that under value wider and deeper intelligence. Wisdom can also appreciate and anticipate the practical impacts of decisions (Schwartz, 2011).

The hallmarks of such an approach to wisdom are being visionary spatially i.e., looking at impactful events in terms of places beyond immediate locations and boundaries (non-local), and temporally, i.e., beyond narrow short term thinking, having broad comprehension, inclusivity and scope (Izak, 2013), and a deep appreciation of decisional impacts (McKenna, 2004; McKenna & Biloslavo, 2011). Moreover the sustainable impacts of trans-disciplined longer term thinking of interconnections are also emphasized (Max-Neef, 2005) in modern 21st century international education. This is a central theme in modern education as it rises to meet the onslaught of globalization (Jorgenson & Shultz, 2012), and the pressures of a knowledge economy (Gurubatham, 2005a). Active discussion was found to be a major means to facilitate wisdom development involving fluid intelligence.

The ability to identify drivers impacting organizations along with the ability to recommend innovative solutions based on critical and inclusive thinking are essential. Traditional MBAs and textbook approaches may not adequately address these needs. The engagement of learners in topical issues related to the subject matter content in active discussion goes a long a way to develop critical and inclusive thinking. This then is the relentless demand in this 21st century of change and emerging markets, the value addition that commands a premium among human capital include higher value-added thinking that is capable of insights across themes, the adaptability to implement best practices company-wide and nationally, and the ability to enhance the relationship of business with relevant stakeholders and communities.

Legitimacy for the Learning Cases with Active Discussion

Change drivers and evolving trends in sustainability and government or international regulations are discussed in classroom settings that made use of e-learning enabled blended learning – for example, Moodle discussion boards – to help facilitate the *far transfer* of learning. Far transfer is understood as applying conceptual learning beyond the original learning contexts so that higher order principles with commonalties are gleaned, abstracted, and applied in a variety of seemingly unrelated contexts (Salomon &Perkins, 1989). Far transfer is effective in mitigating rapid obsolescence in knowledge and skills. Near transfer often involves the low road of learning with strategies by rote, pattern or template matching and impacts only a limited range of variability in the contexts from original learning. Behavioral learning is much like this.

Overall Approaches

The author applied active teaching learning strategies, involving metacognition, or reflective activity. The discussion and conclusions are thus not restricted to any one method alone. The overall active teaching-learning strategies as an approach subsume specific methodologies in these cases. Learner engagement is the underpinning of active learning where online discussion provides the un-moderated flat channel and space. Graduate courses were offered in the managerial psychology at HELP University in Malaysia and at Maharishi University of Management (MUM) accredited in the United States of America by the Higher Learning Commission and The International Assembly for Collegiate Business Education which is recognized by the Council on Higher Education Accreditation (CHEA). MUM also offers an action learning corporate MBA program for managers at Neotel, a telecommunications corporation in South Africa. All courses were taught in a blocks, or modules, in varied formats amongst the three venues, ranging from two to six weeks in duration but shared the commonalty of one subject matter module at a time. Especially remarkable was the steep learning curve in which students attained reflective and higher order thinking in the relatively *short 6 week* period of time.

Active discussion on the Moodle e-learning platform was found to reinforce the development of insightful thinking. Learning was encultured and encouraged as *Self exploration* with a *connectedness to community and cosmos* with the inclusion of affect. Emotional intelligence targeted values of the heart i.e., refined feeling levels in order to enculture not just higher order thinking but also practical wisdom.

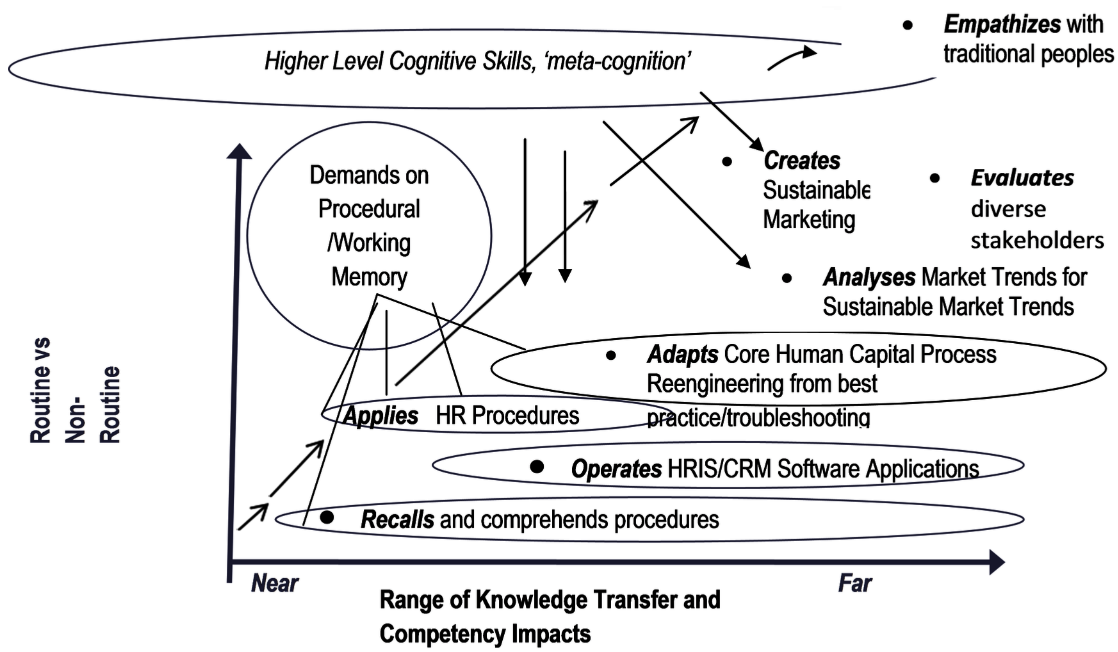
Oftentimes there is a need to disconnect from conventional narratives and wisdom. Learners also have to make practical, and sometimes hard, decisions in life. There is a need to be more than just aware, sensitive or merely just capable of reflection. All the courses included themes as a running thread such as ethics, spirituality, race, interfaith relations, and conflict resolution. Other themes covered were the ways in which globalization is oftentimes framed as mere consumerism and the ways in which sustainability has to go beyond just being green to include the preservation of cultural values and relationships.

Active Discussion on Moodle Forums

Course content was based on current topics and real cases, involving provocative cases with action syndicated learning i.e., learning by doing in groups, and an articulation of the thinking process through student presentations to the class with peer probing and feedback. Additionally, there was Socratic prompting, exercises in thinking on your feet', personal reflection in learning journals, and online Moodle discussion boards. The online discussions required each student to present at least two hot button topics and give insightful responses to two topics posted by other students. The postings had to include not just passive descriptions, but explanations of why the student found it personally interesting, how it could be connected to one's own Self, and how it might be culturally impactful in the 21st century. Learning this way was taking place beyond the classroom walls and enlivening engaged peers. High involvement and high interactivity were design features exploited to engage by information and communication technology (ICT) enabled learning (Gurubatham, 2005b). Interactivity is ergonomic or more concerned with the usability driven features of the Moodle environment. While involvement is psychological bonding triggered upon hot button interests in topics. Learning journals were entered from preconfigured electronic templates containing thought prompts.

The Moodle discussion boards provided a highly communal context. The initial rubric based grading of 3% was dispensed with and combined with reflection journals and face-to-face presentations of totaling 10%. The online discussion process also seemed to acquire a momentum of its own. As a result, at least on a small scale mini-scale, community simulations of networks were initiated and enlivened very much in the manner alluded to in Metcalfe's Law (Metcalfe, 2006). This law suggests that the value of adding additional participants to a network in a community increases exponentially if value is conceived of as insight spontaneously emerging from harnessing a diversity of viewpoints. This indeed appeared to happen. The discussion based learning was peer-driven, flat, and not moderated by the professor. Sample comments are presented at the end of the paper. There were instructions and a rubric for online discussion evaluation but the examples were samples drawn from over 30 classes in different settings and countries. Frankly, the rubric became less important over time as the author observed the buzz with refinement and respect evolving. Cultural reticence was overcome as the online discussion helped in breaking the

Figure 1. The cognitive literacy value chain



ice from direct face to face discussion. Insights and access to participation even for topics deemed too sensitive to broach in face to face discussions in sensitive cultures emerged. The online discussions stimulated the discussions even face to face.

Conceptual Model for Teaching and Learning

The core teaching and learning approach drew from the theory of high road learning involving metacognition by Salomon and Perkins (1989). Such an approach demands pushing the boundaries of concept application that transcend localized boundaries in time and space. Cross-cultural applications of best practices were mindfully and critically discussed both face-to-face and online, and explored for their current relevance. Figure 1 presents the schematic called the Cognitive Literacy Value Chain (Gurubatham, 2005a) and is followed by a discussion of the process of activation in the teaching and learning commonalities of underlying themes and principles. The cognitive literacy value chain is the model while online discussion was part of the process not the parcel, in blended learning albeit a major one.

Wisdom is at the uppermost level of the cognitive literacy value chain often accompanied with global insights. Wisdom is essentially deeper and wider thinking. Wisdom evaluates, empathizes, integrates, and subsumes the lower cognitive levels of thinking. This is the ability to integrate and evaluate that requires use of the lower levels of mental activity such as perception. More critically, wisdom's effectiveness rests on the ability to yield insight that derives from more than the sum-of-parts of data. This process, which can be modeled on hierarchies such as Bloom's Taxonomy, often involves affective and ethical dimensions of human judgment. Thinking was nudged out of the box and conventional narratives deconstructed from cases and topics, facts as declarative knowledge were presented, and actively discussed by the instructor while being available as electronic content. At the top right section of Figure 1 is shown, i.e., Non-Routine Thinking and Far Transfer Competency Impacts, Socratic prompts asked were "who are the protagonists" and "what are the drivers impacting an organization, a country, a region, and a culture." These were analyzed with appropriate tools by discussion and then prioritized and quantified. For example, the process of stakeholder mapping for conflict resolution was illustrated by involving a business case of a timber monopoly in East Malaysia, its business activities were threatening, traditional peoples such as the Penan; stakeholder values were carefully identified, explored and analyzed with strategic tools from both an industrial and from sustainable perspectives.

Unfreezing the given status quo schema of conflict began with a negotiation of interests and values, escalating to a consideration of rights, and culminating in the resolution of issues of power which were found to be positive, resulting in win-win outcomes for all parties. Etic and emic perspectives i.e., within the culture and neutral stances were exchanged by syndicated learners in stakeholder role analysis. Similarly, other stakeholders were identified and their roles scoped, for example, the logging company and its employees, shareholders, the state government, environmental activists, and sustainability conscious consumers.

Cases were explored from multiple perspectives through active discussions in both face-to-face and online forums. Engaging videos from different stakeholders' perspectives were presented and shared electronically as Youtube links. The use of this media for active blended learning engages and involves (Gurubatham, 2005b) learners by being able to see hear and feel the perspectives and emotions of different roles and contexts. Additionally the uses of central and peripheral routes of persuasion (Petty & Cacioppo, 1986) are attention arousing and engaging. Peripheral routes make use of graphics, audio, and music to attract attention. Central routes are more deeply cognitive to activate audience schemas by engaging with compelling narratives. High involvement and high interactivity were design features exploited in information and communication technology (ICT) enabled learning (Gurubatham, 2005b). Interactivity is ergonomic or more concerned with the usability driven features of the Moodle environment that provide the learners the functionality to respond, comment, and post. While involvement is higher order thinking and emotional bonding which is triggered upon hot button interests in topics. Additionally there were presentations of diverse viewpoints and role plays by learners. Evaluation, analysis, and the creation of plans and policies involved lively discussions, which were interactive, reflective, and oftentimes resulted in the unfreezing of the learners' unconscious assumptions and biases. Critical thinking within syndicated peer groups together with instructor coaching provided the checks and balances necessary when using strategic thinking tools in inductive learning. Online discussion boards on Moodle were not moderated, were respectful, and captured controversial themes.

The lower half of Figure 1 illustrates the more localized impact of *routine* thinking. Teaching and learning at this level does not have to invoke higher order critical thinking, nor does it have to unfreeze unconscious assumptions or biases – except, perhaps, for the purpose of adapting best practices to locally or organizationally specific needs. Troubleshooting is another example. Troubleshooting best practice methods can be stored in electronic repositories so that learners have only to read, understand, refer, and apply with coaching. Troubleshooting outcomes here emphasize procedural accuracy or *template matching* from *pattern recognition* paradigms. Troubleshooting skills require operational flexibility beyond routine thinking but not necessarily higher order thinking. They are low level and knowledge management is more appropriate, and not necessarily online higher order thinking discussion. The transfer of prior learning to current tasks is thus still relatively *near*. In the hierarchy of knowledge, data represents the lowest value of information. For example, much of Human Resource Information Systems (HRIS) today are procedural, and is enacted typically at an operational level that can be outsourced or automated by information technology so as to require little or no vigilance by human operators. In the 21st century, this level of the chain has little competitive advantage. For example, process checks in quality control can be automated.

This level of information processing involves the interpretation of data. Typical activities at this level include quickly recognizing critical quality parameters such as in statistical process control, inputting unique customer data in Customer Relationship Applications (CRM) while on-line, and recognizing key or salient customer information in call-centre tasks. These activities elicit perceptual competencies.

Generic Learning Format: Self-Exploration and Learning How to Learn

For the most part, classes were held on-site at three locations: MUM in the U.S.A., HELP University in Malaysia, and the Neotel Corporation in South Africa. The courses were short but intensive and included blended learning. At MUM, the classes were taught as part of the MBA in global strategic management and were comprised of blocks spanning from two weeks to four weeks. At HELP University, the Masters in Managerial Psychology had modules of six weeks. The Neotel Corporation in South Africa had a six week block.

In addition another modality, a meditative technique popularly known as Transcendental Meditation (TM) was learned and practiced by many students at Neotel in South Africa, at MUM in the U.S.A., and at HELP University in Malaysia. This was not a random assignment of subjects to meditation as a treatment variable, such as would have been the case in a formal comparative study with pre-test and post-test evaluations. The experiential comments below, which were reported by these meditating students, are explored in the context of unfreezing prior schemas to facilitate higher order thinking and creativity, to enable insight, transparent thought processes, and deeper and wider thinking. Empirically, there have been several controlled published peer reviewed studies on research in TM that have shown increased creativity and wisdom, or thinking out-of-the-box. What emerges as salient is the ability to process information as opposed to just recalling and recognizing learned data or information. However TM was also found to improve lower level perceptual cognitive tasks such as these. More importantly however is the ability to learn new content. Such ability as described is dubbed fluid intelligence. Processing data into information then into higher order cognitive activity results in knowledge and wisdom. This is a central theme in modern education with the onslaught of globalization pressures in the knowledge economy (Gurubatham, 2005a). Most mainstream standardized tests of intelligence test or IQ tests utilize both fluid and another type of intelligence called crystallized intelligence (Cattell, 1963). Crystallized intelligence involves acquired knowledge, is content based and where content can be revised. Fluid intelligence is process based and is said to be highly vulnerable to aging, (Lee et al., 2005) peaking at the early twenties. Therein lays the challenge for lifelong learning and nurturing productive human capital.

How can fluid intelligence be enlivened and sustained for the information onslaught posed by ICT? Also how can adaptation pressures be balanced with the wisdom of sustainability and preserving cultural integrity? A brief review of previous research follows.

Creativity was suggested to have been enhanced in TM practitioners (Travis, 1979; Jedrczak, Beresford, & Clements, 1985). Divergent thinking is highly correlated with low frequency EEG psychophysiological states of consciousness. Self-reports describe a process free of mood control and manipulation; rather, an innocent, fluid, and spontaneous experience. Again, highly relaxed states of consciousness in transcending are correlated with spontaneous creativity (Molle et al., 1996). The noted British psychologist Guy Claxton has argued that creativity is lost without an instinctive ability to access free-floating mental states (2002). In comparison, TM is reported to be a natural process of contacting the source of thought, which is experienced as a field of pure creative intelligence. Fluid intelligence, as well as general intelligence, has been found to significantly increase with TM as shown by longitudinal controlled studies and random assignments.

The practice of TM is found to: increase intelligence as measured by standardized tests (Jedrczak, Beresford, & Clements, 1985; Dilbeck et al., 1985; Jedrczak, Toomey, & Clements, 1986); develop culture fair intelligence as operationalized in terms of inspection time with control groups (Tim & Orme-Johnson, 2001); result in higher levels of moral reasoning as shown in longitudinal studies with children, as well as in studies with adult inmates in maximum security incarceration in California, according to Kohlberg's stage development mode as reviewed by Alexander (Alexander et al., 1993); and culture wisdom as shown in a 10-year longitudinal study (Chandler, 1990). Other studies on TM have shown increased field independence, which is indicative of perception that is not unduly influenced by the environment (Gelderloos, Lockie, & Chutoorgoon, 1987); increased flexibility of perception and improved verbal problem solving (Dilbeck, 1982); increased creativity along with increased fluid and culture fair intelligence (Dillbeck, Assimakis, Raimondi, Orme-Johnson, & Rowe, 1986; Tim & Orme-Johnson, 2001); and increased brain wave coherence, which is indicative of orderliness of thinking (Travis, Tecce, Arenander, & Wallace, 2002).

In this era of globalization, there is a critical need for higher order, or higher value-added thinking, facilitated by high road strategies such as metacognition. The pressures of globalization demand responses, or optimal responses, to meet the challenges of change drivers that are apparently relentless. What is needed, today, is the cognitive ability to synthesize from cultural schemata the patterns of shared norms and values that exist in latent groups, patterns that can be identified by using cues, appreciating other cultures with more refined values of consciousness, and being cognizant of the universality in humanity while being respectful of differences (Gurubatham, 2001). There is a need to be grounded in one's own transcendent Self while, at the same time, appreciative of the cherished and diverse values of cultural integrity and political sovereignty. Spiritual aspirations of this goal can be found in both eastern and western psychology. For example, Maslow (1971) refers to the Psychology of Being and the Veda or knowledge in Sanskrit espouses the value of transcendence and the essential unity underling diversity, which is expressed in the Sanskrit phrase *vasudeva kutumbutam*: The world is my family. Established in one's true transcendental Self beyond the ego in Being, one never feels threatened by outside influences. William James (1996) wrote of this same state of consciousness in the Pluralistic Universe. Also contributing to the conversation were Martin Heidegger (1962) and Soren Kierkegaard (1985).

CONCLUSION

Globalization and the relentless pace of technological evolution are exerting great pressures on the obsolescence cycles of crystallized, or acquired, knowledge, a dynamic that is commensurate with Moore's Law (Liddle, 2006) which states that raw computing power doubles every 18 months along with an exponentially increasing bandwidth and lowering network costs. The pressures of globalization in an information age are creating challenges for those who do not choose to keep up with the rapidly upgrading ICT as they become available. At the same time, those who choose to increase knowledge via interactive media are being given exponentially growing opportunities. New platforms are providing lower costs, greater reach, and user-friendly design features. More power in computer processing is enabling higher speeds, greater memory capacities, and increasing network bandwidth. Curiously, the ICT enabled outward-looking, global knowledge economy also demands that we turn inward and learn how to learn. Both self-knowledge and active engagement with other learners are necessary. Social media and online Moodle discussions give the student exposure to different perspectives and a potential for enriching value exponentially (Metcalfe, 2006). However, interactivity *per se* is not enough. A high level of involvement is required. Topics must be hot buttons that are close to the student's heart, engaging personal interests and values (Gurubatham 2005b). Using this strategy along with the lively discussion of such topics with peers, facilitates further insights into one's own values and outlook.

Overall, in the amalgam of classroom cases spanning 4 years and 3 countries, 80 percent of the students' attained mastery of concepts as measured in terms of the higher value added outcomes such as utilizing strategic management tools in scenario planning, analyzing, prognosticating and recommending strategies in contemporary global managerial psychology and business cases. As this is a position paper highlighting the emergent theme of higher order thinking, formal evaluations are not presented here because of space considerations. Nonetheless, all classes had ongoing and summative evaluations. At both HELP University and MUM, accreditation boards such as the Malaysian Quality Assurance and the U.S. Higher Learning Commission and The International Assembly for Collegiate Business conduct regular audits of the teaching and learning strategies with their formalized learning outcomes. It was noteworthy because many of the students had little or no prior knowledge of neither psychology nor business content in their prior majors. Often times the higher levels of strategic evaluation invoked a richer understanding of global business drivers, balanced with a fine grain understanding of diverse stakeholder psychology. Globalized content and active debate is enabled by blended learning that allows for reflection beyond the classroom walls, and forays into a virtual world via videos, and links to foreign websites. Frankly, the rubric of evaluating online discussion became less important over time as the instructor observed the buzz with refinement and respect evolve and reticence overcome with insights and access to participation even for topics deemed too sensitive to broach in face to face discussions in reticent cultures. The online discussions stimulated the discussions even face to face.

Sample Moodle discussion comments are presented below. Brief sample comments are culled from the reflection learning journals which students are required to document in a standard template are presented below. As stated at the beginning, no formal systematic content analysis was employed other than the rubric for insight and why it was important to the learner.

ACKNOWLEDGMENT

This paper would not have been possible without HELP University, Malaysia, Maharishi University of Management, USA, and the Neotel Corporation in South Africa.

REFERENCES

Alexander, C. N., Davies, J. L., Dixon, C. A., Dillbeck, M. C., Druker, S. M., & Oetzel, R. M. … Orme-Johnson, D. (1990). Growth of higher stages of consciousness: Maharishi's Vedic Psychology of human development. In Higher Stages of Human Development. Oxford, UK: Oxford University Press.

Cattell, R. B. (1963). Theory of fluid and crystallized intelligence: A critical experiment. *Journal of Educational Psychology*, *54*(1), 1–22. doi:10.1037/h0046743

Claxton, G. (2002, September 22). What's the big idea? *The Observer*. Retrieved from http://www.guardian.co.uk/theobserver/2002/sep/22/jgballard1

Dillbeck, M. C. (1982). Meditation and flexibility of visual perception and verbal problem solving. *Memory & Cognition*, *10*(3), 207–215. doi:10.3758/BF03197631 PMID:6750312

Dillbeck, M. C., Assimakis, P. D., Raimondi, D., Orme-Johnson, D. W., & Rowe, R. (1986). Longitudinal effects of the Transcendental Meditation and TM-Sidhi program on cognitive ability and cognitive style. *Perceptual and Motor Skills*, *62*(3), 731–738. doi:10.2466/pms.1986.62.3.731

Gelderloos, P., Lockie, R. J., & Chuttoorgoon, S. (1987). Field Independence of Students at Maharishi School of The Age Of Enlightenment and A Montessori School. *Perceptual and Motor Skills*, *65*(2), 613–614. doi:10.2466/pms.1987.65.2.613

Gurubatham, M. R. (2001). Consciousness as the Basis of Culture and Cognition. In *Maximizing Human Intelligence Deployment in Asian Business: In The Sixth Generation Project* (pp. 140–162). London: Palgrave.

Gurubatham, M. R. (2005a). Understanding and interpreting the drivers of the knowledge economy. In *Engineering the knowledge society*. IFIP. doi:10.1007/0-387-23120-X_17

Gurubatham, M. R. (2005b). Cognition, culture and effective e- praxis guiding principles: Theoretical roots for e-culture. *IFIP Advances in Information and Communication Technology*, *167*, 121–128. doi:10.1007/0-387-23572-8_15

Heidegger, M. (1962). *Being and Time* (J. Macquarrie & E. Robinson, Trans.). New York: Harper and Row.

Izak, M. (2013). The foolishness of wisdom: Towards an inclusive approach to wisdom in organization. *Scandinavian Journal of Management*, *29*(1), 108–115. doi:10.1016/j.scaman.2012.07.002

James, W. (1996). *A Pluralistic Universe*. Lincoln, NE: University of Nebraska Press.

Jedrczak, A., Beresford, M., & Clements, G. (1985). The TM-Sidhi program, pure consciousness, creativity and intelligence. *The Journal of Creative Behavior*, *19*(4), 270–275. doi:10.1002/j.2162-6057.1985.tb00409.x

Jorgenson, S., & Schultz, L. (2012). Global Citizenship Education (GCE) in Post-Secondary Institutions: What is Protected and what is Hidden under the Umbrella of GCE? *Journal of Global Citizenship & Equity Education*, *2*(1).

Kierkegaard, S. (1985). *From Philosophical Fragments, Johannes Climacus* (H. V. Hong & E. H. Hong, Eds.). Princeton, NJ: Princeton University Press.

Liddle, D. E. (2006, September). The Wider Impact of Moore's Law. *IEEE, Solid State Circuits Newsletter*. Retrieved from http://www.ieee.org/portal/site/sscs/menuitem.f07ee9e3b2a01d06bb9305765bac26c8/index.jsp?&pName=sscs_level1_article&TheCat=2165&path=sscs/06Sept&file=Liddle.xml

Maslow, A. (1971). *The further reaches of human nature*. New York: Viking.

Max–Neef, M. (2005). Foundations of transdisciplinarity. *Ecological Economics*, *53*(1), 5–16. doi:10.1016/j.ecolecon.2005.01.014

Metalfe, R. (2006, August). Guest Blogger Bob Metcalfe: Metcalfe's Law Recurses Down the Long Tail of Social Networks. *VC Mike's Blog*. Retrieved from http://vcmike.wordpress.com/2006/08/18/metcalfe-social-networks/

Mölle, M., Marshal, L., Lutzenberger, W., Pietrowsky, R., Fehm, H. L., & Born, J. (1996). Enhanced dynamic complexity in the human EEG during creative thinking. *Neuroscience Letters*, *208*(1), 61–64. doi:10.1016/0304-3940(96)12539-8 PMID:8731175

Petty, R. E., & Cacioppo, J. T. (1986). *Communication and Persuasion: Central and Peripheral Routes to Attitude Change*. New York: Springer-Verlag. doi:10.1007/978-1-4612-4964-1

Salomon, G., & Perkins, D. N. (1989). Rocky roads to transfer: Rethinking mechanisms of a neglected phenomenon. *Educational Psychologist*, *24*(2), 113–142. doi:10.1207/s15326985ep2402_1

Schwartz, B. (2011). Practical wisdom and organizations. *Research in Organizational Behavior*, *31*, 3–23. doi:10.1016/j.riob.2011.09.001

Sternberg, R. J. (1985). *Beyond IQ: A triarchic theory of human intelligence*. New York: Cambridge University Press.

Sternberg, R. J. (1998b). A balance theory of wisdom. *Review of General Psychology*, *2*(4), 347–365. doi:10.1037/1089-2680.2.4.347

Sternberg, R. J. (2001). Why schools should teach for wisdom: The balance theory of wisdom in educational settings. *Educational Psychologist*, *36*(4), 227–245. doi:10.1207/S15326985EP3604_2

Sternberg, R. J. (2009). *Academic intelligence is not enough Wics: An expanded model for effective practice in school and later in life*. Paper presented at the conference on Liberal Education And Effective Practice, Mosakowski Institute for Public Enterprise. Dubuque, IA.

Tim, S. K., & Orme-Johnson, D. W. (2001). Three randomized experiments on the longitudinal effects of the Transcendental Meditation technique on cognition. *Intelligence*, *29*(5), 419–440. doi:10.1016/S0160-2896(01)00070-8

Travis, F., Haaga, D. H., Hagelin, J., Tanner, M., Nidich, S., & Gaylord-King, C. et al. (2009). Effects of Transcendental Meditation Practice on Brain Functioning and Stress Reactivity in College Students. *International Journal of Psychophysiology*, *71*(2), 170–176. doi:10.1016/j.ijpsycho.2008.09.007 PMID:18854202

Travis, F. T. (1979). The Transcendental Meditation technique and creativity: A longitudinal study of Cornell University undergraduates. *The Journal of Creative Behavior*, *13*(3), 169–180. doi:10.1002/j.2162-6057.1979.tb00203.x

Travis, F. T., Tecce, J., Arenander, A., & Wallace, R. K. (2002). Frontal Cortical Measures that Characterize the Integration of Transcendental and Waking States. *Biological Psychology*, *61*, 293–319. doi:10.1016/S0301-0511(02)00048-0 PMID:12406612

KEY TERMS AND DEFINITIONS

Blended Learning: Combination of e-learning with face to face.

Schema: Cognitive structures that enable content assimilation.

Transcend: To go beyond or unfreeze from thought or boundary.

Constructivism: Active, iterative and eclectic approach to learning with instructor facilitation.

Metacognition: Reflective cognition.

Far Transfer: Application of learning beyond prior learning contexts essentially metacognitive.

Near Transfer: Application of learning narrowly locked into prior learning context essentially procedural.

Fluid Intelligence: Ability to learn apply novel concepts.

Crystallized Intelligence: Knowledge of prior learned content and process.

This work was previously published in E-Learning as a Socio-Cultural System edited by Vaiva Zuzeviciute, Edita Butrime, Daiva Vitkute-Adžgauskiene, Vladislav Vladimirovich Fomin, and Kathy Kikis-Papadakis, pages 283-301, copyright year 2014 by Information Science Reference (an imprint of IGI Global).

APPENDIX: LEARNING HOW TO LEARN SAMPLE MOODLE ONLINE DISCUSSION BOARD FROM HELP UNIVERSITY MALAYSIA

Learning how to learn sample Moodle online discussion board from HELP University Malaysia :

Re: Decoding Resistance to Change

by XXX from Malaysia - Saturday, 14 January 2012, 10:39 AM

http://hbr.org/2009/04/decoding-resistance-to-change/ar/1

As discussed, concepts are easy to understand but the resistance to change makes execution tough.

Attached article stated that even difficult people can provide valuable input when you treat their communications with respect and are willing to reconsider some aspects of the change you're initiating.

Supposed to have 5 ways in the article but because I am not willing to pay, we can only see 2.

Take a guess of what are the other possible ways that we can use employee's resistance to effect change more productively?

Edit | Delete | Reply

Re: Decoding Resistance to Change

by XXX from Zimbabwe - Thursday, 26 January 2012, 03:10 AM

There are key important issues that draw my attention from this article Catherine which according to my understanding are key issues worthy discussion. It seems the article is using the long route, only to explain the importance of communication when it comes to organizational change. People tend to think communication in the organization is as easy as it sounds familiar, however, in actual fact there are a lot of variations when it comes to the impact a vehicles of communication have on employees. The millennium generations may require some recent vehicles of communication like Facebook, organizational forums etc while the generation X and the baby boomers may still inclined to meetings, memos, notice boards etc. So in other words forms of communications should target all diverse groups within the organization. 2. Emotional intelligence sounds very key from the article, because it sounds like for a leader to understand others and even to influence others it requires a degree of emotional intelligence.

Show parent | Edit | Split | Delete | Reply

Free space for posting -> Why Change Is Necessary – Change The Road -> Re: Why Change Is Necessary – Change The Road

by XXX - Thursday, 26 January 2012, 02:06 AM

Wow, its metaphoric nature makes it more interesting. i remember a quote which i once came across which says he who rejects change is the architect of decay. The only human institution which rejects progress is the cemetery. In other words change is part of living humanity. Change will always stimulate the sympathetic nervous system of many employees because they don't want to move out of their comfort zones, and they cannot envision the future state.
We must learn to view change as a natural phenomenon to anticipate it and to plan for it, as the article expresses. The future is ours to channel in the direction we want to go. we must continually ask ourselves, "What will happen if...?" or better still, "How can we make it happen?". This cannot happen overnight, it requires commitment, determination, motivation and courage from the leadership to the whole organizational parts, structure and systems

Show parent | Edit | Split | Delete

See this post in context

Entrepreneurship is the highest form of philanthropy

by XXX Malaysia - Thursday, 4 October 2012, 10:45 AM

1. Dear everyone,

2. ***"Entrepreneurship is the highest form of philanthropy."***

3. This is a quote by Flip Filipowski, Executive Chairman and CEO of SilkRoad, during his recent interview on BFM radio. Filipowski is one of the world's most successful high-tech entrepreneurs, philanthropists, and industry visionaries.

4. He is also the former COO of Cullinet, the largest software company of the 1980's, and also the founder and CEO of PLATINUM technology, inc. Flip grew PLATINUM into the 8th largest software company in the world at the time of its sale to Computer Associates for $4 billion dollars, the largest such transaction for a software company at the time. Upside Magazine named him one of the Top 100 Most Influential People in Information Technology.

5. A recipient of Entrepreneur of the Year Awards from both Ernst & Young and Merrill Lynch, Flip has also been awarded the Young President's Organization Legacy Award and the Anti-Defamation League's Torch of Liberty award for his work fighting hate on the Internet.

6. **Interesting excerpts from the interview**

7. Values that guide him: "***Entrepreneurship is the highest form of philanthropy*** – if one is capable of taking the risk, start a business & creating jobs then one is doing more for society than one is capable."

8. "If you have the skills of creating jobs and engaging people, then you owe that to society to continue doing that than to retire."

9. **Is everyone meant to be entrepreneur?**

10. His opines that "It is not for everyone. It is a rare trait that involves the ability to stomach risk and the ability to eliminate all rational thoughts from your behaviour".

11. To hear more, here's the link to the podcast:
http://www.bfm.my/raise-your-game-flip-filipowski-silkroad.html

Re: Entrepreneurship is the highest form of philanthropy

by XXX Malaysia - Monday, 8 October 2012, 05:25 PM

Hi Fauzi,

Thank you for your response. You brought up a very fair point and one which has been and continually being addressed by the business & corporate communities. For the past couple of decades, there have been growing pressure by various stakeholders e.g. customers, consumers, NGOs, the local governments etc. for large corporations/businesses to be more transparent in the way they run their business and to be sustainable in all aspects of its operations – from mitigating its environmental impact, ensuring that it provides conducive working condition for its people, good governance and to ensure that the communities in which it operates are not negatively impacted by its operations.

Traditionally, successful business people, corporations, leaders have been too focused on the **social** component of Sustainability i.e. Corporate Social Responsibility CSR). You mentioned Foxconn & Apple, which is a good example! Terry Gou, CEO of Foxconn, dubbed "Samaritan of the Poor" is one of the greatest philanthropist, giving away millions annually to charity. You would not think that a person like him would jeopardise the health and safety of his people who helped grow his empire. However, as stakeholders are becoming more sophisticated, issues of appalling working conditions, poor labour practices at Foxconn factory in Northern China came to light and causes uproar among the public and also within the business community.

My personal view, if I may is that situation at Foxconn should not detract us from appreciating & reflecting on what these entrepreneurs through their multi-million businesses have done to the local communities by creating jobs, empowering its local communities etc. In running a successful business, there will inevitably be a trade-off, it is not about running a perfect business which should not cause any negative impact to the environment etc but it is about striking a good balance – which realistically is a very hard thing to do.

Show parent | Edit | Split | Delete | Reply

Re: Entrepreneurship is the highest form of philanthropy

by XXK Zimbabwe - Friday, 12 October 2012, 11:11 PM

Fauzi i like your insight there, I believe many companies they come in the camouflage of Job creation to acquire glory and honor in the heroic faces that misrepresent their actual faces of profit making, and as result their external image will cover up their environmental immorality in the name of making societal difference. This is definitely affecting sustainability as Dinor commented.

I remember in our previous module , we encounter a British Tobacco company that donated a lot of money for medicine related research. So this was done in the name of saint /saviour face of that company but with self interests to cool down anti tobacco campaign. So the bottom line of point is, an ideal entrepreneurial of our time, should be people of virtue and integrity who operates business with high ethical principles.

Show parent | Edit | Split | Delete | Reply

Table 1. Sample reflection journal from a Malaysian student at HELP University

	Explore a Learning Experience…		
	Awareness	**Insight**	**Evaluation/Application**
Content (What)	I have a new perspective looking at entrepreneurs. Locus of control and the strengths concept were my interests of studies. The course emphasizing following one's bliss and differentiates a truly successful entrepreneur with a mere business owner triggered me to think further. Apart from that, probably because I am new to the module, I also learned concepts like value network, unique selling proposition and many more.	Internal/External- Believes that result is the cause of own action/thoughts or it is the result of luck/chance factors. I have always think that people with internal locus of control would be more successful as they will be more willing to make changes on their actions to lead to a more desirable outcome. I am glad that research proved the fact too. The concept about strengths changed my thinking paradigm towards a person's development. Other theories also served as a good reminder of what I have learned and also introduced me to more research concepts.	Although Rotter's loc research is quite old, I believe that if tested, it is still quite valid and reliable. Furthermore, researches could probably relate it with other factors, not just entrepreneurial success. I think that the strength theory pretty much changed my stand in education. I felt that our old education needs to be changed so that social problems can be reduced, people are not labelled as talented or slow. Slow learning is merely a sign of weakness and people should not dwell in it. The theory can also be applied in other industries, specifically how its learning and development training works.
Process (How)	I truly appreciate that I have the opportunity to learn the module in various ways and where most of the methods were fun and interactive. In both online discussion and classes, everyone was allowed to share freely and respect was showed, even between course leader and students. The reading was actually made easy as it was a short course and good reading materials have been handpicked and the only thing we need to do is just read! Reflection was also essential for me to often check my progress and clarify my thoughts.	The different models of learning allowed me to learn and think critically in different ways. I felt as if learning took place all the time as after classes, there were online discussions and brainstorming on group projects, I mainly learned much from course mates rather than theorists in books. Learning never stopped after module ends as to be frank, I still have some reading materials that I was not able to finish reading during the modules.	It allowed me to open my eyes to see how steep a learning curve can be in a short period of time. I am able to change my perspective towards a course, knowing that learning a lot does not equals to stress and reading dry materials. It can be very fun and interactive. I am pretty glad that this course is not based on analysing journals and concepts of research. It is true that sometimes researches are confusing themselves and one can be successful in another way.

continued on following page

Table 1. Continued

	Explore a Learning Experience…		
	Awareness	**Insight**	**Evaluation/Application**
Apply into Personal and career development	I felt as if I am moving upwards a stairs pretty quickly, being able to see more things clearer as I go higher. Interestingly, I managed to go up higher by going deeper into myself and spend time doing reflection after learning something new. I am new in terms of career building and I am glad that I am learning so much to be able to adjust my views accordingly. Personally, I felt that I see how one can develop even further in various ways.	The influence is strong as I have not just learned the core concepts of entrepreneurship but it generally shifted my thinking paradigm and general perspective towards embracing learning and interaction.	It is reliving to know that many times spirituality plays a role too. It is important to pay attention to self and tune in with nature. I always feared that I may not know enough to live a better life, not knowing enough vocabularies to understand concepts but instead, it turned out that I have learned how important it is to not let words shape our thinking. It is true, our mind is too magnificent for us to label it's processes. Ironically, the process to succeed is simple enough, to summarize in words like "Just follow your bliss".

Table 2. Sample reflection journal from a South African manager MBA student

	Think of a Learning Experience in Relation to		
	Awareness	**Insight**	**Evaluation/Application**
Content (What)	The environment I have been exposed to for my entire career focused on the technical aspects of business – either operations or project management. Strategic Human resources brought about an awareness not just focusing on human resources in general but how this can be used in determining strategic direction for a given organisation. During the course schedule, we have become aware of fundamentals, concepts and processes to derive and prioritise these strategic initiatives. The beauty of this was how easily we managed to relate to internal challenges within Neotel. Working with large teams is indeed challenging as we try to derive maximum productivity, efficiencies whilst also trying to keep them constantly motivated. Highlighted in the process was competency levels – where we actually are and where we would like to be at various periods and just as importantly how we can utilise competency levels to our advantage	As a group we brainstormed all factors (internal and external), strengths, weaknesses, opportunities and threats to list key issues relating to competency within our department in Neotel (Field Services) We looked at our successes, and how we actually delivered on those. We also looked at strengths and weaknesses and how best we could utilise these to positively differentiate us from our competitors. After quantifying this we were able to pick key strategic initiatives that were actually worth focusing on.	As an organisation we are driven by revenues and customer satisfaction. Mapping key areas highlighted against models (Ulrich and Brockbank HR Value proposition and Value maps), we were able to illustrate how strategy and assessment of organisation relates to this. It proved to be very valid and also brought about different approaches to thinking. There are various models which can be applied and as we progress through the learning process, we can definitely pick up various theoretical approaches that we can practically apply…successfully

continued on following page

Table 2. Continued

<table>
<tr><th></th><th colspan="3">Think of a Learning Experience in Relation to</th></tr>
<tr><th></th><th>Awareness</th><th>Insight</th><th>Evaluation/Application</th></tr>
<tr><td>Process (How)</td><td colspan="2">I must admit the current process is different to learning experience to date. Whereas in the past I have become accustomed to a physical presence of an instructor during classes, this course has somewhat become a combination of distance learning with the use of technology to create a virtual impression lecturer presence (video conference, Skype etc.). being from Durban we were at a disadvantage compared to the Johannesburg team.
Nevertheless, the experience has been fruitful with good interaction amongst lecturer, group members and other groups
Sources of knowledge were in abundance from either lecturer, prescribed textbook, articles, websites and information sharing sessions on allocated site
Knowledge and theory has been applied to workplace scenario and formulated to propose intent to senior management</td><td>The learning schedule and program allowed for constant workload in a structured format that ultimately led to the course goals and objectives
Learning was not just confined to lecture periods but due to assignments, projects, reading material etc., the mind was constantly involved in exploring this module
Group interaction also activated various approaches to a situation I would have otherwise overlooked.
Great learning experience!</td></tr>
<tr><td>Apply into Personal and career development</td><td>I have benefited from this in several ways:
● Having a competent workforce has a significant effect on efficiencies and productivity
● It makes management of activities that much easier when you have a team you can trust and rely upon. It prevents the need for micromanagement
● Boasting a highly competent workforce in a given industry makes for good brand awareness amongst competitors
● Competency addresses a key motivational factor
● As a manager, I have always focused strongly on training and development. This re-inforces my approach to this initiative</td><td>Insight on this has revealed the following:
● Understanding key concepts and fundamentals that drive HR strategy and net effect on business
● Support HR provides in driving business
● Looking at all factors that influence strategy (internal, external, strengths, weaknesses, opportunities, threats)
● Ability to quantify hence prioritise in terms of effect on organisation
● Measure and track from a baseline point and at various intervals until completion or achieving goals
● Think holistically and always look at the bigger picture</td><td>The knowledge and experience gained from a combination of a “tutor” that has shared experiences at a global level with us, interaction with regional and national groups, practical application to workplace situation, being exposed to various sources of literature will put me in good stead in future and will no doubt support me tremendously in career growth…and not in just the field I have been accustomed to for so long during my career.
Strategy is not just a top-down approach as was commonly understood. Driven properly, employees at all levels play a vital role in having a positive impact herewith</td></tr>
</table>

Chapter 63
M-Learning in the Middle East: The Case of Bahrain

Evangelia Marinakou
Royal University for Women, Bahrain

Charalampos Giousmpasoglou
Bahrain Polytechnic, Bahrain

ABSTRACT

The introduction of e-learning in higher education has brought radical changes in the way undergraduate and postgraduate programmes are designed and delivered. University students now have access to their courses anytime, anywhere, which makes e-learning and m-learning popular and fashionable among university students globally. Nevertheless, instructors are now challenged, as they have to adopt new pedagogies in learning and teaching. This chapter explores the adoption of m-learning at universities in the Kingdom of Bahrain, as well as the relevant current developments and challenges related to the major stakeholders (educators and students) in higher education. It mainly investigates the educators' views and perceptions of m-learning, as well as its future potential in higher education. Most of the educators use m-learning tools to some limited extent, and there is still opportunity to reach full integration with curriculum and the blended learning approach. Further, it is proposed that professional development should be provided to instructors to enable them to use the available new technologies in an appropriate and effective way.

INTRODUCTION

The rapid technological advancements in the context of globalization have changed our everyday lives at individual and societal level. Universities worldwide are among the first to embrace these changes and prepare their students with the appropriate tools to enter the 'real' world of work. Two decades ago the technological advancements infiltrated the traditional classrooms with the introduction of e-learning. The extensive use of Information and Communication Technologies (ICTs) – especially the use of the Internet – revolutionized and changed for good the design and delivery of curricula in universities around the world. During the last decade, an unseen 'revolution' emerged from the introduction of e-learning and even more recently of m-learning tools in the

DOI: 10.4018/978-1-4666-8246-7.ch063

classroom. The magnitude of these information technology developments is still not very well understood, simply because practice has run well ahead theory. In addition, many argue that the m-learning community is still fragmented among the various stakeholders, with different national perspectives, differences between academia and industry, and between the school, higher education and lifelong learning sectors (Al Saadat, 2009). Whether one looks at this phenomenon of e-learning and m-learning as a fad, threat, or a solution to educators' problems in delivering mainstream learning in higher education (Peters, 2009), it is currently a hot issue that needs our attention.

The emergence of the World Wide Web supported the development and the popularity of e-learning (Peng, Su, Chou, & Tsai, 2009). In addition, mobile devices such as mobile phones, laptops have increased drastically and are widely used in e-learning (Iqbal & Qureshi, 2012; Koszalka & Ntloedibe-Kuswani, 2010). The use of e-learning in higher education has grown in the past two decades, transforming the nature of higher education, as the technologies are supplementing the course delivery (Bharuthram & Kies, 2013). There are ongoing debate and criticisms on using e-learning, nevertheless most of the literature has shown a positive impact of e-learning in educational contexts, as the drastic developments in technologies have produced a new revolution in education.

Nevertheless, most studies in e-learning and m-learning focus on its acceptance by students in developing countries (i.e. Rhema & Sztendur, 2013; Wang, 2011), on the challenges and opportunities from the adoption of e and m-learning, but very few focus on its acceptance by instructors or on their perceptions of m-learning and its future potential. Therefore, this chapter discusses the origins of m-learning, its pedagogical value and the current developments and challenges in higher education context; in addition, it presents the instructors' perceptions of m-learning in general in the Middle East and more specifically in the Kingdom of Bahrain. The chapter is organized as follows: the first part provides a summary of the origins and concepts of e-learning and m-learning. The following section explores the opportunities and challenges from the use of m-learning in higher education, as well the instructors' perception and use of m-learning via the survey results. The final part discusses the current and future status of m-learning followed by the conclusions.

THE ORIGINS AND CONCEPTS OF E-LEARNING AND M-LEARNING

E-Learning in Higher Education

Despite the relative recent appearance in literature, the concept of e-learning has fueled a number of debates regarding its usefulness in higher education and more particular, in the development of learning and teaching strategies. The few theoretical models describing this concept are still not adequate to capture the dynamics of the e-learning and m-learning proliferation in universities globally. The growing body of literature is still too narrow and short-sighted to capture the changes that currently take place in higher education. Nevertheless, the future is here, at least from a technological perspective.

In fact, practice has understandably run well ahead of theory, and in some issues and approaches away from theory, for example, the use of virtual learning environments (VLEs) and the use of applications to support them in mobile devices. A VLE is a set of teaching and learning tools designed to enhance a student's learning experience by including computers and the Internet in the learning process (Demian & Morrice, 2012). The principal components of a VLE package include curriculum mapping (breaking curriculum into sections that can be assigned and assessed), student tracking, online support for both teacher and student, electronic communication (e-mail, threaded discussions, chat, Web publishing), and Internet links to outside curriculum resources. There are a number of commercial and customized VLE software packages available, including Blackboard, Moodle and WebCT. A quick search on the Internet reveals that commercial and customized VLEs have introduced e-learning and m-learning applications to allow ubiquitous access for users (i.e. http://www.blackboard.com/platforms/mobile/products/ mobile-learn. aspx). Big search engines for academic content also adopt and follow this trend (i.e. EBSCO, Science Direct, Emerald) as well as international publishers (i.e. Prentice Hall, McGraw Hill, Springer).

Another recent important development is the use of tablet PCs and e-books as integral parts of the m-learning pedagogy. The optimization of mobile devices such as smart phones, e-book readers and tablet PCs, in conjunction with the digitalization of university libraries currently based mainly on e-books in PDF format, has changed for good the way we perceive study in a university environment. The classic view of a university student spending valuable time in a campus library struggling to borrow the last short-loan copies of the books s/he needs, tends to be an image of the past: virtual or e-libraries allow university students access content and borrow e-books for literary anywhere, anytime they wish for. A recent study undertaken as part of the project of the Open University's Building Mobile Capacity initiative, provides strong indications that e-learning is here for good. Despite the various issues reported in this project, it was found that when combined synergistically, the functionality, portability and comprehensiveness of resources offered by e-books, Internet access and mobile group learning, together facilitate rich learning experiences for students (Smith & Kukulska-Hulme, 2012).

As it has been previously discussed, the availability of mobile and wireless devices enables different ways of course contents delivery in higher education. It has also changed the communication between the teacher and the learner, as teachers nowadays are confronted with digitally literate students. In addition, these devices have created learning opportunities different to those provided by e-learning (Peters, 2009). E-learning is also changing by providing instructors and students with a different educational environment that is enabled with the use of mobile devices such as PDAs, mobile phones and other. According to Sarrab, Al-Shihi, and Rehman (2013) e-learning offers two main facilities to improve the educational system. E-learning happens anywhere anytime where learning and educational activities are offered the individuals and groups the opportunity to work online or offline, synchronously and asynchronously via networked or standalone computers and other mobile devices. The main drawback of e-learning according to Sarrab et al. (2013) is that it is bound to the location of personal computers or laptops, hence there is an issue with usability. Therefore, m-learning has been integrated to help make learning more interesting, widely available, more interactive and flexible.

The Emerging Concept of m-Learning

M-learning or mobile learning is an evolving phase of e-learning (Peng et al., 2009), as e-learning is dependent on desktop computers, whereas m-learning is dependent on mobile devices (Orr, 2010). There are a variety of definitions of m-learning, partly because m-learning is a new concept. Most studies define m-learning as an extension of e-learning which is performed using mobile devices such as PDA, mobile phones, laptops etc. (Sad & Goktas, 2013; Motiwalla, 2007). Others highlight certain characteristics of m-learning including portability through mobile devices, wireless Internet connection and ubiquity. For example Hoppe et al. (2003 in Iqbal & Qureshi, 2012), define m-learning as "using mobile devices and wireless transmission" (p.148). Kukulska-Hulme and Traxler (2007, p.35) suggest that "m-learning emphasizes the ability to facilitate the

Table 1. Difference between normal learning and m-learning

Normal Learning Style	Mobile Learning
Individual assessment, group projects, group discussions and project presentations will be done through quizzes and tutorials.	The use of multimedia elements in conveying information and receive online feedback.
Students will go to a class or lecture hall to attend the lecture.	The learning process can be done anywhere and at any time.
Students will interact face to face to allow them to communicate effectively.	Able to organize meetings and schedules of all team members at the same time.
Using chalk and talk method in delivering information.	Students can get the lecture notes quickly without copying from the board.

Source: Devinder & Zaitun (2006)

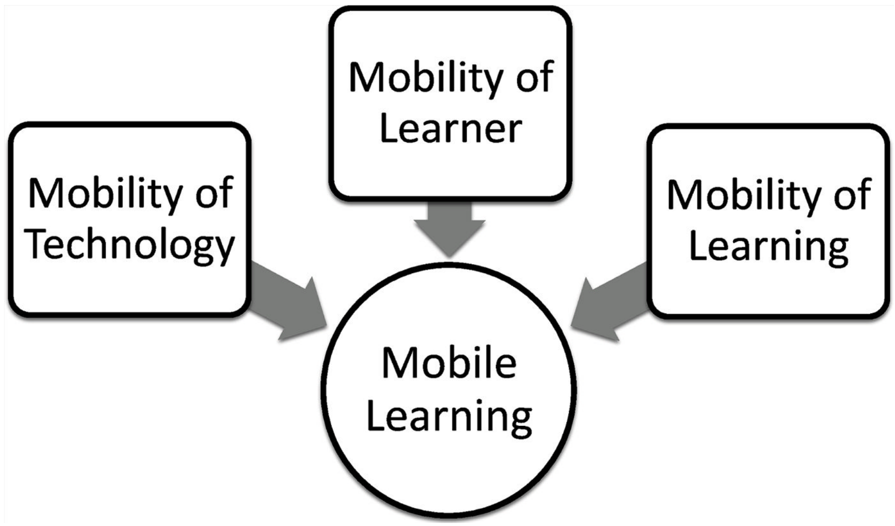
learning process without being tied to a physical location". In the higher education context, the term mobile learning (m-learning) refers to the use of mobile and handheld devices, such as smart phones, laptops and tablet PCs, in the delivery of teaching and learning. Simply put, m-learning is defined as "the process of learning mediated by a mobile device" (Kearney, Schuck, Burden, & Aubusson, 2012). M-learning can be thought of as a subset of e-learning, which is the "the use of computer network technology, primarily through the Internet, to deliver information and instruction to individuals" (Welsh, Wanberg, Brown, & Simmering, 2003).

Brink (2011) divided m-learning in three main types, formal, informal and well-directed or self-directed. Forma learning includes normal learning, which is triggered by notifications and reminders such as short messages. Informal learning encompasses two-way message exchange, hence an interactive relationship, such as Facebook, blogs, Twitter etc. Finally well-directed or self-directed learning uses reference and media-based materials such as videos and podcasts. For example, Table 1 shows the differences between normal and m-learning.

Although, in higher education, students are regarded as pioneers in forcing the faculty to change and adapt m-learning, the literature suggests that there are significant positive outcomes (Sad & Goktas, 2013). The literature suggests that there are several factors that influence readiness for m-learning. For example, demographic influences on users' readiness for m-learning such as gender, age and educational level. Others refer to technology acceptance, ease of use, perceived usefulness, quality of services and cultural factors.

A prerequisite for the delivery of e-learning programmes is the use of fixed locations i.e. in a classroom or where a desktop PC and an Internet connection are available. The remedy to this significant e-learning limitation appeared in the mid-2000s with the advent of m-learning applications for a wide variety of uses such as workplace learning, teaching and social networking. Quinn (2001) argues that m-learning intersects mobile computing with e-learning. The unique features of the new mobile technologies and the unlimited potential they offer in terms of flexibility and customization to individual needs, place it also in the framework of flexible learning (Peters, 2009; Sarrab et al., 2013). In this context, students expect training that is "just in time, just enough and just for me" (Rosenberg, 2001), and that can be delivered and supported beyond the boundaries of traditional classroom settings (Kearney et al., 2012). M-learning emphasizes the *mobility* of learning, whereas others place emphasis on the mobility of learners, and the experiences of learners as they learn by means of mobile devices (El-Hussein & Cronje, 2010, p.14). Similarly, Traxler (2007) claims that m-learning is not about 'mobile' or about 'learning' but is part of a new mobile conception of society. Hence, the

Figure 1. Mobile learning
Source: El-Hussein and Cronje (2010, p. 17)



definition of m-learning depends on how each member of the society understands and explains mobile learning. For example, other definitions refer to the physical way in which technology is used and others emphasize on what learners experience when they use mobile technologies in education, whereas others refer to how it can be used to make unique contribution to education and e-learning (El-Hussein & Cronje, 2010, p. 14). Figure 1 illustrates the above view.

The mobility of technology refers to the mobile cellular devices that link to the internet and deliver content and instruction and can enable learning to learn at anytime and anywhere in a form that is culturally prestigious among people in the same group (King, 2006; El-Hussein & Cronje, 2010). The mobility of learners is linked to the mobility of the devices and the fact that the learner is connected to the internet, hence learning can occur at any time and any place (Traxler, 2009). Finally, the mobility of learning is unique as it is "received and processed withing the context in which the learner is situated" (El-Hussein & Cronje, 2010, p. 19).

While the technical advancements in m-learning progress rapidly by satisfying a consumer driven demand, there are still many barriers in the development of an appropriate pedagogical framework for its application in teaching and learning. The aging instructor population is apparently one of the primary barriers in the smooth transition to the new era in higher education. The well-established learning theories of the past are based on teaching by the textbook and memorizing information. Educating and persuading older instructors to use m-learning as part of their learning and teaching approach poses as one of the most difficult challenges. Another issue in the use of m-learning in higher education programmes is that learning practices are changing while learning theories that support them are not (El-Hussein & Cronje, 2010). In addition, Wang (2011) found that e-learning (including m-learning) development tends to focus on technical issues of design and ignores organizational, social, and pedagogical aspects that are necessary for effective e-learning programmes in the workplace. Most applications are lacking of pedagogical underpins on the use of m-learning, and fail to understand learning behavior that takes place in the organizational and social context. It is also suggested that locating distinctive features of learning with mobile devices is an evolving process interwoven with the maturation of the relevant technologies (Kearney et al., 2012). The design of m-learning content for higher education is a complex and difficult task. Account still needs to be taken of learner's and instructors' specific needs as well as the environment which learning takes place. What also needs to be done is to include appraisal and evaluation for each programme, tailored to the different cultural and organisational needs (El-Hussein & Cronje, 2010). The way that people and organisations perceive this new era in teaching and learning is the key to shape the new curricula in higher education. Sharples, Taylor, and Vavoula (2007) identify two layers of m-learning, the semiotic (socio-cultural) and technological; they argue that these two layers will eventually converge. This convergence requires though a total rethink and redesign of formal learning as we know it: a more open and collaborative model which places educators as facilitators of learning in a connected and mobile world, where students participate actively in the learning creation process. On the other hand, others believe that m-learning will never fully replace classroom or other electronic learning approaches (Liaw, Hatala, & Huang, 2010). However, if leveraged properly, mobile devices can complement and add value to the existing learning models and frameworks.

M-learning and e-learning also differentiate from a pedagogical perspective in the learning approach. While e-learning is based primarily on the objectivist learning model (Wang, 2011), m-learning is building on a *constructivist* approach. The objectivist approach is based on the transfer of knowledge from the instructor to the learner; on the other hand the constructivist approach views learning as a process in which learners actively construct or build new ideas or concepts based upon current and past knowledge. In this interactive environment, instructors should let learners participate in meaningful activities so that they can generate their own knowledge (Brown & Campione, 1996). M-learning is also linked with the theory of *connectivism* which states that learners are actively attempting to create meaning through engagement in networks; learning is the process of creating connections and developing a network (Siemens, 2005). King (2006) proposes that the use of m-learning in higher education, reduces the physical walls of the classroom and replaces them with virtual, as the content of the education it delivered by means of a radical new technology, and he adds that "by breaking down the assumptions and process behind writing and speaking, we can go beyond them and find new ways of thinking about the world" (King, 2006, p. 171). Herrington, Herrington, Mantei, Olney, and Ferry (2009) placed m-learning in the context of the *authentic learning* approach. Authentic learning situates students in learning contexts where they encounter activities that involve problems and investigations reflective of those they are likely to face in their real world professional contexts.

Researchers have also explored m-learning perspectives from a wider socio-cultural view. Traxler (2009) described m-learning as noisy and problematic, featuring three essential elements: the personal, contextual and situated. Klopfer, Squire, and Jenkins (2002) propose that mobile devices (handheld computers) "produce unique educational affordances," which are: portability, social interactivity, context sensitivity, connectivity and individuality. Based on the activity theory approach Liaw et al. (2010) investigated the acceptance toward to m-learning as a means to enhance individual knowledge management. They found that factors such as enhancing learners' satisfaction, encouraging learners' autonomy, empowering system functions and enriching interaction and communication activities, have a significant positive influence on the acceptance of m-learning systems. More recently Kearney et al. (2012) presented a framework, which highlights three central features of m-learning: authenticity, collaboration and personalization, embedded in the unique time-space contexts of mobile learning. Sharples et al. (2007, p.4) provide more details on

Table 2. Convergence between learning and technology

New Learning	New Technology
Personalised	Personal
Learner-centered	User-centered
Situated	Mobile
Collaborative	Networked
Ubiquitous	Ubiquitous
Lifelong	Durable

Source: Sharples, Taylor, and Vavoula (2007, p.4)

the convergence between learning and technology as shown in the Table 2.

M-learning has attracted attention due to the increasing number of available mobile devices, which are affordable and their costs are increasingly decreasing making them more accessible to people. At the same time these devices have multiple features and capabilities, such as making phone calls, taking pictures and making videos, storing data and of course accessing the internet (Sarrab, Al-Shihi, & Rehman, 2013). Maccallum and Jeffery (2009) propose that all these capabilities may be used in teaching and learning, for example for classroom activities (Dawabi., 2003). These mobile devices can be used for learning purposes via interactive games, for brainstorming, quizzing and are widely used to support and develop students' own learning and collaborative learning (Iqbal & Qureshi, 2012). Moreover, they are available to users at any time and all time (Giousmpasoglou & Marinakou, 2013). Kukulska-Hulme and Traxler (2007) present several case studies that report and support the experience of educators with mobile technologies in universities. Zawacki-Richter, Brown, and Delport (2009) claim that e-learning and m-learning provide a wide range of opportunities for learners and teachers. However, as it has been previously discussed, Herrington, Mantei, Olney, and Ferry (2009, p.1) claim that it is not still clear whether "m-learning is used in pedagogically appropriate ways".

M-learning is widely used in distance learning as it supports the access to the teaching material for a large number of students, independent of time and space, at low costs. Moura and Carvalho (2009, p.90) suggest that "the development of m-learning as a new strategy for education has implications on the way students learn, on the role of the teachers as well as in the educational institution". Hence, for the purpose of this chapter m-learning is studied as an element of e-learning and blended learning in general not necessarily as a tool for distance learning, as it also helps in constructing problem-based learning as well as any related assignments and projects that meets the students' interest (Kukulska-Hulme & Traxler, 2007). M-learning allows student-centered learning in which students are able to modify the access and transfer of information to strengthen the knowledge and skills of students to meet their educational goals (Giousmpasoglou & Marinakou, 2013; Sharples et al., 2007). In addition, it can support ubiquitous learning and can make the educational process more comfortable and flexible (Sarrab et al., 2013, p. 828).

Higher education may be presented in a more interactive ways as m-learning provides the support for learning and training. Although, technological developments have made mobile devices strategic tools to the delivery of higher education instruction, these fundamental changes pose new problems, challenges as well as opportunities to the instructors and students as they are discussed in the following.

Opportunities and Challenges from the Use of m-Learning in Higher Education

The introduction of m-learning in universities change radically the way we perceive, design and deliver higher education programmes. In this mobile and always connected world, a number of benefits and challenges arise for both educators and students. Literature indicates that three features are most cited by researchers, practitioners and users: mobility/ ubiquity (anytime, anywhere), personalization, and collaboration. Current technology allows learners to disseminate information and complete coursework even when they are away from their desktop PCs and hard-wired Internet connections. A wireless device has the potential to give instant gratification to students by allowing them to interact with the instructors, other students in the course, and access course related content from anywhere wireless connectivity is available. BenMoussa (2003) identifies three key benefits of mobile connectivity for the users. Firstly, mobile devices offer personalized and/or individualized connectivity. Liaw et al. (2010) also suggest that the relationship between the owner and the mobile/ handheld device provides a 'one-to-one' interaction in a personalized manner. Secondly, mobile connectivity improves collaboration via real-time or instant interactivity that may lead to better decision-making. And third, mobile connectivity enhances users' orientation or direction. Kearney et al. (2012) argue that m-learners can enjoy a high degree of collaboration by making rich connections to other people and resources mediated by a mobile device. This often-reported high level of networking creates shared, socially interactive environments so m-learners can readily communicate multi-modally with peers, educators and other experts, and exchange information. Learners consume, produce and exchange an array of "content", sharing information and artefacts across time and place. In addition, Motiwalla (2007) suggests that access to information at the point of relevance may make it possible for m-learners to minimize their unproductive time, which may enhance their work-life-education balance.

The challenges generated from the advent of m-learning in higher education programmes affect mostly those responsible for the design and delivery and evaluation of teaching and learning. Wang (2011) argues that the emergence of Web 2.0. related technologies, brought a radical transformation in e-learning (and thus m-learning) environment: the largely central controlled education system turned to an interactive and conversational learning network. As a direct consequence we observe that learning practices are changing very fast (i.e introduction of e-books instead of traditional textbooks), while the learning theories that support educational practices are not (El-Hussein & Cronje, 2010). Educators are currently unable to follow the needs of the younger generations of learners described as digital natives (Corbeil & Valdes-Corbeil, 2007). These learners do not see technology as something foreign: they readily accept it and consider it as part of their everyday lives; they are totally immersed and addicted to mobile technologies. Young learners also created and use their own language and signs when communicating either via Short Message Service (SMS), e-mail or live chat through a mobile Internet or Wi-Fi connection (El-Hussein & Cronje, 2010); this is how they were called the text generation. Overall, the traditional teacher-centered, classroom situated learning environment, is now challenged by the digitally literate students who view learning as an open collaborate process without boundaries (Peters, 2009).

M-learning provides flexibility in higher education programmes that may result in some challenges that learners may not have imagined (Motiwalla, 2007). For example, a serious implication from the continuous exposure to information and interaction in a connected world can be the creation of confusion and disorientation to m-learners. Then various security issues regarding the information privacy of the users are raised as in any other commercial application. Mobile devices are currently appear to be more vulnerable than PCs, thus personal data are easily traceable for mobile users (Okazaki, 2011). Finally, there are ethical issues reading the use of m-learning in student assessment, where cheating cannot be easily prevented or traced based on the current technologies and learning philosophies (Banyard, Underwood, & Twiner, 2006).

The challenges of the use of m-learning are many for all stakeholders as it may have many technological restrictions. For instructors, m-learning is a challenge as they should be familiar with technology, not only to use it for teaching and learning but also to support developers who are challenged by the limited memory, the lack of keyboard, the small displays especially when compared to computers and laptops (Iqbal & Qureshi, 2012; Wang et al., 2009). Instructors should adapt the design of the courses to integrate ICT; this design should be dynamic, easily scalable and should be applied at all times and places (Marwan, Madar, & Fuad, 2013). Moreover, Marwan et al. (2013) suggest that instructors face the lack of time to prepare for class. There is also concern on the educators' ability to understand and respond to digital learning opportunities, as in many cases they are challenged by the need "to collaborate with a wide range of people such as web developers and programmers to deliver successful web-based education" (Peters, 2007). It is a fact that m-learning enables learning to occur at a less formal setting that is teacher-mediated, hence technical skills are required (Kearney et al., 2012). In addition, m-learning experiences can be customized for the learner to meet different learning styles and approaches, they may provide a high degree of collaboration and making connections to other people, creating further challenges to educators whose roles are changing (Mohammad & Job, 2013; Kearney et al., 2012). Thus, educators should be able to understand and analyze the unique challenges in emerging m-learning environments and facilitate insights to support their design and use of m-learning resources.

Students usually have access to the Internet and other applications via their mobile devices such as Facebook, YouTube, MySpace and other. They are also familiar with its use, hence being well introduced to m-learning may lead to its wide use in their own learning. Nowadays students are active and innovative in terms of their learning, they expect a quick response from the tutor and want an interactive learning, student-centered, authentic, collaborative and effective learning with the use of ICT (Marwan et al., 2013). According to Mirza and Al-Abdulkareem (2011, p. 88) "the learner's attitude and lack of prior knowledge of IT use are major factors that affect the acceptance of e-learning by students".

Previous research suggests that there are various factors that contribute to the adoption of m-learning by instructors and students. Ju, Sriprapaipong, and Minh (2007) claim that the perceived usefulness influences the intention to adopt m-learning. On top of usefulness, Wang et al. (2009) and Sarrab et al. (2013) identified other factors such as the self-managed pace of learning, the social influence, the performance and the effort expectancy. Venkatesh, Morris, Davis, and Davis (2003) added the available infrastructure to support the use of any m-learning system, and Liu and Li (2010) add the playfulness. The interface makes the use of mobile devices more interesting for students, as the learning is personalized, more fun, spontaneous, and engaging users to contribute and share (Sarrab et al., 2013). Marwan et al. (2013) add the interactive learning process, the integrated learning information and the high learning needs. Thornton and Houser (2002 in Moura & Carvalho, 2009) propose that recordings, communication and access to information in the local set, sending reminders or relevant information for students are good options of the use of m-learning. Attewell (2011) propose that m-learning assists in the development of the learners' literacy and numerical skills. In addition, m-learning students are able to experience a dynamic class via interaction. To understand the factors that contribute to the adoption of m-learning will help stakeholders (educators, software developers and technicians) to incorporate these factors into the design of the m-learning systems.

Challenges and restrictions of the use of m-learning include the lack of standardization, the low bandwidth, the limited processor speed and small screen size, low storage, short battery life, lack of data input capability (Sarrab et al., 2013; Maniar & Bennett, 2002), low display resolution, limited memory and less computational power (Shiau, Lim, & Shen, 2001). Marwan et al. (2013) claim that classes are difficult to be rescheduled with m-learning. All of the above benefits and challenges of m-learning could be summarized in Table 3.

If students are provided with the educational context in an appropriate and challenging manner, which is exciting and novel, they will be more inclined to use all these mobile devices and m-learning. M-learning has been considered to be a promising approach to complement student learning. At the same time, instructors cannot just be provided with the technology and left on their own; they should be provided with a vision and the necessary resources and support to use e-learning and m-learning.

E-Learning and M-Learning in the Middle East (ME) and Bahrain

Although e-learning has been growing rapidly in the Middle East (ME), North Africa (MENA) region and the Gulf Co-operation Council (GCC) countries, m-learning has been considered as an alternative learning style and a new fashion. In these countries, according to Hamou, Anwar and Benhadria (2012) several initiatives have been introduced such as proliferation of e-books and e-learning devices, as well as flexible access to distance learning. In fact, the Arab region witnesses an increasing penetration of mobile phones and much faster Internet (Muttoo, 2011). However, these initiatives do not show a clear shift towards e-learning and m-learning in the region.

Nevertheless, there are some good examples and initiatives of educational institutions that have contributed to the development of e-learning and m-learning. For example, Hamdan Bin Mohammed e-University (HBMeU) in the UAE has introduced an effective architecture for

Table 3. Benefits and challenges of m-learning

Benefits of M-Learning	Challenges of M-Learning
Great for people on the go.	May make it easier to cheat.
Anytime, anywhere access to content.	Could give tech-savvy students an advantage over non-technical students.
Can enhance interaction between and among students and instructors.	Can create a feeling of isolation or of being out-of-the-loop for non-techies.
Great for just-in-time training or review of content.	May require media to be reformatted or offered in multiple formats.
Can enhance student-centered learning.	Might render some content outdated because of rapid upgrades – here today, outdated tomorrow.
Can appeal to tech-savvy students because of the media-rich environment.	Could require additional learning curve for non-technical students and faculty.
Support differentiation of student learning needs and personalized learning.	Many be used by a new high-tech package for the same old dull and boring content.
Reduce cultural and communication barriers between faculty and students by using communication channels that students like.	There are different mobile platforms such as iOS, Android etc.
Facilitate collaboration through synchronous and asynchronous communication.	The wireless network trust ability.
Supports distance learning.	

Source: Corbeil and Valdes-Corbeil (2007, p. 54); Sarrab et al. (2013, p. 835-836) e-learning, and also contributed to the development of standards for e-learning programme accreditation (Hadj-Hamou, Anwar, & Benhadria, 2012). The *e-learning Declaration* was drafted at the 2008 e-learning Forum in Dubai, providing a new educational model, which is based on research on active research changing teaching and learning from the traditional approach to the student-oriented approach. In addition, they have launched an e-book and e-reader device to help learners use their iPad/iPhone for their learning. They support the blended learning approach, where they integrate the face-to-face learning with online collaborative learning and self-paced learning, as they make effective use of ICT to support delivery of the courses. They use Moodle, which enables the online collaborative learning, and asynchronous study is enabled by interactions with the professors via virtual classrooms (with the use of Wimba) and access to electronic teaching material.

Moreover, in Saudi Arabia, the rapid advancement in mobile technologies, wireless networks and the acceptance of new smart devices have increased the interest in m-learning. In fact, the Ministry of Higher Education (MOHE) has launched a national project "AAFQ" to develop a long-term plan for HE in order to address future challenges including m-learning (Garg, 2013). They have also established other projects such as the National Centre for E-learning and Distance Education (NCELDE) with its own learning portal, the Saudi Digital Library and the Saudi Centre for Support and Counseling to all beneficiaries of e-learning among others. The aim of the center is to become "an international leader in research, development and implementation of an e-learning architecture and infrastructure using open standards" (Mirza & Al-Abdulkareem, 2011, p. 91). Many universities in Saudi Arabia are utilizing distance-learning technologies. For example, King Saud University has recently initiated a new service that offers users with the ability to send text messages directly from a PC to a mobile phone (Altameem, 2011, p. 22). There is also the Knowledge International University (http://www.kiu.com.sa/website/index.php) established in Saudi Arabia in 2007, which specializes in online degrees programmes in Islamic studies (Mirza & Al-Abdulkareem, 2011).

In Oman, the Ministry of Education has established ongoing relations with Edutech Middle East to integrate 590 schools around the country with e-learning solutions (Mirza & Al-Abdulkareem, 2011). They also state that the Syrian Virtual University offers various degrees including diplomas, bachelor's and master's in business, technology and quality management.

As the GCC countries are endowed with oil and gas reserves they have turned their attention to education and to the improvement of the quality of education (World Economic Forum, 2010).

Table 4. Education rank of GCC countries

Country	Quality of Primary Education	Secondary Enrolment	Tertiary Enrolment	Quality of Educational System
Bahrain	41	36	74	38
Kuwait	79	62	92	88
Oman	48	70	81	43
Qatar	5	49	106	4
Saudi Arabia	54	43	75	41
UAE	29	46	84	27

Source: World Economic Forum (2010)

Although education is a high priority in the GCC countries, considerable ground has to be covered to make progress in terms of enrolment and quality enhancement (Hadj-Hamou et al., 2012, p. 57). Education has strategic significance in the Arab world, but still there are great variations among the Arab states in their literacy rates. In addition, there is limited financial support for education in a large number of Arab countries. According to the World Bank (2007) the rate of total expenditure in education relative to GDP in all Arab countries is nearly 1.3%.

Table 4 shows the education rank of GCC countries among 134 countries.

The same study reports that there is low quality of research, and low number of publications in the GCC countries in comparison to those from fast developing countries. Most universities are teaching-oriented, rather than research-oriented; the rate of researchers in Arab universities as compared with employees is 2.7 per 10.000. Moreover, the report suggests that there is lack of planning and strategies for education at all levels, lack of information and communications technology (ICT) integration into education, there is centralization of education, intellectual migration and weaker linkages between education and labour markets. Hence, decision-makers can respond to these challenges by exploring the potential of electronic communication for spreading education in the countries (Hadj-Hamou et al., 2012, p.60).

Bahrain is one of the countries in the Arab world that have recently considered the potential of distance education with the use of e-learning. A study in the Middle East reveals that only 49% of society members are aware of e-learning (CITC, 2007) and the main reason for the limited use of e-learning and m-learning in the region is the low public and teachers' esteem for online learning (Mirza & Al-Abdulkareem, 2011). The first e-learning project in Bahrain was the Future Project at His Majesty King Hamad's Schools, which was established on January 2005 to serve the public secondary education and at a later level to include the private schools as well. There is also the e-learning center at the University of Bahrain, opened in March 2007 under the patronage of the King's wife, Her Majesty Shaikha Sabeeka Bint Ibrahim Al Khalifa, who is also the President of the Supreme Council for Women. The e-learning center plays a significant role in Bahrain's development as the government of Bahrain takes a regional lead in the launch of a range of egovernment services. The center focuses on promoting the adoption of wireless technology to support teaching and learning programmes across eight university departments. It can be accessed by 8000 students, and both staff and students are benefiting with 145 teaching modules already tailored for delivery on the university's network. The center's facilities include a range of e-learning tools including email, and online university chat and discussion rooms, which enable 24-hour interactivity and access to information for academic staff and students. It ultimately aims to support all University of Bahrain students to become proficient in the use of modern technology in their learning and to develop valuable employment skills. The center has a broader remit to cascade and share the knowledge and expertise acquired through the e-learning and e-teaching with other academic institutes and professionals throughout Bahrain (Albardooli, Alobaidli, & Alyousha, 2006, p. 15).

Moreover, universities in the oil-rich GCC have shown particular interest in m-learning, which currently is treated as fashion (Mohammad & Job, 2013), but at the same time is considered by corporations and educational institutions to be very promising (Sharrab et al., 2013; Unesco, 2012). Nevertheless, there are many challenges identified in the adoption of e-learning and m-learning in the region. Weber (2011) suggests that there are some cultural concerns in the use of the Internet in the region. More specifically, he proposes that cultural taboos prevent or restrict the social interaction of unmarried men and women; hence some of the collaborative tools in the use of e-learning and m-learning "may be at variance with Islamic customs" (Weber, 2011, p. 1). He continues that there might be cultural bias such as language, as in many universities nowadays the communication and teaching and learning language is English. Even the fact that people in this culture are used to communicate mainly orally creates some challenges for the use of m-learning. In his study, Weber (2011) identified women and the issue of literacy as another challenge. He suggests that women's illiteracy in the Arab world is a major concern for women's education and development. Traditional, social and religious affiliations are impacting on women, as they cannot physically attend classes in traditional universities. However, the use of m-learning could be a potential solution to this issue as proposed by Tubaishat (2008) in his study of Zayed University, an all girl university in the UAE.

Finally, Weber (2011) claims that the issue of privacy is also a challenge. Censorship in most ME countries is common practice. There is the fear of misuse of student information similar to this of the use of Facebook. He adds that "Arabian Gulf traditions emphasize the privacy and sanctity of the home and the potential for misuse of online information used in an educational setting is immense" (2011, p. 2). Weber (2011) supports that in the MENA region instructors are concerned about the security of the educational data, and parents are concerned about the use of chats and the safety of the online environment. Mirza and Al-Abdulkareem (2011, p.84) add that exposure to material from the internet "could be considered dangerous to youths and to the religious moral values of those nations".

Moreover, Mirza and Al-Abdulkareem (2011) provide another barrier to e-learning adoption in the ME. They include the passive attitude that some governments took in response to e-learning and the low Internet penetration rate by the general public. They also comment on the conservative religious clerics who were warning of the dangers of the Internet, nevertheless, many adhered to the warning. The low public esteem for online learning was among the reasons for hesitation of many academics to resort to e-learning. This barrier impacted on the lack of online repositories that contain educational material in the Arabic language (Al-Khalifa, 2008).

Although, there is increased interest in m-learning adoption in teaching and learning in the region, there is limited research conducted (Iqbal & Qureshi, 2012; Mirza & Al-Abdulkareem, 2011). Most studies focus on the learners' perceptions and use of m-learning with very little research conducted in the instructors' views (Mirza & Al-Abdulkareem, 2011). Hence, the authors decided to investigate the adoption of m-learning at universities in the Kingdom of Bahrain, and explore the educators' views and perception of m-learning, their intention to use it, as well as its future potential in higher education. This chapter aims to provide an overview of the challenges that instructors face with the use of m-learning and of insights and recommendations on strategies for the use of mobile learning to change and enhance the pedagogies in HE.

SURVEY IN M-LEARNING

This chapter presents the findings of the pilot study of the questionnaire conducted in four out of eight universities in Bahrain; both private and public universities were included in the survey. In order to address the aim and the research questions of the study, Zawachi-Richter, Brown, and Delport (2009) questionnaire titled 'Mobile Learning: From single project status into the mainstream?' was used after having acquired the authors' permission for its use. Instructors were asked to rate the mobile learning and teaching experience of distance educators, the development and growth of mobile learning, the impact of mobile technologies on teaching and learning, mobile learning applications and mobile learning activities, mobile learning and access to (higher) education, and the future development of mobile learning with a 5 Likert scale from (1) strongly disagree to (5) strongly agree.

For the pilot study, a total of 45 questionnaires were collected between April and June 2013, in which educators were asked to provide their attitudes regarding m-learning as a tool in their teaching. The participants in the study were from different faculties such as Business, ICT, Humanities, Art and Design, and from different academic rankings, with the majority being PhD holders (53.3%). 35.6% were female and 64.4% were male.

In order to identify the instructors' perceptions of m-learning frequencies, means and standard deviations were calculated. Moreover to identify the main ideas about the future of m-learning the frequencies of responses were calculated.

M-Learning Survey Results in Bahrain

The current status of the use of m-learning at the institutional level was identified and the results are shown in Table 5. For the purpose of this paper the authors present the most frequent answers or the majority of answers.

It is evident from the above that the majority of the institutions in the study were face-to-face with limited use of e-learning. M-learning was non-existent and most did not have any plans in developing m-learning. In addition, there was no technical support or in the cases that there was, it was limited. However, 31.1% claimed that a new unit within the organisation has been created for the purpose of m-learning. In reference to the current status on m-learning the participants expressed their opinions on their knowledge on m-learning and on the use of mobile devices. The results are shown in Table 6.

Interestingly, most respondents are aware of m-learning, but only 15.6% are currently doing research and only 4.4% are involved in projects relevant to m-learning. Similarly, 15.6% of the respondents have not heard about mobile learning. The use of mobile devices is shown in Figure 2.

Most of the respondents (43.52%) used a laptop for connecting to the internet, and then their smartphone (22.27%), 16.20% use a tablet PC and only 1.1% use PDAs. Moreover the participants were asked to evaluate their experience in m-learning. The results are shown in Figure 3.

The majority of the responses to this question were towards the strongly disagree (1) area. 28% of the participants have been involved in m-learning projects, however, 22% of them state that these projects are not within their universities. 14% of the participants were not involved in projects on m-learning but were aware of others who were, and still 20% were not exposed to m-learning at all.

Further, respondents were asked to rate the importance of learning tools for students, the learning activities that are appropriate for mobile devices and the importance of applications. The findings are shown in Table 7. The results suggest that the respondents found very important 'being connected anywhere, anytime' (B4.5), and 'sharing texts, notes and documents' (B4.4), hence they did not find the text messaging or voice calls and

Table 5. M-learning status at institution level

	Response (N=45)	Frequency (%)
C1	A traditional face-to-face or contact-based teaching institution	34 (75.6)
C2	Non-existent	27 (60)
C3	No, there are no institutional plans for developing course materials for use on mobile devices	27 (60)
C4.1	No, there is no institutional support.	14 (31.1)
C4.2	Yes, a new unit at the organisation/institution has been created for this purpose.	14 (31.1)

Table 6. Current personal status

	Response (N=45)	Frequency (%)
B1.1	Yes, I am personally doing research on mobile learning	7 (15.6)
B1.2	Yes, but I am not personally doing research on mobile learning	11 (24.4)
B1.3	Yes, I am involved in mobile learning projects	2 (4.4)
B1.4	I have read a number of articles and papers on mobile learning.	4 (8.9)
B1.5	No, but other persons in my institution are knowledgeable.	14 (31.1)
B1.6	No, I have not heard about mobile learning.	7 (15.6)

Figure 2. Mobile devices

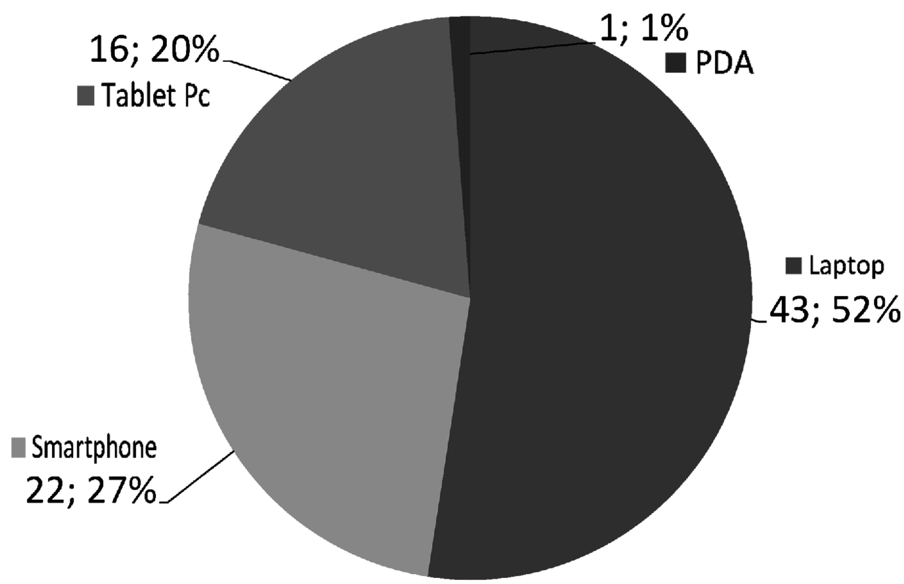
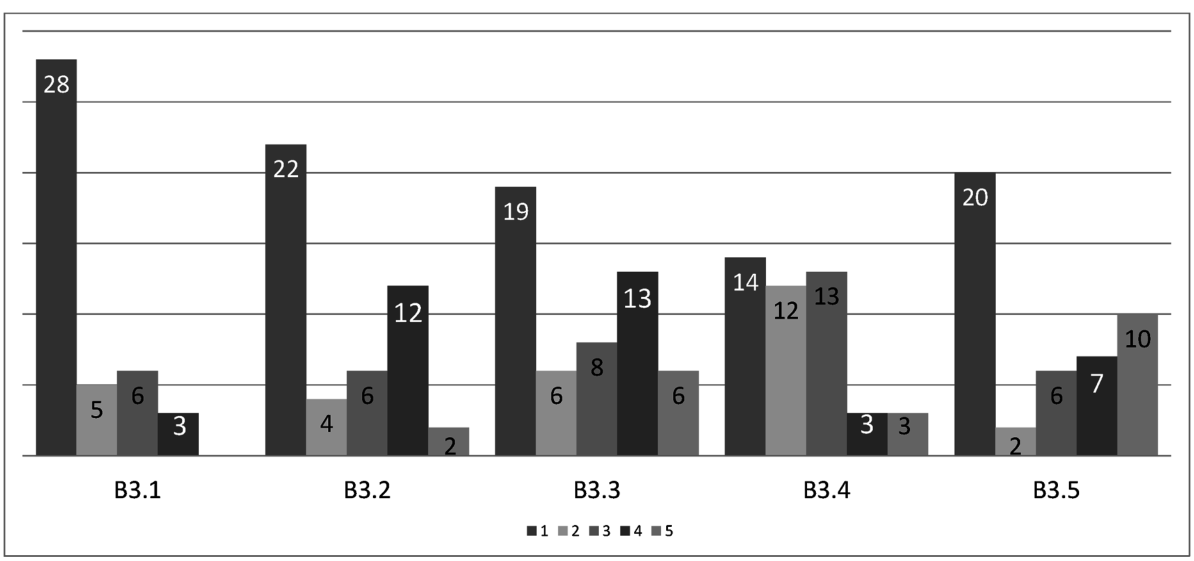


Figure 3. Experience in m-learning



e-mails as highly important tools for students. Moreover, they identified as appropriate learning activities for mobile devices 'coursework' (B5.1), 'collaborative learning' (B5.3) and 'information retrieval' (B5.5). The applications found to be more important were all those included in the questionnaire such as mobile office (B6.1), diary and scheduling (B6.2), audio and video applications (B6.3), imaging (B6.4), other accessories (B6.5) and online data services (B6.6). Finally, the most useful tools were accessing information such as notes, documents etc (B7.2) and again 'being connected anywhere, anytime' (B7.5).

The respondents were asked to rate the new strategies and methodologies that are facilitated by m-learning. The results are shown in Table 8.

Except the 'assessment' (B8.2, Mean=2.69), the rest of the variables were rated close to agree and strongly agree responses. It was evident that they would use m-learning mainly to assess students' knowledge short time before a lecture or a discussion. Interaction (B8.4, Mean=4.02) was the most important of all the strategies that are facilitated by m-learning. Hence, the respondents suggested that m-learning provides more support for collaboration, more support for bottom-up content creation and could be used to consult peers. Next important strategy for m-learning was the resources for m-learning (B8.3, M=3.84). The participants use it for generating information, sharing resources, navigation and other. The major weaknesses of mobile devices that might hinder

Table 7. Importance rating of importance for tools (B4), learning activities (B5), applications (B6) and learning tools (B7)

Item (N=45)	1 (Freq)	2 (Freq)	3 (Freq)	4 (Freq)	5 (Freq)
B4.1	7 (15.6)	7 (15.6)	10 (22.2)	10 (22.2)	11 (24.4)
B4.2	7 (15.6)	8 (17.8)	13 (28.9)	10 (22.2)	7 (15.6)
B4.3		5 (11.1)	12 (26.7)	18 (40.0)	10 (22.2)
B4.4	3 (6.7)	1 (2.2)	5 (11.1)	18 (40.0)	18 (40.0)
B4.5	3 (6.7)	1 (2.2)	3 (6.7)	14 (31.1)	24 (53.3)
B5.1	6 (13.3)	7 (15.6)	10 (22.2)	6 (13.3)	16 (35.6)
B5.2	3 (6.7)	12 (26.7)	5 (11.1)	12 (26.7)	13 (28.9)
B5.3	2 (4.4)	3 (6.7)	7 (15.6)	19 (42.2)	14 (31.1)
B5.4		5 (11.1)	12 (26.7)	18 (40.0)	10 (22.2)
B5.5		4 (8.9)	10 (22.2)	10 (22.2)	21 (46.7)
B6.1	5 (11.1)	5 (11.1)	7 (15.6)	9 (20.0)	19 (42.2)
B6.2	2 (4.4)	6 (13.3)	8 (17.8)	10 (22.2)	19 (42.2)
B6.3	2 (4.4)	4 (8.9)	15 (33.3)	7 (15.6)	17 (37.8)
B6.4	2 (4.4)	7 (15.6)	10 (22.2)	12 (26.7)	14 (31.1)
B6.5	2 (4.4)	1 (2.2)	11 (24.4)	15 (33.3)	16 (35.6)
B6.6	2 (4.4)		2 (4.4)	7 (15.6)	34 (75.6)
B7.1	1 (2.2)	7 (15.6)	12 (26.7)	11 (24.4)	14 (31.1)
B7.2	2 (4.4)	3 (6.7)	11 (24.4)	15 (33.3)	14 (31.3)
B7.3	1 (2.2)	9 (20.0)	10 (22.2)	12 (26.7)	13 (28.9)
B7.4	1 (2.2)	8 (17.8)	8 (17.8)	15 (33.3)	13 (28.9)
B7.5	1 (2.2)	1 (2.2)	5 (11.1)	10 (22.2)	28 (62.2)

Table 8. Strategies and methodologies

Category	Typical Examples	Mean	SD
B8.1 Learning Activities	(Inter)active learning, authentic learning, explorative learning, project orientated learning, situated and informal learning, Qs & As.	3.60	1.286
B8.2 Assessment	Security for testing and evaluation procedures, assessment to determine students' knowledge a day or two before a lecture/discussion to determine which topics need more attention.	2.69	1.411
B8.3 Resources	Generation of information, sharing resources, data sourcing, access to information, navigation, m-library.	3.84	1.127
B8.4 Interaction	More support for collaboration, more support for bottom-up content creation, enhanced social support, consulting peers & experts. Distance Educators will teach again instead of providing teaching material only.	4.02	1.033
B8.5 Personalisation & Individualisation	New strategies might emerge from better knowledge of learner behaviours and study patterns with technology, which were never examined that closely before, just-in-time learning, addressing learner styles or needs, keeping it simple, focus on small 'chunks' of learning, just-in-time support/job aids.	3.76	.957

m-learning were also rated by the respondents as shown in Figure 4.

Most of the respondents agreed or strongly agreed with all the variables except the screen size (B9.2). This showed that the size of the screen of mobile devices was not considered to be a hindering factor for m-learning. On the contrary, the small size of the displays was found to be a challenge for m-learning activities. Similarly, the costs of network, the memory size, the device capabilities and the limited battery time were among the most important challenges for applying m-learning.

When respondents were asked their views on the latest trends and developments in teaching and learning as well as on when m-learning will be an integral part of mainstream in HE, this is reflected in Table 9.

Most of the respondents (51.1%) supported the view that although the technology should impact on the teaching and learning, currently this was not the case. 26.7% agreed that teaching and learning strategies and methodologies adapt to the constant changes in technology. In addition, most of the respondents (75.6%) believed that m-learning will become an integral part of mainstream HE within 5 years.

Finally the participants were asked to present their views on the future trends of m-learning. For the purpose of this paper only the majority of responses are illustrated in Table 10.

The majority of the respondents (55.6%) supported the view that new teaching and learning strategies will emerge due to IT developments. In addition, they proposed that they will enhance the teaching and learning, nevertheless, they proposed that the mobile devices will be the preferred device for learning. They also supported that m-learning will widen access to HE, because of the profileration of mobile phones and wireless infrastructure and the devices are expected to be small in size. Most of the respondents (84.4%) agreed that m-learning will facilitate new strategies and methodologies for learner support.

CONCLUSION

M-learning as a relatively recent phenomenon in higher education, enjoys high popularity among university students globally. In the ME region change has already started and e-learning and m-learning are becoming part of the educational system. Some may still be unfamiliar with the technical advancements in e-learning and m-learning, but plans are in place to make these technologies widely known and usable in the near future.

Figure 4. Major weaknesses

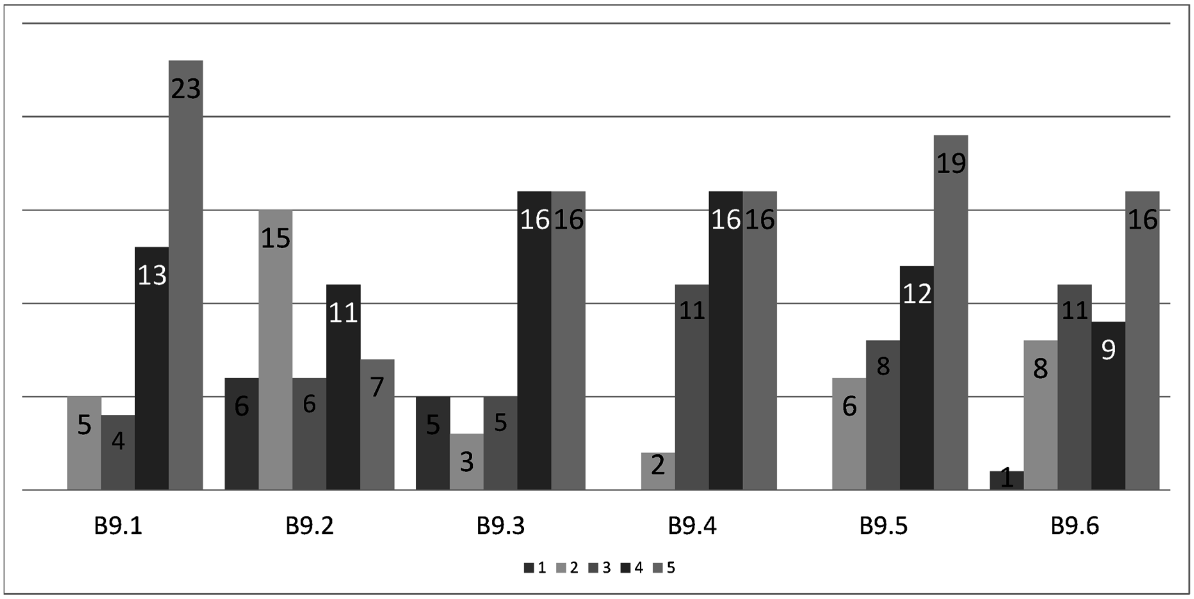


Table 9. Respondents' views on trends and developments in m-learning (and in years)

Responses	Technology changes should not have an impact on our teaching & learning strategies and methodologies.	Technology changes should have an impact on our teaching & learning strategies and methodologies, but this is currently not the case at present.	Teaching and learning strategies and methodologies adapt continuously due to new affordances that technology provides.	Technology changes bring about radical changes to our teaching & learning strategies and methodologies.
Frequency	2	23	12	8
(Percent)	(4.4)	(51.1)	(26.7)	(17.8)

The key opportunity identified in this chapter is the ability of m-learning to provide learning that is "just in time". Mobile devices have the potential to deliver the kind of learning that is embedded in our daily lives, as the use of these devices is well established. Many instructors in higher education, including Bahrain, recognize the benefits of m-learning, but there is limited adoption for educational use. The main challenge identified in the chapter is the age and ability of instructors to use these mobile devices and technologies.

In order to support a strategic response to the opportunities and demands of mobile learners, the higher education sector needs to be informed about the actual use of mobile devices, and about potential future trends in mobile learning. This requires the re-examination and re-design of the foundational assumptions and presuppositions on which all previous understandings of the term "higher education" are constructed. It is imperative that this process foregrounds pedagogy rather than technology. In addition, these on-going structural changes in higher education, provide the potential to make learning more efficient, personal and culturally acceptable for learners. Training and workshops should be provided to increase faculty perception of e-learning and m-learning. This change and the integration of m-learning

Table 10. Future trends of m-learning

Statement	Frequency N=45	Percent
Teaching and learning theories in 20 years…		
In essence remain the same, but new learning paradigms and learning strategies will emerge because of technological developments.	25	55.6
Change completely with new learning theories replacing behaviourism and constructivism due to the radical impact of future technologies.	15	33.3
The attributes and opportunities that mobile technologies afford will…		
Be very helpful in enhancing teaching and learning independent of time and space.	33	73.3
Mobile devices and applications will in future be…		
Only one of many types of computing devices used.	22	48.9
The preferred access and learning device for any type of learning.	15	33.3
The development of m-learning will have an impact on HE		
It will widen access to (higher) education, because of the proliferation of mobile phones and wireless infrastructure – especially in developing countries.	29	64.4
The ideal mobile devices in the future will be…		
Small but still laptop sized devices because of its all-in-one device nature.	12	26.7

requires a change in the pedagogical paradigm in agreement with Moura and Calvalho (2009). The authors propose that this change should include transformation in the design and the development of teaching material.

It is also important to introduce by laws that governs the e-learning and distance learning which encourages students to participate at this type of learning. Regardless criticisms and debates, m-learning is now part of the academic curricula; what remains to see is how smooth the transition from the traditional to the contemporary teaching and learning environment can be.

IMPLICATIONS FOR FUTURE RESEARCH

The purpose of this chapter was to investigate the instructors' views on m-learning and its use in teaching and learning in higher education in Bahrain. It is evident from the above that m-learning plays an important role in teaching and learning strategies. Although, most of the participants work in institutions that do not offer m-learning strategies and they use face-to-face teaching, the instructors are considering its use, and some already conduct research in m-learning. Students and faculty will find ways to integrate m-learning in all aspects of their lives including the tasks of teaching and learning. Nevertheless, educational systems should not assume that instructors are proficient in using new technologies. Similarly to Ferry (2008), this chapter proposes that there is a need to integrate appropriate technologies into existing education systems. Professional development programmes should focus not only on the technology, skills and knowledge required to implement m-learning strategies, but also on the targeted use of technologies that support overall learning goals. Hence, further research is required to identify and determine such professional development programmes for instructors in higher education, especially in the Kingdom of Bahrain and the region.

Moreover, it was interesting that the majority of the respondents have not heard of m-learning.

The findings proposed that m-learning could be considered a continuation of traditional learning methods as well as an alternative to the methods of effective learning. It is mainly used for coursework, information retrieval and collaborative learning. The most important elements of m-learning included the fact that instructors are connected anywhere anytime, and they can share texts with their students, supporting the view of Giousmpasoglou and Marinakou (2013). Hence, instructors should be cautious when including e-learning as part of their assessment as the infrastructure and the support is not available at the institutions in the study. This study agrees with Venkatesh et al. (2003) that the available support and infrastructure are important for the use of e-learning and m-learning. Similarly to Sarrab et al. (2013), the main weaknesses identified include the small size of displays, the cost of network, the memory size and the mobile devices capabilities. However, the participants proposed that the new technologies should have an impact on teaching and learning in HE, and they believed that new may emerge, as they may enhance the learning and the teaching strategies. Macallum and Jeffery (2009) also propose that mobile devices may enhance m-learning, and the teaching and learning pedagogies.

Understanding the factors that contribute to the effective use of m-learning may help stakeholders to incorporate those in the design and implementation of m-learning. It is necessary to identify the practices in terms of instructional design and adapt them to reflect the number of changes that have taken place in education from the use of e-learning and m-learning. A transformation towards m-learning requires not only the use of the devices but also awareness and familiarity with new technologies (Wang, 2011), hence mobile tools should be aligned with the course objectives, and instructors should be aligned with m-learning requirements. M-learning should be used appropriately in order to be effective (Herrington et al., 2009), thus instructors should have the technical know-how as they are an essential part of m-learning.

This study proposes that informative meetings and instructors' training on m-learning can enhance the perception and the use of m-learning in higher education in Bahrain. Nevertheless, more empirical research is required to test the effectiveness of e-learning. Future studies can focus on identifying the factors, challenges and weaknesses in specific disciplines as the use of technology varies depending on the field of study for example it can be limited in liberal arts. It would also be interesting to explore the above findings in terms of gender differences.

REFERENCES

Al-Khalifa, H. (2008). Building an Arabic learning object repository with an ad hoc recommendation engine. In *Proceedings of the iiWAS* (pp. 390-394). Linz: iiWAS. doi:10.1145/1497308.1497378

Albardooli, M., Alobaidli, O., & Alyousha, F. (2016). *E-mobile, the future of e learning*. Thesis submitted at the University of Bahrain. Retrieved from www.albardooli.com/dlobjects/EmobileMAlbardooli.pdf

Alsaadat, K. (2009). Mobile learning and university teaching. In *Proceedings of the International Conference on Education and New Learning Technologies* (vol. 6, pp. 5895-5905). Barcelona: IATED.

Altameem, T. (2011). Contextual mobile learning system for Saudi Arabian universities. *International Journal of Computers and Applications*, *21*(4), 21–26. doi:10.5120/2499-3377

Attewell, J. (2011). *From research and development to mobile learning: tools for education and training providers and their learners*. Retrieved from http://www.mlearn.org.za/CD/papers/Attewell.pdf

Banyard, P., Underwood, J., & Twiner, A. (2006). Do enhanced communication technologies inhibit or facilitate self-regulated learning? *European Journal of Education*, *41*(3/4), 473–489. doi:10.1111/j.1465-3435.2006.00277.x

BenMoussa, C. (2003). *Workers on the move: New opportunities through mobile commerce*. Paper presented at the Stockholm Mobility Roundtable. Stockholm, Sweden.

Bharuthram, S., & Kies, C. (2013). Introducing e-learning in a South African higher education institution: Challenges arising from an intervention and possible responses. *British Journal of Educational Technology*, *44*(3), 410–420. doi:10.1111/j.1467-8535.2012.01307.x

Brink, J. (2011). M-learning: The future of training technology. *Training & Development*, *65*(2), 27.

Brown, A., & Campione, J. (1996). Psychological theory and design of innovative learning environments: on procedures, principles, and systems. In L. Schauble & R. Glaser (Eds.), *Innovations in learning: new environments for education* (pp. 289–325). Mahwah, NJ: Erlbaum.

Corbeil, J. R., & Valdes-Corbeil, M. E. (2007). Are you ready for mobile learning? *EDUCAUSE Quarterly*, *30*(2), 51–58.

Dawabi, P., Wessner, M., & Neuhold, E. (2003). Using mobile devices for the classroom of the future. In *Proceedings of Mlearn 2003 Conference on Learning with Mobile Devices* (pp. 14-15). London: Mlearn.

Demian, P., & Morrice, J. (2012). The use of virtual learning environments and their impact on academic performance. *English Education*, *7*(1), 11–19. doi:10.11120/ened.2012.07010011

Devinder, S., & Zaitun, A. B. (2006). Mobile learning in wireless classrooms. *Malaysian Online Journal of Instructional Technology*, *3*(2), 26–42.

El-Hussein, M. O. O., & Cronje, J. C. (2010). Defining Mobile Learning in the Higher Education Landscape. *Journal of Educational Technology & Society*, *13*(3), 12–21.

Ferry, B. (2008). *Using mobile phones to augment teacher learning in environmental education*. Retrieved from http://www.ascilite.org.au/conferences/melbourne08/procs/ferry.pdf

Garg, V. (2013). *The emergence of mobile learning for higher education in Kingdom of Saudi Arabia*. UPSIDE learning blog. Retrieved from http://upsidelearning.com/blog/index.php

Giousmpasoglou, C., & Marinakou, E. (2013). The future is here: M-learning in higher education. *Computer Technology and Application*, *4*(6), 317–322.

Hadj-Hamou, N., Anwar, S. A., & Benhadria, M. (2012). A new paradigm for e-learing in the Arab Middle East: Reflections on e-books and e-Reader devices. In T. T. Goh, B. C. Seet, & P. C. Sun (Eds.), *E-Books & E-Readers for E-Learning* (pp. 92–123). Wellington, New Zealand: Victoria Business School.

Herrington, J., Mantei, J., Olney, I., & Ferry, B. (2009). Using mobile technologies to develop new ways of teaching and learning. In J. Herrington, A. Herrington, J., Mantei, I., Olney, & B. Ferry (Eds.), New technologies, new pedagogies: Mobile learning in higher education (p. 138). New South Wales, Australia: Faculty of Education, University of Wollongong.

Iqbal, S., & Qureshi, I. A. (2012). M-learning adoption: A perspective from a developing country. *International Review of Research in Open and Distance Learning*, *13*(3), 147–164.

Ju, T. L., Sriprapaipong, W., & Minh, D. N. (2007). *On the success factors of mobile learning*. Paper presented at 5th Conference on ICT and Higher Education. Bangkok, Thailand. Retrieved from http://www.mendeley.com/research/success-factors-mobile-learning/

Kearney, M., Schuck, S., Burden, K., & Aubusson, P. (2012). Viewing mobile learning from a pedagogical perspective. *Research in Learning Technology*, *20*(1).

King, J. P. (2006). *One hundred philosophers: A guide to world's greatest thinkers* (2nd ed.). London: Apple Press.

Klopfer, E., Squire, K., & Jenkins, H. (2002). Environmental detectives: PDAs as a window into a virtual simulated world. In *Proceedings for the International Workshop on Wireless and Mobile Technologies in Education* (pp. 95-98). Vaxjo, Sweden: IEEE.

Koszalka, T. A., & Ntloedibe-Kuswani, G. S. (2010). Literature on the safe and disruptive learning potential of mobile technologies. *Distance Education*, *31*(2), 139–157. doi:10.1080/01587919.2010.498082

Kukulska-Hulme, A., & Traxler, J. (2007). *Designing for mobile and wireless learning*. London: Routledge.

Liaw, S. S., Hatala, M., & Huang, H. M. (2010). Investigating acceptance toward mobile learning to assist individual knowledge management: Based on activity theory approach. *Computers & Education*, *54*(2), 446–454. doi:10.1016/j.compedu.2009.08.029

Liu, Y., & Li, H. (2010). Mobile internet diffusion in China: An empirical study. *Industrial Management & Data Systems*, *110*(3), 309–324. doi:10.1108/02635571011030006

MacCallum, K., & Jeffrey, L. (2009). Identifying discriminating variables that determine mobile learning adoption by educators: An initial study. In Proceedings of the conference for Same places, different spaces. Auckland: Ascilite. Retrieved from http://www.ascilite.org.au/conferences/auckland09/procs/maccallum.pdf

Maniar, N., & Bennett, E. (2007). Media influence on m-learning? In S. Iqbal, & I.A. Qureshi. (2012). M-learning adoption: A perspective from a developing country. *International Review of Research in Open and Distance Learning*, *13*(3), 147–164.

Marwan, M. E., Madar, A. R., & Fuad, N. (2013). An overview of mobile application in learning for student of Kolejpoly-tech Mara (KPTM) by using mobile phone. *Journal of Asian Scientific Research*, *3*(6), 527–537.

Mirza, A. A., & Al-Abdulkareem, M. (2011). Models of e-learning adopted in the Middle East. *Applied Computing and Informatics*, *9*(2), 83–93. doi:10.1016/j.aci.2011.05.001

Motiwalla, L. F. (2007). Mobile learning: A framework and evaluation. *Computers & Education*, *49*(3), 581–596. doi:10.1016/j.compedu.2005.10.011

Moura, A., & Carvalho, A. (2009). Mobile learning: two experiments on teaching and learning with mobile phones. In R. Hijon-Neira (Ed.), *Advanced Learning* (pp. 89-103). Rijeka, Croatia: InTech. Retrieved from http://www.intechopen.com/download/get/type/pdfs/id/8593

Muttoo, S. (2011). '*Mobile' changes in the Arab world.* Middle East economy and Globalization. Retrieved from http://www.strategicforesight.com/inner-articles.php?id=128£.UiRFZD-BWSo

Okazaki, S. (2011). Teaching students while leaking personal information: m-learing and privacy. In *Proceedings of 4th International Conference of Education, Research and Innovations* (pp. 1659-1664). Madrid: IATED.

Orr, G. (2010). Review of the literature in mobile learning: Affordances and constraints. In *Proceeding of the 6th IEEE International Conference on Wireless, Mobile and Ubiquitous Technologies in Education* (pp. 107-111). Taiwan: IEEE. doi:10.1109/WMUTE.2010.20

Peng, H., Su, Y., Chou, C., & Tsai, C. (2009). Ubiquitous knowledge construction: Mobile learning re-defined and conceptual framework. *Innovations in Education and Teaching International*, *46*(2), 171–183. doi:10.1080/14703290902843828

Peters, K. (2009). m-Learning: Positioning educators for a mobile, connected future. In M. Ally (Ed.), Mobile learning: Transforming the delivery of education and training (pp. 113-132). Vancouver: Marquis Book Printing.

Quinn, C. (2001). Get ready for m-learning. *Training & Development*, *20*(2), 20–21.

Rosenberg, M. (2001). *E-learning: Strategies for delivering knowledge in the digital age*. New York: MacGraw-Hill.

Sad, S. N., & Goktas, O. (2013). Preservice teachers' perceptions about using mobile phones and laptops in education as mobile learning tools. *British Journal of Educational Technology*, *45*(4), 606–618. doi:10.1111/bjet.12064

Sarrab, M., Al-Shihi, H., & Rehman, O. M. H. (2013). Exploring major challenges and benefits of m-learning adoption. *British Journal of Applied Science and Technology*, *3*(4), 826–839. doi:10.9734/BJAST/2013/3766

Serin, O. (2012). Mobile learning perceptions of the prospective teachers (Turkish Republic of Northern Cyprus sampling). *TOJET: The Turkish Online Journal of Educational Technology*, *11*(3), 222–233.

Sharples, M., Taylor, J., & Vavoula, G. (2007). *A theory of learning for the mobile age*. London: Sage Publications.

Shiau, K., Lim, E. P., & Shen, Z. (2001). Mobile commerce: Promises, challenges, and research agenda. *Journal of Database Management*, *12*(3), 4–13. doi:10.4018/jdm.2001070101

Siemens, G. (2005). *A Learning Theory for the Digital Age*. Retrieved from http://www.elearnspace.org/Articles/connectivism.htm

Smith, M., & Kukulska-Hulme, A. (2012). Building Mobile Learning Capacity in Higher Education: E-books and iPads. In M. Specht, J. Multisilta, and M. Sharples, (Eds.), *11th World Conference on Mobile and Contextual Learning Proceedings* (pp. 298-301). Helsinki: CELSTEC & CICERO Learning.

Traxler, J. (2009). Learning in a mobile age. *International Journal of Mobile and Blended Learning*, *1*(1), 1–12. doi:10.4018/jmbl.2009010101

Tubaishat, A. (2008). Adoption of learning technologies to alleviate the impact of social and cultural limitations in higher education. In *Proceedings of the 1st E-learning Excellence Forum* (pp. 15-18). Dubai: Academic Press.

Venkatesh, V., Morris, M. G., Davis, G. B., & Davis, F. D. (2003). User acceptance of information technology: Toward a unified view. *Management Information Systems Quarterly*, *27*(3), 425–478.

Wang, M. (2011). Integrating organizational, social, and individual perspectives in Web 2.0-based workplace e-learning. *Information Systems Frontiers*, *13*(2), 191–205. doi:10.1007/s10796-009-9191-y

Weber, A. S. (2011). *Research programme for next-gen e-learning in MENA region*. Paper presented at the 7th International Scientific Conference eLearning and Software for Education. Bucharest, Romania. Retrieved from https://adlunap.ro/else_publications/papers/2011/1758_2.pdf

Welsh, E. T., Wanberg, C. R., Brown, K. G., & Simmering, M. J. (2003). E-learning: Emerging uses, empirical results, and future directions. *International Journal of Training and Development*, *7*(4), 245–258. doi:10.1046/j.1360-3736.2003.00184.x

World Bank. (2007). *World development report*. Washington, DC: Author.

World Economic Forum. (2010). *Global competitiveness report 2010-2011*. Davos: Author.

Zawacki-Richter, O., Brown, T., & Delport, R. (2009). Mobile learning: from single project status into the mainstream? *European Journal of Open, Distance and E-learning*. Retrieved from http://www.eurodl.org/?article=357

KEY TERMS AND DEFINITIONS

Bahrain: The Kingdom of Bahrain is a small island country in the Persian Gulf. Since 2012 was ranked 48th in the world in the Human Development Index, and was recognized by the World Bank as a high income economy. Currently, there are 12 universities.

Blended Learning: A method of learning which uses a combination of different resources, especially a mixture of classroom sessions and online learning materials.

Collaboration (Collaborative Learning): Learners making rich connections and sharing resources to other learners and/or educators; this type of communication is mediated by a mobile device.

E-Learning: Any type of learning conducted via electronic media using specialized software, typically on the Internet.

Higher Education: The education offered after secondary education, usually available through colleges, universities, including vocational training, trade schools and other professional certifications.

Information and Communication Technologies (ICTs): The term stresses the role and importance of unified communications and the integration of telecommunications with computers as well as necessary enterprise software, middleware, storage, and audio-visual systems, which enable users to access, store, transmit, and manipulate information.

M-Learning (Mobile Learning): Any activity that allows learners to be more productive when interacting with, or creating information, mediated through a mobile device that the learner carries on a regular basis, has reliable connectivity, and fits in a pocket, a purse or a handbag.

Teaching and Learning: Teaching is undertaking certain ethical tasks or activities the intention of which is to induce learning, to impact knowledge of or skill of. Learning is the act or process of acquiring knowledge or skill.

Ubiquity: The ability of users to access content "anytime – anywhere" though the use of mobile devices.

Virtual Learning Environments (VLEs): A set of teaching and learning tools designed to enhance a student's learning experience by including computers and the Internet in the learning process.

This work was previously published in Assessing the Role of Mobile Technologies and Distance Learning in Higher Education edited by Patricia Ordóñez de Pablos, Robert D. Tennyson, and Miltiadis D. Lytras, pages 176-199, copyright year 2015 by Information Science Reference (an imprint of IGI Global).

Section 5

Issues and Challenges

This section contains 13 chapters, giving a wide variety of perspectives on Curriculum Design and Classroom Management and its implications. Within the chapters, the reader is presented with an in-depth analysis of the most current and relevant issues within this growing field of study. Crucial questions are addressed and alternatives offered, and topics discussed.

Chapter 64
Using a Task-Based Approach for Supporting a Blended Learning Model for English as a Foreign Language

Anita Ferreira Ferreira
Universidad de Concepción, Chile

Jaime García Salinas
University of Queensland, Australia

Sandra Morales
Newcastle University, UK

ABSTRACT

As Computer-Assisted Language Learning (CALL) has taken an important role in foreign language teaching and learning, not only is concrete data about the usefulness of technology- mediated environments for these purposes necessary, but also how the learning process is improved in such environments when learner training for CALL. The objective of this paper is to present an investigation which sought to explore empirical evidence regarding the effectiveness of a blended learning model, and also the use of language learning strategies in this kind of learning environment in order to increase its methodological potency with language learners. Consequently, this paper shows the findings of 2 experimental studies which aimed to provide data on (1) the efficiency of a blended learning (BL) model for language teaching and learning which combined task-based instruction, cooperative learning and optimal methodological principles for online learning (Doughty & Long, 2003), and (2) the use of learner training strategies for CALL in order to support and enhance the language learning process in this blended learning environment. The results from both studies suggest that the experimental group improved their language proficiency when compared to the control group. As a result, it is possible to conclude that (1) the blended learning design that included online tasks and cooperative instruction was beneficial for the development of language skills and (2) the use of learner training strategies for the blended learning model was highly beneficial for the students' language learning experience.

DOI: 10.4018/978-1-4666-8246-7.ch064

INTRODUCTION

One of the main objectives in CALL research has been the search and analysis of language learning and teaching models which are able to optimize the amount of input and practice that language learners receive inside and outside the classroom (Hubbard, 1996; Warschauer & Kern, 2000; Chapelle, 2001; Lamy & Hampel, 2007; Levy & Stockwell, 2007). Currently, with innovations such as mobile devices, it is possible for language teachers to implement methodological models which combine face-to-face teaching and technology-mediated tasks in order to support language learning using different resources for content delivery. Generally, the limited amount of practice hours tends to hinder the language learning process and the development of linguistic skills. In addition, the tasks assigned by the teacher (during or after the lesson) normally receive minimal attention due to the lack of time for feedback. Even though online learning provides valuable resources for language learning in general, it is in some cases the speaking skill which is left aside because of the lack of appropriate resources that enhance its development in virtual environments. This is why teaching in a context which combines e-learning and face-to-face instruction makes it possible to balance the development of the different language skills. The advantages of e-learning allow the implementation of eclectic models for language learning by including the best elements of these two areas (Gruba & Hinkelman, 2012; Lamy & Hampel, 2007).

Taking this into consideration, a model which includes face-to-face classes in e-learning contexts empowers this blend to improve language learning. The CALL methodological framework indicates that teachers have an important role acting as a guide in technology-mediated language learning contexts. The existing generation of technological resources offers advantages compared to the traditional class in terms of accessibility to authentic materials and experts in the field such as the case of using a computerized tutor, which may support certain aspects of students' learning like metacognitive monitoring (Aleven & Koedinger, 2002). Moreover, including task-based language teaching - defined by Nunan (2004) as a piece of classroom work that involves learners in comprehending, manipulating, producing or interacting in the target language while their attention is focused on mobilizing their grammatical knowledge in order to express meaning and in which the intention is to convey meaning rather than to manipulate form - and cooperative learning - defined as the use of small groups designed to encourage students to work together to maximize their own and each other's learning (Johnson, Johnson, & Holubec, 1998) - in a blended learning model provides many advantages to the language learning process. The use of the *tasks* (i.e. real-world-related projects) as the main pedagogical input in face-to-face or online setting connects the students with authentic situations, emphasizing communication and an appropriate psycholinguistic environment for language acquisition (Doughty & Long, 2003; Ellis, 2003; Richards & Rodgers, 2001). In addition, cooperation fosters critical thinking, responsibility for learning and interaction with peers (McGroarty, 1993; Olsen & Kagan, 1992).

These teaching methodologies, however, present certain challenges for teachers as well as students in terms of developing learning strategies in order to use a variety of virtual resources effectively. As a result, learning a language using the blended learning approach requires students to develop plans of actions to make the most out of this learning experience. Several investigations in this area (Cohen, 1990; Oxford & Crookall, 1989) suggest the necessity to train students regarding the use of language learning strategies in online contexts, in order to manage technology in the language class and learn the target language efficiently in computer mediated environments. Bearing this in mind, in addition to observe the effectiveness of a blended learning model for language learning, this research intended to explore how training students to use different learning strategies in a blended learning context allowed them to be more autonomous. The aim was, therefore, to explore if they managed to improve their language proficiency levels by setting goals, monitoring and evaluating their performance in the target language. This learner training sought to foster students' autonomous learning by raising their awareness on how to take advantage of the blended model so they could be more competent to organize their learning, control their anxiety and foster language learning skills development.

The organization of this paper is explained as follows: Firstly, a literature review concerning the major theoretical principles of the foundation of this research is analyzed. In this section, concepts such as blended learning, task based instruction; cooperative learning, learner training and language learning strategies will be defined and examined. Secondly, a description of the experimental study which targeted the efficiency of a blended learning model for language teaching and learning is presented. Thirdly, the investigation related to learner training and language learning strategies is introduced. Finally, data analysis is examined and conclusions, as well as implications drawn from both studies, are presented and discussed.

LITERATURE REVIEW

Blended Learning Approach

Among the different methodologies for foreign language learning and teaching through technology-mediated environments, blended learning can be seen as a valid alternative that combines face-to-face sessions and computer-assisted language learning (CALL). It involves learning language in any context with, through, and around computer technologies (Egbert, 2005). Incorporating online and offline resources may provide greater support to foster language learning and also autonomy in students. This exposure to different content transmission channels not only would enhance language skills development among learners (i.e. reading, writing, speaking and listening), but also their electronic literacy. The aim is that students are able to learn the language effectively by making optimal use of online applications for educational purposes (Doughty & Long, 2003).

Blended learning combines the elements of virtual learning (technological resources and internet) with the possibility to interact with a teacher or tutor (and the rest of the students) as a guide and facilitator for learning (Marsh, 2003). When using this methodology, it is possible to organize how the contents will be delivered in a more strategic and flexible way considering the students' needs (Morrison, 2003). According to Graham, Allen and Ure (2005), if a blended learning methodology is used, it is possible to develop pedagogy, improve access and flexibility, and increase learning and teaching effectiveness. In terms of design, Neumeier (2005) recommends that in order to implement an efficient blended learning model that helps to meet a language course's objectives, it is necessary to have a methodological framework with clearly defined parameters that mix theory and practice of the taught contents. Taking this into account, it is possible to include the theoretical background from different language teaching approaches such as task-based language teaching, cooperative learning, and the communicative approach. This is done in order to effectively combine the core elements from each aforementioned approach, thus increasing language proficiency in online and offline contexts.

When working with blended learning models, students can take more advantages of the resources to develop their language skills and have a substantial learning experience. If they have access to different technological resources, they can acquire and employ a range of learning strategies that can promote autonomy. In the face-to-face sessions, the students are forced to carefully think about the procedures they use to make decisions, monitor their learning (and that of their peers sometimes), set objectives, and self-evaluate their learning. All of these actions will have a direct repercussion in their learning process and help them to reach their goals.

Task-Based Language Teaching and Cooperative Learning

Over the last decades, the supposition that the quality of second language (L2) teaching will improve if teachers themselves improve their teaching techniques has resulted in a variety of new approaches, methods and practices that can be adapted or implemented depending on their current needs (Richards and Rodgers, 2001). The two latest approaches in use are: task-based language teaching (TBLT) and cooperative language learning (CLL).

Task-based language teaching is characterised by the use of tasks, also known as "activities", "objectives", "practise exercises", "complex work plans", "actions" and "responses" (Bygate, Skehan & Swain, 2001; Ellis, 2003; Skehan, 1996; Willis & Willis, 2007) as the main pedagogical input for teaching; the absence of a grammatical sequence or any other systematic program; and by the use of real communicative activities to carry out those tasks which are meaningful for the students, emphasizing authentic communication (Richards & Rodgers, 2001). This approach is theoretically and practically supported by Gass and Mackey (2007) regarding input, interaction, and output in Second Language Acquisition. This is due to TBLT being seen as a teaching method that simulates real-world situations which activate learners' prior knowledge and incorporate additional understanding of the target language. Furthermore, the meaning focus of tasks permits the students to use the language communicatively without paying central attention to the linguistic form. For this reason, interaction and negotiation increase, creating an appropriate environment for a significant learning experience.

Cooperative learning (CL) is the result of a more general approach known as collaborative learning. Collaboration encourages interaction through collaboration in a sociocultural way in order to co-construct knowledge with others (Oxford, 1990; Johnson, Johnson & Holubec, 1998; Johnson & Johnson, 2005). On the other hand, Cooperative learning emphasizes different language teaching and learning strategies which can be used to design and implement cooperative activities which are student-centered. By means of these activities, students develop their critical thinking skills and are responsible for their own, as well as their classmates', learning by making use of structured information exchange actions among peers and small groups (Olsen & Kagan, 1992; McGroarty, 1993). Unlike some other language teaching approaches for L2, cooperative learning is founded in solid empirical research evidence. Each student is responsible for planning, monitoring and evaluating his or her own learning, which implies active and direct participation (Richards & Rodgers, 2001). The teacher's role in this case is more of a facilitator who is in charge of creating a highly structured and organized environment, setting goals, structuring tasks, setting the classroom physical arrangement, establishing groups and students' roles, selecting materials and allotting assignment time (Johnson & Johnson, 2005). In this context, computers contribute to work cooperatively due to their inherent characteristics. To structure cooperation among students using a computer, the teacher will have to include mixed-ability students, establish positive interdependence and individual accountability and teach the use of social skills (Salmon, 2011).

An essential element of effective cooperation is promotive interaction in which individuals encourage and facilitate each other's efforts to complete tasks to reach the group's goals (Gillies, 2007). In order to create opportunities for the students to use the target language, engaging tasks involving group work and projects which combine online and face-to-face interaction should be designed and implemented in the language class. Johnson and Johnson (2009) state that promotive interaction occurs as individuals encourage and facilitate each other's efforts to accomplish the group's goals. This interaction is characterized by individuals acting in trusting and trustworthy ways, exchanging needed resources, providing effective assistance to friends, being motivated to strive for mutual benefit, influencing each other's efforts to achieve the group's goals, providing group participants with feedback to improve their subsequent performance and challenging each other's reasoning and conclusions.

Learner Training to Foster Autonomy for Effective Use of CALL

In order to enhance language learning methodological models involving technology-mediated tasks, one of the objects of interest in the field of CALL is appropriate learner training for use of online and offline learning resources. According to Hubbard (2004) most students do not have the proper skills to work in these contexts and need to be oriented to do so effectively. Even though learners today relate and know how to interact with current technologies, they may lack skills and may not be prepared to use them appropriately to improve language learning. One of the main principles in CALL states that students must have control of their learning, but if not treated carefully this can have a negative effect on their learning process (Hubbard, 2004). Boling and Soo (1999) explain that the fact that the students control their process does not always promote effective learning. It is necessary for learners to understand the alternatives they have (e.g., search engines) and how to use them in a correct way. It is vital that they are aware of their learning and develop different kinds of techniques to foster knowledge and increase autonomy when using online applications. In this context, Hubbard (2004) suggests that autonomy is strictly related to the learners' capacity to acquire language deliberately and systematically outside the language classroom, with or without the guidance of a teacher, tutor or classmate. Therefore, the main objective of training is that students learn how to manage the pace, time, and procedures to reach their goals and the evaluation of their progress in learning a new language (Healey, 2007). In addition, when developing learner autonomy, Healey (2007) emphasizes the role of the facilitator (i.e., teacher, tutor or guide) in terms of fostering the use of materials and methods as well as explaining their correct use to improve learning. Generally, when students go through a computer-mediated learning experience (i.e., distance education) without appropriate guidance, they tend to get overwhelmed with the amount of information which causes difficulties when making decisions regarding the importance of the contents and how to manage them with technology (Healey, 2002). For these reasons, blended learning possess the characteristics to foster learner autonomy in a context that mixes offline sessions with a facilitator to obtain training, practice and guidance, and online sessions where students work independently based on previous learning strategy training (Coaten, 2003; Garrison and Kanuka, 2004; Hinkelman, 2004, Graham, 2006, Gruba & Hinkelman, 2012).

The principle of using strategies in foreign language learning is based upon conclusions of different research conducted in order to clarify the characteristics of a good learner (see Anderson, 2005; Bruen, 2001; Chamot & El-Dinary,1999; Green & Oxford, 1995; O'Malley & Chamot, 1990; Wharton, 2000). The findings of these studies suggested that being skillful and/or motivated to learn a language was not sufficient, but that an active attitude in this process throughout the use of individual language learning techniques was also necessary. In general terms, a strategy can be defined as a "sequence of procedures for accomplishing learning" (Schmeck, 1988). Edward Cohen (2005) also defines a language learning strategy stating that they are the students' thoughts and conscious or semi-conscious behaviors in order to improve their knowledge and understanding of the target language.

These strategies include a series of steps with the aim of improving their linguistic skills. They empower the student to increase their attention spam to learn the target language, promote the learning of the new content, improve the retention of new material related to language, and increase language knowledge recall when necessary (Oxford, 1990; Mayer, 1988).

EXPERIMENTAL STUDIES

The experimental studies conducted for this investigation sought to obtain empirical evidence of the effectiveness of (1) blended learning (BL) vs. face-to-face instruction for English as a FL and (2) BL instruction "with training" in language learning strategies vs. BL "without training" in language learning strategies for English as a FL. The experiments were carried out within a quasi-experimental approach consisting of an experimental and a control-group with pre and post-test administration. Participants were randomly assigned to form two groups, each containing 12 students.

The Efficiency of a Blended Learning Model for EFL Teaching and Learning

The First Experimental Study was conducted in order to determine how the theoretical was conducted in order to determine how the theoretical principles of task-based teaching, cooperative learning and CALL can be used together in the design of activities for the improvement of linguistic abilities in the context of a blended learning environment.

Method

Our Research Question: *Will English language proficiency improve in those students who are exposed to the blended learning model?*

Along with this research question the following hypothesis was suggested:

Hypothesis: The students who employ the blended learning module based on the task and cooperative approaches will show a *greater improvement* in their language proficiency compared to those who use the face-to-face method.

Participants: The group of participants in this study consisted of 24 first year students enrolled in the English Teaching program of a private university in Concepción, Chile. The students were enrolled in the subject called *Developing Communicational English I* and did not possess any previous experience working in technology-mediated contexts for language learning purposes. The age range for the participants was from 18 to 23 years old. . The majority of the participants were female (79%) and 21% were male. For this study, the students were divided into 2 groups of 12 students each: One group was the experimental group and the other one was the control group.

The Experimental Group: They were given a pre-test before the study and a post-test after the completion of the study in order to compare the results. It is important to mention that the pre-test and post-test were formulated using the Preliminary English Test (PET) exam format and parameters. These adapted tests evaluated the students' proficiency level in the four language skills (reading, writing, listening and speaking), each carrying 25% of the total marks, before and after their exposure to the blended learning model. The experimental group was exposed to the blended language learning methodology throughout 14 sessions. The contents of the online/offline classes were linked to the course syllabus and delivered using several technological resources such as webpages, chat, email and blog in order to provide richer input and improve language skills. The face-to-face sessions were used to practice speaking skills, mostly, and were connected to the tasks developed in the online work.

The Control Group: The participants in the control group studied the same contents as the experimental group, but in a traditional face-to-face manner. The teaching materials just included the course book and audio CD prescribed for the course. Technological resources were not used in the sessions with the students in the control group.

Blended Learning Module Description

In order to collect data for this first experimental study that this research is based on, a blended learning module was designed and developed using the principles of CALL, TBLT and cooperative learning. The design of the blended learning model for the development of the language skills was connected to the communicative goals and grammar structures from course syllabus. The online tasks for the practice of the language skills were elaborated using Computer-Mediated Communication (CMC), both synchronous and asynchronous. The design of the online tasks considered seven of the ten methodological principles proposed by Doughty and Long (2003): Use task as the unit of analysis; promote learning by doing; provide rich input; focus on form; provide corrective feedback; promote cooperative/collaborative learning; and incorporate individualized instruction.

In addition, the following techniques from cooperative learning were included in the blended module design. The aim of incorporating this type of learning was to foster peer interaction and language exchange. This would add communicational value to the tasks, as the students were asked to conduct most of them by working in groups or pairs:

1. **Learning together:** The students worked in groups to complete the tasks. Each learner was assigned a specific role so they could all contribute to a successful task completion. Responsibility and commitment to the learning process were the key elements for including this technique into the design;
2. **Group Investigation:** The students were assigned a topic and a situation they had to resolve by searching for the appropriate information. They were asked to organize themselves to undertake the research. This would put them in direct contact with authentic materials in the target language, therefore increasing the opportunities for learning and practice;
3. **Jigsaw:** Using this technique the students were given different pieces of information to share with their group members. The 'experts' were supposed to contribute with their knowledge to complete the given task.

The objective of the blended module was to give the students enough opportunities to use the target language through interactional and communicative tasks, in order to promote the development of the different language skills. The main idea was to assign tasks associated with 'real-life' situations so that the students were able to perform them successfully. The tasks were focused on form and meaning in order to foster interaction and negotiation. In Figure 1, and Table 1, the distribution of the lessons of the blended learning model is outlined.

The students made use of the module comprising 14 sessions, divided into online and offline classes. The activities were elaborated based on clear grammatical and communicational objectives to foster the contact and interaction opportunities with the target language. These tasks were organised into a task cycle of pre-task, main-task and post task (Ellis, 2003) in order to help and guide the students to achieve their final outcome.

Figure 1. Blended learning module

Face-to-face environment.	Speaking Listening Topic: Travel and Tourism.
Online environment.	Writing Reading Listening Linguistic form: Modal verbs to give advice and suggestions. Topic: Travel and Tourism.
Methodological approaches	TBLT Cooperative learning (strategies: learning together, puzzle, group research)
Use of emergent technologies	JClic Platform (included feedback strategies) ICT: Internet, e-mail, chat, blog.
Cultural context	Tourism in Scotland

Table 1. Online and face-to-face sessions

Online Work	
Web search	14 sessions
Blog	2 sessions
Email	14 sessions
Chat	2 sessions
Application JCLIC	14 sessions
Group Work	
Face-to-Face	5 sessions

In this case, the purpose of the tasks was to gather information and do activities to elaborate a brochure outlining the tourist attractions of Scotland.

Before the students started to work on the activities included in the blended module, they underwent training which guided them to use the materials in an appropriate manner and foster language acquisition. The training incorporated academic and technical aids, as well as learning strategy-based sessions to help the learners make this experience instrumental to their learning process.

After the pre-test, the students in the experimental group studied the contents of the BL module based on the task and cooperative approaches during 16 sessions: one introductory, 9 online, 5 offline and a final evaluation session. The themes and grammar topics selected were directly related to those of the course syllabus, so the students worked with the linguistic forms in a blended manner instead of the traditional face-to-face method used in the university program. Regarding the offline sessions, the students performed cooperative tasks such as role plays, interviews and oral reports mainly based on the materials presented in the online sessions.

Moreover, the focus on form contents were studied through drill-type exercises contained in an e-learning platform created with a free access authoring tool called JCLIC 3.0 (2010). It is important to mention that all the grammar exercises provided corrective feedback and a record of the students' performance in terms of correct/incorrect answers as well. This feedback was based on the taxonomy presented by Ferreira (2006, 2007) regarding effective feedback strategies in

CALL. This information was valuable for post data analysis related to the students' learning process. The following strategies were considered for the grammar exercises and included in the feedback messages provided by JCLIC:

1. **Elicitation:** The main objective is to obtain the correct answer from the students through questions that guide them to come to the correct conclusion on their own, rather than simply giving them the correct answer. For example:
   a. One more time! What would you do to warn people?
   b. Maybe next time! What would you do if someone needed guidance?
2. **Metalinguistic Cues:** The grammatical information given will help the students to notice what their error was and try to answer again. Some of the cues included in this study were:
   a. Try again! Use the negative form;
   b. Are you sure? Remember to use the correct question form;
3. **Clarification Request:** They are intended to communicate that the message wasn't conveyed clearly. Therefore, the student is forced to reformulate the sentence. Some of the requests included in this study were:
   a. Could you do it again?
   b. What do you mean?

Pre and Post-Test Data Analysis Interpretation

Tables 2 and 3 show the results obtained by both the experimental and control groups. Table 2 shows the language proficiency development achieved by the experimental group, which is clearly visible in the post-test results. All of the students improved their language skills after being exposed to the blended learning model and their improvement averaged 0.5 points, which is a meaningful improvement (in statistical terms) in learning for the whole group.

According to the results obtained once the process was completed, it was possible to confirm our hypothesis and to point out that there were

Table 2. Results achieved by experimental group

Pre-Test Experimental Group			Post-Test Experimental Group		
N	**Students**	**(% for Language Skills)**	**N**	**Students**	**(% for Language Skills)**
1	Subject 1	42	1	Subject 1	64
2	Subject 2	33	2	Subject 2	52
3	Subject 3	61	3	Subject 3	78
4	Subject 4	34	4	Subject 4	56
5	Subject 5	64	5	Subject 5	84
6	Subject 6	39	6	Subject 6	53
7	Subject 7	37	7	Subject 7	52
8	Subject 8	37	8	Subject 8	57
9	Subject 9	43	9	Subject 9	53
10	Subject 10	50	10	Subject 10	55
11	Subject 11	47	11	Subject 11	56
12	Subject 12	39	12	Subject 12	55
		44			**60**

Table 3. Results achieved by control group

Pre-Test Control Group			Post-Test Control Group		
N	**Students**	**(% for Language Skills)**	**N**	**Students**	**(% for Language Skills)**
1	Subject 1	47	1	Subject 1	51
2	Subject 2	58	2	Subject 2	66
3	Subject 3	34	3	Subject 3	46
4	Subject 4	30	4	Subject 4	45
5	Subject 5	71	5	Subject 5	76
6	Subject 6	41	6	Subject 6	43
7	Subject 7	32	7	Subject 7	35
8	Subject 8	57	8	Subject 8	60
9	Subject 9	41	9	Subject 9	45
10	Subject 10	35	10	Subject 10	39
11	Subject 11	25	11	Subject 11	27
12	Subject 12	37	12	Subject 12	43
		42			**48**

significant differences between the average of the pre-test and post-test of the experimental group. The results showed that the learning improvement in the students in the experimental group that employed the task-based-cooperative blended learning model was statistically significant (Experimental group, F-Test= 1.196, P= 0.7717 and T-Test= 3.148, P=0.0047; Control group, F-Test=1.149, P=0.8217 and T-test= 1.508, P=0.1458).

Task-Based Language Teaching provided the rationale for the design and implementation of online and offline tasks in the blended learning model. In addition, the learning-by-doing principle from Cooperative learning enhanced the model in order to meet the objectives to validate its efficiency. The organization of the model proved to be effective in this study because the four skills were developed in a balanced way. The incorporation of technology was crucial in the design of the model due to the fact that when using technological resources, it is possible to create tasks to improve every skill.

In this study, feedback was fundamental when the students used the JCLIC application in the offline sessions in order to support their learning process in virtual environments. Also, as JCLIC provides different resources to present materials, the students were given richer input concerning grammar than they would be given in traditional contexts. Feedback from the teacher was also given via email or blog posts. In the face-to-face classes, students received error correction from their peers and the teacher.

Use of Language Learning Strategies in a Blended Learning Environment to Foster Student Autonomy

This second study was conducted in order to determine if constant language learning strategy training in a blended learning environment turned out to be effective in promoting learner autonomy and supported English as foreign language learning. For this specific study, we used the same blended learning model as in experiment 1, which employed a task-based and cooperative approach. For a better use of the courseware designed, students were trained in the use of language learning strategies which foster a more effective learning process:

Our Research Question: *Will explicit and constant language learning strategy training help to improve learner autonomy and support EFL language learning in a Computer-Mediated context?* Along with this research question, the following hypothesis was suggested.

Hypothesis: Regular and explicit training in language learning strategies for a foreign language, adapted to a blended-learning context, can help students improve their learning of the target language.

Methods

Participants: In this research, the sample was composed of 24 freshmen students of English as a foreign language from a private university enrolled in "Developing Communicational English I" as a requisite of their program. This subject is taught 4 times a week, with 8 pedagogical sessions of 40 minutes each, and is divided into two sections of 20 students each. As for their linguistic abilities, 13 of them (54.2%) were at the basic level and 11 of them (45.8%) were at a pre-intermediate level. The students' English level was assessed with the use of the "Quick placement test" (Oxford University Press) which measures their reading skills, their grammar knowledge, and their listening comprehension through multiple choice items. Students were divided into two groups, the experimental and control groups, with 12 students each.

The Experimental Group: It was made up of 12 students with language levels ranging from basic to pre-intermediate. They were exposed to a blended language learning methodology providing them with specific training to foster the use of language learning strategies in CALL environments. Throughout the 14 sessions, the students were trained to make a more efficient use of the courseware designed.

The Control Group: It was made up of 12 students. They were also exposed to a blended language learning methodology, but they were not provided with any kind of training in language learning strategies for that context.

Language Learning Strategy Evaluation Tool Description: Both the experimental and control group were given as pre and post-test an adapted version of the Strategy Inventory for Language Learning (SILL) to measure their entry level as well as the final level they reached after the training period. This inventory was developed by Oxford (1990) and it has been used to determine the types of strategies used by students to cope with the language learning process; it assesses the frequency of use of such strategies (Oxford, 1990; Oxford & Burry-Stock, 1995; Cohen 1990; Nyikos & Oxford, 1993; Olivares-Cuhat, 2002).

The inventory used for this specific study was adapted to reliably assess strategy use in a CALL environment. The original instrument is aimed at assessing the use of strategies in a traditional language learning context. Adaptation consisted of modifying specific items (out of the 50 original ones, divided into 6 different parts) to identify language learning strategies in blended contexts.

The 50 items retrieve personal information on previous language learning experiences that students have (see Appendix 1).

Test questions aim at assessing the use of:

1. Memorization strategies (9 questions)
2. Cognitive strategies (14 questions)
3. Compensation strategies (6 questions)
4. Metacognitive strategies (9 questions)
5. Affective strategies (6 questions)
6. Social strategies (6 questions)

Procedure

According to Hubbard (2004) students should not be released into powerful learning environments unprepared. Despite the cost in time and effort, most students will profit from some formal, sustained training in how to take operational competence in a given computer application and transfer that into learning competence. This training calls for student's autonomy as one of the five learning goals listed by Warschauer, Schetzer, and Meloni (2000). Therefore, students underwent the intervention process to increase their language learning as well as their conscious use of language learning strategies.

Before the whole intervention process took place, students were explicitly trained in the use of the different learning strategies (metacognitive, cognitive, affective, and social strategies) that they were going to make use of. They also received information regarding the type of work they were going to undergo. When the actual intervention process started, and throughout 14 sessions, participants reflected on and made comments in respect to the different activities to which they were exposed during the day. This was made in the light of the prior training they received keeping a log book in which they reflected on the use of those strategies previously taught.

The whole process was divided into the following 3 stages:

Stage 1: Pre-Test Administration: During this stage two instruments were administered. One of them was the adapted version of the Strategy Inventory for Language Learning (SILL, Oxford, 1990) taken by both groups that were exposed to a blended learning language approach. The other test was aimed at assessing students' linguistic skills. This test consisted of 3 different parts aimed at assessing students listening, reading, and writing comprehension. It was created following the PET format. There was a fourth component, the oral part, but that was assessed separately;

Stage 2: Language Learning Strategy Training: The training process lasted 14 sessions, during which the students were instructed in the use of different activities to promote language learning strategy in a blended learning context. The teacher showed and modeled the different types of activities which fostered the development of metacognitive, cognitive, affective and social strategies. This training in language learning strategy use was based on the framework proposed by Pearson and Dole (1987) and Oxford (1990) which has a pre-established sequence. There is an *initial strategy modeling* done by the teacher, including a direct explanation about the strategy and its importance, which is then followed by *guided practice* using that specific strategy. In the *consolidation* part of the sequence, the teacher helps students to identify and decide when the strategy has to be used. Finally, there is *independent practice* carried out by the students who are, at this stage, able to make use of the strategy on new tasks.

During the first session there was an introduction to concepts as well as language learning strategy clarification in blended contexts. After being introduced to the different types of strategies, the students received printed material to reinforce the different strategy concepts: metacognitive, cognitive, affective and social. Printed material also included a list of specific activities which fostered the use of each of these strategies. They also received a log book in which they registered their information regarding strategies used while working in a blended learning environment. The aforementioned tools were used throughout the whole training process and encouraged students to reflect upon the data. It was also at this stage that the students were familiarized with the blended learning environment in which the training was going to take place, and what it consists of.

On a daily basis, after each of the 14 work sessions, students had to attend a reflection workshop to discuss the strategies used which, as a result, promoted the internalization of strategy use:

Stage 3: Post-Test Administration: Once the whole training process had taken place, the students were given both instruments again: the adapted version of the Strategy Inventory for Language Learning (SILL, Oxford, R. 1990) and the test which was aimed at assessing the students' linguistic skills improvement (described above).

Pre and Post-Test Data Analysis

Tables 4 and 5 show the results obtained by both the experimental and control groups. Table 4 displays the increase in language learning achieved by the experimental group, which is clearly visible in the post-test results. All of the students improved their language learning strategy use, and their improvement averaged 0.5 points, which is a meaningful improvement (in statistical terms) in learning for the whole group.

Data shown in Table 5 illustrates that even though there was a slight increment in post-test results for the control group, this could be due not to language learning training, but to the blended learning approach. As presented in the experimental study 1 of this investigation, the blended learning model had already been proven effective to develop language skills and improve proficiency. Therefore, in the second experiment, the control group was expected to have some increase in their linguistic skills development even without the training.

To prove the statistical significance of the results, a T-test was administered: the value obtained (T= P value = 0.29369) in the control group showed that there are no significant differences between the pre and post-test means, which shows that without explicit training in language learning strategies in blended contexts, they cannot seem to make the most of the courseware designed. The value obtained in the experimental group (P value= 0.00201) showed that there are significant differences between the pre and post-test means.

Table 4. SILL results achieved by experimental group

Pre-Test Experimental Group			Post-Test Experimental Group		
N	**Students**	**Average**	**N**	**Students**	**Average**
1	Subject 1	3.5	1	Subject 1	3.9
2	Subject 2	3.9	2	Subject 2	4.2
3	Subject 3	3.3	3	Subject 3	3.7
4	Subject 4	3.1	4	Subject 4	3.7
5	Subject 5	2.6	5	Subject 5	3.5
6	Subject 6	3.3	6	Subject 6	3.7
7	Subject 7	3.5	7	Subject 7	4.3
8	Subject 8	3.5	8	Subject 8	3.7
9	Subject 9	3.4	9	Subject 9	3.7
10	Subject 10	2.7	10	Subject 10	3.3
11	Subject 11	3.4	11	Subject 11	3.8
12	Subject 12	3.3	12	Subject 12	3.5
		3.3			**3.8**
		Pre-Test		**Post-Test**	
Median		3.3		3.8	
Standard Deviation		0.36		0.28	

Table 5. SILL results achieved by control group

Pre-Test Experimental Group			Post-Test Experimental Group		
N	**Students**	**Average**	**N**	**Students**	**Average**
1	Subject 1	3.2	1	Subject 1	3.3
2	Subject 2	3.0	2	Subject 2	3.0
3	Subject 3	3.1	3	Subject 3	3.3
4	Subject 4	3.1	4	Subject 4	3.0
5	Subject 5	3.3	5	Subject 5	3.2
6	Subject 6	2.4	6	Subject 6	3.0
7	Subject 7	3.4	7	Subject 7	3.5
8	Subject 8	3.3	8	Subject 8	3.3
9	Subject 9	3.4	9	Subject 9	3.4
10	Subject 10	3.2	10	Subject 10	3.6
11	Subject 11	3.6	11	Subject 11	3.9
12	Subject 12	3.7	12	Subject 12	3.9
		3.2			**3.4**
		Pre-Test		**Post-Test**	
Median		3.2		3.4	
Standard Deviation		0.33		0.31	

This means that explicit training in language learning strategy use in a blended learning context promoted courseware use allowing the students to make a more efficient use of it. This resulted in a better understanding and learning of the different topics covered. This result is similar to the one obtained by Nisbet and Shucksmith (1991) who showed that less skilled students benefit from the use of language learning strategies and are then able to adapt them to specific situations. In relation to language learning strategy use, we can say with a 95% confidence level that there are significant differences between the pre and post-test results regarding their use, which is not the case in the control group. There is a clear relationship between language learning strategy use and language competency. Students with a better language proficiency use a wider variety of strategies (Anderson, 2005; Bruen, 2001; Chamot & El Dinary, 1999; Green & Oxford, 1995; O'Malley & Chamot, 1990; Wharton, 2000).

This means that students made progress in the efficient use of the four strategies they were trained in. These results ratify a previous study conducted by Cohen and Ishihara (2005), since participating students made great progress in the learning of the target language, showing that language learning strategy training allows them to learn the target language more effectively (see Table5).

In addition, the F-test was used in order to identify the model that best fits the population from which the data was sampled (see Table 6). In statistical terms, the F-test is used when testing differences in means in more than one group. An F-test for the null hypothesis shows that two normal populations have the same variance.

CONCLUSION AND IMPLICATIONS

This article has focused on reporting the results of an investigation that aimed to examine (1) the

Table 6. F-test for the null hypothesis

Variation (F-test)	0,87
Confidence level (nivel de confianza)	95%
P value	0,29369

effectiveness of a blended learning model for language skills development and (2) the use of learner training and language learning strategies in order to take advantage of the resources to increase language proficiency. Our main concern was to analyse empirical evidence in order to determine the efficiency of this mixed model that included Task-based instruction and a cooperative approach for English language learning in technology-mediated environments. In establishing concrete tasks with clear goals, the students worked in an appropriate context which incorporated useful elements and guides to help them reach the task outcome successfully. In addition, the principle of using authentic communication situations allowed the students to focus and reflect on selecting the correct linguistic forms and structures to elaborate their texts and speech. The use of chat, blog, email and internet allowed the students to practice the language in established contexts. The use of corrective feedback in the e-learning application supported the importance of using effective feedback strategies in CALL materials for second language acquisition. By including different strategies, the students deeply analysed the structures and contents in the target language. In this study, feedback was fundamental when the students worked with the application in online sessions. Also, as JCLIC provides different resources to present the materials, the students were given richer input concerning grammar than they would be given in traditional contexts.

Even though students use language learning strategies in an incipient way, constant and explicit training fosters their continuation. Being able to control anxiety, carefully plan their learning, and monitor the course of action to finally assess the whole process are important aspects which motivate students and help them learn at their own pace and in a more effective way. The language learning strategy training is a key element which triggers better understanding and learning by allowing students to make the best out of the means available to them. The fact that the use of learning strategies is mainly a cognitive process helps the students become aware of their benefits. This also supports explicit instruction in language learning strategy use which can be internalized through constant use in communicative tasks.

Metacognitive strategies play an important role since they enable students to reflect on their own way of thinking, fostering planning, monitoring, setting of objectives to finally evaluate the whole process. Language learning strategy use results in a better learning of content as well as in the capacity for students to express themselves more accurately and fluently, which in turn improves motivation.

Results show that the hypothesis for this study is correct, since regular and explicit training in foreign language learning strategies, adapted to a blended-learning model based on TBLT, can help students improve their learning of the target language. This training and its results show that the general objective was achieved. It is possible to say that students learn much more effectively in a blended learning context when there is constant training in language learning strategies. The use of a blended learning approach enriches the design and implementation of communicative tasks. This, in turn, provides students with access to meaningful materials that naturally motivate their curiosity.

All of this results in a more autonomous student who is able to be in charge of their own learning. The learners are now more able to set objectives, monitor and evaluate their own learning process, mostly underpinned by metacognitive strategies. Since new approaches in language learning are more student-centered, this type of training assists with fostering students' autonomy.

Finally, this chapter also shows the benefits that constant training in language learning strategies had on the students. Their use of these strategies improved the acquisition and learning of linguistic skills required to master the target language. This is clearly shown in the results obtained in the pre and post-tests. The inclusion of effectively proven approaches and materials in this model successfully improved the students' foreign language competence, particularly in contexts that are usually established by educational institutions. As is the case with every investigation, this one was not free from limitations.

It is important to mention that the sample used in this study was limited due to the availability constraints of students. Therefore the results can be more generalizable if a more significant sample is used in a follow-up study. Time available to devote to the execution of this study was another drawback. We therefore suggest that more studies be conducted to further validate the conclusions of this research. Another similar study consisting of more participants and sessions could be conducted. For future research, it would be interesting to determine how intrinsically related language learning strategies are and to pinpoint how appropriate it is to consider them as a unique construct to be taught.

The findings will help us to provide valid guidelines for the development of materials using technological resources for foreign language learning. It was found that the experimental group, which worked with the blended model, had a considerable improvement in language skills compared to the control group that used the face-to-face methodology. Considering these results, we advocate the importance of the blended learning models in foreign language learning and strongly recommend researchers and practitioners to include them when designing CALL materials.

ACKNOWLEDGMENT

This investigation was sponsored by the National Council for Scientific and Technological Research (FONDECYT, CHILE) under Grant No. 1080165: "A Blended Learning Task-Based Approach and Cooperative Learning for Foreign Language Learning". CONICYT- CHILE (Principal Investigator: Dr. Anita Ferreira Cabrera).

REFERENCES

Aleven, V., & Koedinger, K. (2002). An effective meta-cognitive strategy: Learning by doing and explaining with a computer-based cognitive tutor. *Cognitive Science*, *26*(2), 147–179. doi:10.1207/s15516709cog2602_1

Anderson, J. R. (2005). L2 strategy research. In E. Hinkel (Ed.), *Handbook of research in second language teaching and learning* (pp. 757–772). Mahwah, NJ: Lawrence Erlbaum Associates.

Boling, E., & Soo, K. S. (1999). CALL issues: Designing CALL software. In J. Egbert & E. Hanson-Smith (Eds.), CALL environments: Research, practice, and critical issues (pp. 442-457). Alexandria, VA: Teachers of English to Speakers of Other Languages.

Bruen, J. (2001). Strategies for success: Profiling the effective learner of German. *Foreign Language Annals*, *34*(3), 216–225. doi:10.1111/j.1944-9720.2001.tb02403.x

Bygate, M., Skehan, P., & Swain, M. (Eds.). (2001). *Researching pedagogical tasks: Second language learning, teaching, and assessment*. London: Pearson.

Chamot, A. U., & El-Dinary, P. B. (1999). Children's learning strategies in immersion classrooms. *Modern Language Journal*, *83*(3), 319–341. doi:10.1111/0026-7902.00025

Chapelle, C. (2001). *Computer applications in second language acquisition: Foundations for teaching, testing and research*. Cambridge, UK: Cambridge University Press. doi:10.1017/CBO9781139524681

Coaten, N. (2003). Blended e-learning. *Educaweb, 69*. Retrieved October 6, 2003, from http://www.educaweb.com/esp/servicios/monografico/formacionindividual/1181076.asp

Cohen, A. D. (1990). *Language learning: Insights for learners, teachers, and researchers*. New York, NY: Newbury House.

Cohen, A. D. (2005). Coming to terms with language learner strategies: What do strategy experts think about the terminology and where would they direct their research? In *Proceedings of the 2nd International Conference of the Centre for Research in International Education*, AIS St. Helens, Auckland, NZ.

Cohen, A. D., & Ishihara, N. (2005). *A web-based approach to strategic learning of speech acts. (Tech. Rep.). University of Minessota, CARLA*. Center for Advanced Research on Language Acquisition.

Doughty, C., & Long, M. (2003). Optimal psycholinguistics environments for distance foreign language learning. *Language Learning & Technology*, *7*(3), 50–80.

Egbert, J. (2005). Conducting research on CALL. In J. L. Egbert & G. M. Petrie (Eds.), *CALL research perspectives* (pp. 3–8). Mahwah, NJ: Lawrence Erlbaum Associates.

Ellis, R. (2003). *Task-based language learning and teaching*. Oxford University Press.

Ferreira, A. (2006). Estrategias efectivas de feedback positivo y correctivo en el español como lengua extranjera. *Revista Signos*, *39*(62), 309–406. doi:10.4067/S0718-09342006000300003

Ferreira, A. (2007). Estrategias efectivas de feedback correctivo para el aprendizaje de lenguas asistido por computadores. *Revista Signos*, *40*(65), 521–544.

Garrison, D. R., & Kanuka, H. (2004). Blended learning: Uncovering its transformative potential in higher education. *The Internet and Higher Education*, *7*(2), 95–105. doi:10.1016/j.iheduc.2004.02.001

Gass, S., & Mackey, A. (2007). *Data elicitation for second and foreign language research*. Mahwah, NJ: Lawrence Erlbaum Associates.

Gillies, R. (2007). *Cooperative learning: Integrating theory and practice*. Thousand Oaks, CA: SAGE Publications. doi:10.4135/9781483329598

Graham, C. R. (2006). Blended learning systems: Definition, current trends, and future directions. In C. Bonk & C. Graham (Eds.), *Handbook of blended learning: Global perspectives, local designs*. San Francisco, CA: Pfeiffer Publishing.

Graham, C. R., Allen, S., & Ure, D. (2005). Benefits and challenges of blended learning environments. In M. Khosrow-Pour (Ed.), *Encyclopedia of information science and technology* (pp. 253–259). Hershey, PA: IGI Global. doi:10.4018/978-1-59140-553-5.ch047

Green, J. M., & Oxford, R. (1995). A closer look at learning strategies, L2 proficiency, and gender. *TESOL Quarterly*, *29*(2), 261–297. doi:10.2307/3587625

Gruba, P., & Hinkelman, D. (2012). *Blended technologies in second language classrooms*. New York, NY: Palgrave.

Healey, D. (2002). Learner autonomy with technology: What do language learners need to be successful? In *Proceedings of the TESOL*, Salt Lake City, UT.

Healey, D. (2007). Theory and research: Autonomy and language learning. In E. Hanson-Smith & J. Egbert (Eds.), *CALL environments* (2nd ed., pp. 391–402). Alexandria, VA: TESOL.

Hinkelman, D. (2004). EML and implications for task design in blended L2 environments. In *Proceedings of CLaSIC*. Retrieved April 13, 2012, from http://www.paccall.org/2004/2004proceedings papers/hinkelman1.pdf

Hubbard, P. (1996). A methodological framework for CALL courseware development. In M. C. Pennington (Ed.), *The power of CALL* (pp. 15–32). Houston, TX: Athlestan Publications.

Hubbard, P. (2004). Learner training for effective use of call. In S. Fotos & C. Browne (Eds.), *New perspectives on CALL for second language classrooms* (pp. 45–67). Mahwah, NJ: Lawrence Erlbaum Associates.

Jclic (Version 3.0) [Computer software]. (n.d.). Retrieved July 21, 2010, from http://clic.xtec.cat/en/jclic/index.htm

Johnson, D. W., & Johnson, R. T. (2005). New developments in social interdependence theory. *Psychological Monographs*, *131*, 285–358. PMID:17191373

Johnson, D. W., & Johnson, R. T. (2009). An educational psychology success story: Social interdependence theory and cooperative learning. *Educational Researcher*, *38*(5), 365–379. doi:10.3102/0013189X09339057

Johnson, D. W., Johnson, R. T., & Holubec, E. (1998). *Cooperation in the classroom*. Edina, MN: Interaction Book.

Lamy, M.-N., & Hampel, R. (2007). Online communication in language learning and teaching. [Palgrave Macmillan Learning.]. *Educational Researcher*, *38*(5), 365–379.

Levy, M., & Stockwell, G. (2006). *CALL dimensions: Options and issues in computer assisted language learning*. Mahwah, NJ: Lawrence Erlbaum Associates.

Marsh, G. E., McFadden, A. C., & Price, B. (2003). Blended instruction: Adapting conventional instruction for large classes. *Online Journal of Distance Learning Administration, 6*(4). Retrieved July 10, 2008, from http://www.westga.edu/~distance/ojdla/winter64/marsh64.htm

Mayer, R. (1988). Learning strategies: An overview. In C. Weinstein, E. Goetz, & P. Alexander (Eds.), *Learning and study strategies: Issues in assessment, instruction, and evaluation* (pp. 11–22). New York, NY: Academic Press.

McGroarty, M. (1993). Cooperative learning and second language acquisition. In D. D. Holt (Ed.), Cooperative learning (pp. 19–46). Washington, DC: Center for Applied Linguistics and ERIC clearinghouse on Languages and Linguistics.

Morrison, D. (2003). e-Learning strategies: How to get implementation and delivery right the first time. New York, NY: John Wiley.

Neumeier, P. (2005). A closer look at blended learning: Parameters for designing a blended learning environment for language teaching and learning. *ReCALL*, *17*, 163–178. doi:10.1017/S0958344005000224

Nisbet, J., & Schucksmith. (1991). *Learning strategies*. London, UK: Routledge & Kegan Paul.

Nunan, D. (2004). *Task-based language teaching*. Cambridge, UK: Cambridge University Press. doi:10.1017/CBO9780511667336

Nyikos, M., & Oxford, R. L. (1993). A factor analytic study of language learning strategy use: Interpretations from information-processing theory and social psychology. *Modern Language Journal*, *7*, 11–22. doi:10.1111/j.1540-4781.1993.tb01940.x

O' Malley, J. M., & Chamot, A. U. (1990). *Learning strategies in second language acquisition*. Cambridge, UK: Cambridge University Press. doi:10.1017/CBO9781139524490

Olivares-Cuhat, G. (2002). Learning strategies and achievement in the Spanish writing classroom: A case study. *Foreign Language Annals*, *35*(5), 561–570. doi:10.1111/j.1944-9720.2002.tb02724.x

Olsen, R. E., & Kagan, S. (1992). About cooperative learning. In C. Kessler (Ed.), *Cooperative language learning: A teacher's resource book* (pp. 1–30). Englewood Cliffs, NJ: Prentice Hall.

Oxford, R. L. (1990). *Language learning strategies: What every teacher should know*. Newbury House.

Oxford, R. L., & Burry-Stock, J. A. (1995). Assessing the use of language learning strategies worldwide with the ESL/EFL version of the strategy inventory for language learning. *System*, *23*(2), 153–175.

Oxford, R. L., & Crookall, D. (1989). Research on language learning strategies: Methods, findings, and instructional issues. *Modern Language Journal*, *73*, 404–419. doi:10.1111/j.1540-4781.1989.tb05321.x

Pearson, P. D., & Dole, J. A. (1987). Explicit comprehension instruction: A review of research and a new conceptualization of learning. *The Elementary School Journal*, *88*, 151–165. doi:10.1086/461530

Richards, J. C., & Rodgers, T. S. (2001). *Approaches and methods in language teaching*. Cambridge, UK: Cambridge University Press. doi:10.1017/CBO9780511667305

Salmon, G. (2011). e-Moderating: The key to online teaching and learning. New York, NY: Routledge.

Schmeck, R. R. (1988). *Learning strategies and learning styles*. New York, NY: Plenum Press. doi:10.1007/978-1-4899-2118-5

Skehan, P. (1996). A framework for the implementation of task-based instruction. *Applied Linguistics*, *17*, 38–62. doi:10.1093/applin/17.1.38

Warschauer, M., & Kern, R. (Eds.). (2000). *Network-based language teaching: Concepts and practice*. Cambridge, UK: Cambridge University Press Applied Linguistics Series. doi:10.1017/CBO9781139524735

Warschauer, M., Shetzer, H., & Meloni, C. (2000). *Internet for English teaching*. Alexandria, VA: TESOL Publications.

Wharton, G. (2000). Language learning strategy use of bilingual foreign language learners in Singapore. *Language Learning*, *50*(2), 203–244. doi:10.1111/0023-8333.00117

Willis, D., & Willis, J. (2007). *Doing task-based teaching*. Oxford, UK: Oxford University Press.

This work was previously published in the International Journal of Computer-Assisted Language Learning and Teaching (IJ-CALLT), 4(1); edited by Bin Zou, pages 44-62, copyright year 2014 by IGI Publishing (an imprint of IGI Global).

Chapter 65
Using Blended Principles to Bridge the Gap between Online and On-Campus Courses

Panagiota Gounari
University of Massachusetts–Boston, USA

Apostolos Koutropoulos
University of Massachusetts–Boston, USA

ABSTRACT

Blended learning, and its relative HyFlex (Hybrid Flexible), are garnering up a lot of attention these days from both academics and administrators on college campuses. Organizations like the Sloan Consortium offer training in Blended Course Design; free Massive Online Open Courses (MOOC) such as BlendKit provide ways for educators to start thinking about and begin implementation of blended course design. Despite the pedagogical benefits, not all institutions are equipped to handle blended courses, instructors are not ready to jump on the blended bandwagon if there is no institutional support, and on-campus students are not very comfortable with it yet. One proposed way to ease the transition into blended learning is to combine two sections of the same course, one running online, and one running on-campus. In this chapter, the authors describe a pedagogical trial in which they adopted this proposal as a way, based on HyFlex principles, to get students thinking about the benefits of blending two sections, thus bringing in some benefits of blended learning, while retaining the "safety net" that some students feel they need when they sign up for on-campus courses.

INTRODUCTION

In the fall semester of 2011 a unique opportunity for pedagogical experimentation and innovation was presented to us in the department of Applied Linguistics at our Institution. One of our faculty members was teaching two sections of the same course (Foundations of Bilingual Education) online and on campus. While the mere fact of teaching two sections of the same course isn't always enough for pedagogical innovation, the fact that these two sections of the course were designed and implemented for different modalities and serve different populations of students, gave us reason

DOI: 10.4018/978-1-4666-8246-7.ch065

to pause and ponder the pedagogical possibilities of blending these two sections. Just as there are different types of "blends," as proposed by Singh & Reed (2001), we thought of blending together an on-campus course with an online section of the same course to see if there is merit in bringing together two different groups of learners to learn together and what might be some of the benefits and pedagogical lessons.

Program Information and Student Background

Our on-campus program in Applied Linguistics has existed since 1981 and has played a pioneering role in preparing K-12 teachers in the fields of bilingual education, English as a Second Language, and foreign language pedagogy, including English as a Foreign Language. It is the largest of its kind in the state of Massachusetts with approximate enrollment size of 124 students each year, and is consistently recognized as one of the most noteworthy graduate programs at our Institution. From 2001 to 2006, Applied Linguistics students comprised approximately 23% of the College of Liberal Arts graduate student body, including both masters and doctoral degree candidates. With the inception of the online program in 2006, the Applied Linguistics Department enrollment figures showed a significant increase. Since 2006, the Applied Linguistics enrollment has virtually doubled, representing 36% of the College of Liberal Arts graduate student body. Applied Linguistics faculty consists of highly qualified, well-published and diverse scholars in the field.

The Program´s mission is "to ensure (1) that our students master the technical aspects of applied linguistics; and (2) that they understand the political and ideological dimensions of language teaching and learning given their work with low socioeconomic status linguistic minority populations who often speak language varieties that are often perceived in biased and uninformed ways by the layperson" (Applied Linguistics Mission Statement 2011). In line with this mission, we have set the following fundamental core values: Languages and cultures are important individual and societal assets; All languages, dialects, and cultures deserve to be respected and cultivated; Multilingualism and multiculturalism are beneficial for individuals and society; Accurate information and research should be the basis for policies and practices that involve language and culture; Effective language education should be widely available, and; Civic-minded teacher education should help prepare language professionals that can theorize the world around them and make informed, critical and ethical decisions. These values inform both our on campus and our online program.

The online program was a pioneer in Distance Learning, being one of the very first degree-awarding Applied Linguistics programs worldwide to be fully online in 2006. The synergy between the two programs has been part of the conceptualization of the online program since its inception. The on-campus and the face-to face program run in parallel ways; they share the same curriculum, goals, objectives and learning outcomes. The ratio of on-campus students to online students has changed from a 63% face-to-face to 37% online ratio to a 50%-50% ratio in the last couple of years, with some years having more online enrollments than on-campus.

Our two modalities serve two different types of student population. Our on-campus students are predominantly focused on the English as a Second Language (ESL) track, with a number of students in the past few years also pursuing initial licensure to teach ESL in a K-12 environment. Our on-campus Foreign Language track, including English as a Foreign Language, has been smaller as compared to the ESL track. The on-campus program also attracts many students who are local to Boston and the surrounding cities and towns, thus the proportion of local to out-of-state students is higher in our on-campus program.

Our on-campus students are, for the large part, also commuting professionals.

Our distance students on the other hand, are a more balanced yet diverse student body. There are students both from the United States and from abroad, teaching in both K-12 and university settings, and teaching English as a Second Language, English as a Foreign Language, and Foreign Languages. We view this great diversity as an important asset to our distance education program. Some of our on-campus students who have taken elective courses that were only offered online, have also benefited from this diversity.

Hyflex Course Design

Looking at the various models that were available to us for consideration, the HyFlex model (Hybrid Flexible) made the most sense as a basis for our pedagogical experimentation. Some of our current on-campus course offerings have in the past been taught at times as Web-Enhanced, or Web-Facilitated in Sloan-C terms (Allen, Seaman & Garrett, 2007), where the course used web technologies, chief among them the Learning Management System, to facilitate the on-campus course and to bridge the gap between weeks. Our online courses were designed to accomplish the same goals as our on-campus course in a different modality. Having one instructor teach both sections gave us the great opportunity to bridge the gap between the two student groups and modalities of instruction.

The universal principles of HyFlex (Beatty, 2010) also struck a chord with us. There were two of the universal principles that we already had in place, in both sections. The principle of *equivalency* was already in place in our online section: Learners had a path to equivalent learning outcomes regardless of the fact that the course was online. According to Beatty (2010) "alternative modes should lead to equivalent learning" (p. 6) where equivalence does not imply equality; our goal was not to replicate what is happening in the classroom in an online environment in a one-to-one fashion. *Accessibility* was also something that we had in place, making sure that materials in both the online course and the on-campus, web-enhanced course were accessible to a wide variety of learners. Since the on-campus course had also in the past been taught at times as web-enhanced, this meant that in cases of school closings the class would be able to go on. Given that we already had these two HyFlex principles in place, it made sense to expand to a third one: *Reusability*. A variety of materials are reusable between classes, and between sections. Videos, podcasts, readings, and now recorded class presentations! If there were opportunities for speakers to come to class, locally, to address the on-campus course, this became an opportunity to have distance learners benefit from this as well. Peer-produced materials are also another instance where reusability could come into place. On-campus students could produce artifacts of learning that they would share with their campus peers. Because these artifacts are usually born digital, they could easily be shared with their online peers. The converse is also true, thus they could not only enrich their online peer's learning but also their on-campus peers.

The only HyFlex principle that we opted to not strictly adhere to is the principle of *learner choice*. Beatty (2010) describes this principle as "[P]rovid[ing] meaningful alternative participation modes and enable students to choose between participation modes weekly (or topically)." One of the reasons we opted to not give our on-campus learners the choice of which mode was their "home" mode (online or on-campus) was that this time we only wanted to experiment with one additional change to the curriculum, as opposed to wondering, each week, who might show up in the on-campus classroom. At the same time, we wanted to keep online and on-campus students together but separate since we expected on-campus students to be physically present in class every week. Our on-campus students are not always familiar with Web-Enhanced courses, so we did not know, in advance, how they would fare if they decided to do the course mostly online. In addition, because this was an individual faculty initiative, we were also unsure of the technical support availability to enable our learners to be successful. Thus our course was Hybrid and *somewhat* flexible because on-campus learners could catch up and participate meaningfully online should they miss an on-campus session due to unforeseen circumstances. This type of design is very close to what Bonk (2005) described as "classes or training experiences [that] can blend students located at various remote regions or perhaps instructors collaboratively teaching a class at two or more locations" when he wrote about the future of blended learning.

EXISTING COURSE DESIGN

On-Campus Version: APLING 614 (Foundations of Bilingual/Multicultural Education) is a required course for ESL concentration students and it has been running as a regular on-campus course without any Web-enhancement. Class attendance is mandatory and students are expected to prepare readings before class in order to meaningfully participate in class discussions. The instructor presents the main issues at the beginning of the class in a mini lecture and raises pertinent questions. Students are required to present one of the assigned readings one time during the semester in class. The day they are assigned to facilitate, they are expected to summarize the readings, frame the discussion, raise questions for the class and keep the discussion focused. They are also expected to write a short paper where they address the article or book chapter they chose, and demonstrate the ways they understand it. They are encouraged to not merely summarize the readings but try instead to raise some points that they consider important and ask questions that they think could generate an interesting discussion.

Their presentation should include the following: (1) a presentation of the main argument made by the author(s); (2) a critical analysis of it; (3) suggestions as to how it could be expanded to address questions, concerns, assumptions and they way these relate to your own philosophy and practices as educators. A written 2-3 page paper is also due at the day of their in-class presentation. Beyond that students in the on campus section are also required to write a *Linguistic and Cultural Profile* that is a reflective paper where they briefly introduce themselves in terms of their social, cultural, gendered, ethnic background and personal and group histories. This course further requires a field-based component (twelve clock hours) in which students produce a *mini ethnography* of any aspect of ESL, Bilingual or Multicultural Education. Finally, students work collaboratively to produce a *Position Research Paper* on Language Policy that they present on the last day of class. Groups are created randomly and students get to choose from a variety of topics. There are final in-class presentations where students share the findings of their research.

Online Version: The course requirements for the online modality are equivalent to the on-campus course. *Class Participation* and *Attendance* are important components of success and are assessed by observing postings on the Message Board. The Discussions area in Blackboard works as a virtual classroom and it is the area where the class meets weekly to discuss, pose questions, and exchange views and ideas about the readings and other issues that emerge throughout the course. Students can post as often as they want but they are required to post at least twice a week. The two postings minimum requirement includes: (1) an original message that demonstrates engagement with the readings, and (2) a response to somebody else's message.

Along the lines of the in-class presentation described above for the on-campus class, each online student is responsible for starting, moderating, and summarizing the weekly discussion forum at least once during the semester. Moderators are expected to post a two-page reaction paper or presentation at the beginning of the week. Their presentation should include a short outline of the argument and a critical analysis of it. They can pose questions and concerns, or highlight points of agreement that they feel will generate some discussion. The discussion leader's presentation must address the assigned readings and demonstrate the way they understand them. During their week to moderate, students will also monitor the message board area daily and keep the discussion focused, generate useful discussion by responding and creating new messages as needed, involve everyone in the discussion, and introduce weaving messages throughout the week. As is the case with the on-campus class, online students also submit a *Linguistic and Cultural Profile*, a *Mini Ethnography* and work in groups for the final *Position Research Paper* on Language Policy. Groups are assigned randomly via Blackboard and each online group has their own virtual space on BB that includes a discussion board, a blog, and individual messaging. All assignments are submitted via the Blackboard learning management system.

Combined Course Design: The goals for the combined course design in this particular instance were (1) to increase meaningful interaction between on-campus and online students; (2) to take advantage of and build on diverse student experiences, understandings and perspectives, especially given that the student body in the two modalities differs; (3) to bridge the two types of learners in order to create a community of learners; (4) to make online students feel more connected to the brick-and-mortar institution; (5) to familiarize on-campus students with the online platform and its potential for enhancing learning; and (6) to use the Blackboard course shell as a repository of readings, discussions, multimedia and other material easily accessible at any point by both on-campus and online students. The conceptualization of this combination was very much based on what Rovai & Jordan (2004) hypothesized; that blended courses provide "a greater range of opportunities for students to interact with each other and with their professor. These interactions should result in increased socialization, a stronger sense of being connected to each other, and increased construction of knowledge through discourse, thus providing stronger feelings that educational goals were being satisfied by community membership" (p. 4).

The combined course design was built into the on-campus syllabus as something new and experimental. On-campus students were informed that there was a group of APLING students taking the same course online and that we wanted the resident students to collaborate and exchange ideas and experiences with the online students, while maintaining the two separate course delivery systems. On-campus students still had to come to class every week but they were given access to the online course shell. They were asked to access the Discussions area every week, read their classmates' postings and post a minimum of two messages. We didn't view this as a "course and a half" symptom (Aycock, Garnham & Katela, 2002) because the few web-enhanced courses in our department have a similar discussion requirement. By "course and a half" we mean the perception on the students' part that there is too much work that feels as if they are taking more than one course at the same time. This happens when instructors start with a classroom-based course and add online activities which results in increasing the workload for both instructor and student. According the McGee and Rice (2012) "the course-and-a-half phenomenon reflects what many students dislike about blended courses: there is too much work" (p. 11).

Osgoodthorpe & Graham (2003) make a claim that blended learning can increase the learner's personal agency by increasing the personal choice of learners. We believed that by having a course shell, and exposing campus students to online students (and vice versa) this was giving students the choice to exploring something outside of their normal everyday situations. For online students it would be exposing them to a specific K-12 ESL environment in Massachusetts, and for on-campus students, most of which are seeking to teach in a K-12 environment in Massachusetts, it would empower them to seek a more global perspective on the issues from their online peers. In addition, having access to a course shell, we were hoping to capitalize on the findings of Means et al (2010) that found that "classes with online learning (whether taught completely online or blended) on average produced stronger student learning outcomes than did classes with solely face-to-face instruction" (p. 18).

On-campus students were also asked to post their Mini Ethnographies online (in the Blackboard Discussions) for the whole class to read. Both online and on-campus students used a rubric to evaluate each other's work. In order to facilitate the collaboration and break the ice, the first week of classes during "Personal Introductions" we asked both groups to introduce themselves online. In addition, the first two weeks were conducted entirely online for both groups in order to get to know each other and get the chance to engage with the readings and exchange ideas at an intellectual level. The combined sections in this course resonate more with what has been termed by McGee & Reis (2012) an "enhanced blend", that is a blend that "allow(s) for incremental changes to the pedagogy but do(es) not radically change the way teaching and learning occurs. This can occur at both ends of the spectrum. For example, in a traditional face-to-face learning environment, additional resources and perhaps some supplementary materials may be included online" (p. 8). Enhanced blends have the potential to become Transforming Blends that is, blends that allow for a radical transformation of the pedagogy, a change from a model where learners are just receivers of information to a model where learners actively construct knowledge through dynamic interactions. These types of blends enable intellectual activity that was not practically possible without the technology later on with more work.

The most "collaborative" part of the course was the final Position Research Paper on Language Policy. Eight groups with four students each were created randomly but care was taken to include students from both the on-campus and the online class in each group; in groups of four students, two were on-campus and two online. Topics were also assigned randomly. All members of each group had equal responsibilities (division of labor is mandatory) in the conceptualization and materialization of the project. Each student was responsible for authoring part of the final paper and one student was responsible for putting the final project together. In this project, part of the learning has to do not only with working in a group, but also with the way the group understands, interprets and frames the topic as well as the perspective they are going to adopt. Final group presentations were scheduled for the last two weeks of classes, and each group was given 20 minutes of class time to present. Online students were encouraged to think about participating with pre-recorded Videos or audio, or call in using Skype. Students were also encouraged to use multimedia, including audio and video. Online students who happened to live in the near the Boston area were encouraged to attend the last two classes on campus.

The last two class meetings were dedicated to class presentations where students shared their findings with the class and submitted their final project.

In collaboration with the institution's Video Production Center, we planned to record the sessions but also to provide synchronous streaming for the online students. The result was two days of group presentations using a variety of tools. The presentations were streamed live so that online students could also watch. Different groups came up with different configurations; one group had worked on an Adobe Presenter presentation with pre-recorded narration by all members of the group and coordination by the two on-campus students. Another group had two on-campus students presenting live and a third member joined it from Spain and presented her part using Skype. We also had a couple of students on Wimba Live Classroom viewing presentation slides and chatting with a support staff member. Unfortunately, technology affected the way that students were able to participate. For instance, while Wimba allows presenter video, the campus network has a hard time supporting it. All students, both those who were physically in the presentation room and those watching from the live streaming had to complete one Peer-Assessment Rubric for each group and submit them directly to the group at the end of the course.

Tools Used, Content, Assessments

Multiple tools were used to support student learning both for online and on-campus modalities. Blackboard was used as a "meeting space" for both online and resident students. Both groups had access to all the Discussion fora and were free to post, comment and interact. Online students obviously used the LMS as the main space for course materials and interactions. On-campus students used Blackboard in addition to regular weekly on-campus seminars. They participated with two postings in the Discussion Board, shared their Ethnographies and received peer feedback, and had access to all material and readings online.

Adobe Presenter was used on a weekly basis for different purposes; the instructor either used it to create a narrated presentation (mini lectures) of the readings and issues discussed and/or at the end of the week to summarize students' points, clarify, comment and wrap up the discussion. Adobe Presenter was also available to students and some of them used it as part of their final group presentation.

Wimba Live Classroom has been employed for two class meetings during the semester with the online students only. What has proven challenging for this synchronous tool was to find a time that would accommodate people in radically different time zones since the students reside in different parts of the world (at least three continents are usually represented in our online courses). Immediately this lowers the participation rate even when the two class meetings are announced ahead of time at the beginning of the semester. Wimba Live Classroom was not used at all with on-campus students.

Skype was used for two purposes; the instructor held office hours on Skype during particular days and times of the week for both online and on-campus students; and some students used Skype to participate in the final group presentation.

What was particularly interesting and purely experimental was to bring the two modalities together in working on their final project in mixed groups. The groups collaborated over email and Blackboard Group Discussions. Their final projects were scheduled for presentation during the last two class meetings. The instructor worked with the Video Production Services to set up a synchronous video streaming. This presupposed holding the last two classes in a specialized presentation room with camera and video conferencing capabilities. On the day of the presentation different tools were used to facilitate participation, including Wimba Live Classroom, Skype, and live streaming. Despite many glitches, mostly with timing the presentations and some technological issues, since so many modalities were used, the presentations were constructive, imaginative and quite fascinating as the two modalities came together.

LESSONS LEARNED AND FUTURE IDEAS FOR COURSE DESIGN

Undoubtedly this blended learning setup was challenging both for the instructor and the students in terms of material organization and student coordination. However, it proved to be a very rich learning experience for both groups of students as evidenced in their final projects. In terms of student performance and learning outcomes, even though we don't have enough quantifiable data that we could compare with previous years, it seems that group projects were richer in terms of content and perspectives and unlike in an on-campus class, they included a more international take on language policies.

In reviewing the course evaluations we noticed that the biggest challenge for both on-campus and online students seemed to be coordination of groups for final projects. On campus students expressed discontent about having to conduct all group work virtually with peers located in different geographical areas and time zones. A couple of on-campus students were plainly resistant about engaging in that kind of work. It is possible that the mixed groups caused trouble, particularly to on-campus students who were not ready to dedicate time and energy outside class to use a different modality for communication. Similar concerns were voiced by online students who did not rate very high the "hybridity" because of group logistics. As did Koh & Hill (2009), we also discovered that group work is something that seems to always come up as an issue in most courses, but it seems that the varying time zones in which students were located caused some problems with on-campus students who were not used to working with partners in different time zones. As such, in future offerings of this course where we attempt to connect online with on-campus learners, it would be worthwhile to try to help scaffold on-campus learners to be able to work with students across different time zones. In addition, a good idea might be to create more structured groups with clear tasks and responsibilities for each member to avoid in-group conflicts that nevertheless might arise in all group work on-campus or online.

Another point of feedback from on-campus students was a complaint that they were signing up for an on-campus course and they were not aware that there would be an online component. They felt that since they were attending class in person every week, online participation was great deal of extra work for them. To this extent some students mentioned that the "hybrid" format of the course was not preferable and that they would have preferred to take the class entirely face-to-face. This is interesting because it is the opposite of what studies, such as the Waddups & Howell (2002) have found, meaning that in this previous study students rated the quality of the blended experience equally or higher than the face-to-face-only experience. This was a bit of a surprise to us.

We have a few ideas on how to address this particular issue. First, there seems to be cultural component to this resistance to this type of hybrid learning in that students expect that their learning experience revolves around a 150 minute class each week. This isn't true since students have readings to prepare, write ups to do, and assignments to complete outside of class. The online component served as a way to connect each other in-between the weekly sessions when they didn't see each other in person.

Another area that was a bit of a challenge was the technology side. Many students in the on-campus courses have the technology available to them, but they don't connect the technology to their own learning and to the learning process. This seems a bit odd because as teachers themselves, they should be using such tools to enhance their own classrooms. To address the cultural expectations of what an on-campus course is, and to address the issue of technology, there is a two-pronged solution that we would like to implement. First, as Davis & Fill (2007) recommend, instead of changing one course to the blended format, it would be better to undertake a review of the entire curriculum in order to identify suitable places for the blend to take place. This means that students on-campus would have many opportunities to work with fellow students who are in the online-only environment earlier on in their studies, not midway, or as they are mostly done with their studies.

Chen, Pendersen & Murphy (2011) have concluded that "most students in [their] study indicated that the orientation sessions were an immense help in resolving technical problems, as well as offering an opportunity to understand the course requirements and the instructor's expectations. Thus, an orientation meeting may be the key to preparing students for the online course" (p. 114). Since our department has welcome sessions for newly matriculated students, this venue would be a great place to introduce the idea of the blended classroom and begin the preparation of on-campus students to use the technology in the classroom to be successful learners. Finally, it would be worthwhile working with our Blackboard administrators to make our courses available one week before the semester starts. The implementation of a "week 0" in both sections would serve as a way to introduce learners to one another and prepare on-campus students for the blend.

While the introductions to the program and "week 0" could address some of these issues, we believe that it is important to also have the instructor address any feelings of the "1.5 course syndrome" that students may have. As Gerber, Grund and Grote (2008) note "as long as the students do not see a relation between their activities during the online course and their performance at the end of the course, they will not be motivated to participate more in their classes – which is a waste of opportunities especially in a blended learning scenario with many different learning settings" (p. 242). By working at blending the curriculum, addressing work amount issues both at the program level and in the course level and making connection on how online work with remote peers, and on-campus work connect, we hope that on-campus students will seize the opportunity to engage more meaningfully with their online peers. Depending on the course subject, learning to be had, and the campus calendar, it may also be advantageous to eliminate some on-campus sessions in favor of online only.

Finally, Swan Garrison & Richardson (2009) write about teaching presence and they mention that there will be a need for the instructor to guide that discussion in a meaningful manner. This ensures that students stay focused and is essential for students to stay engaged and to build a collaborative community of inquiry. Online learners may be more expert in interacting online than on-campus students. Even though there is teacher presence on-campus, there are probably ways in which the instructor needs to modify this presence in this type of blended classroom in order to encourage and foster that collaborative community.

REFERENCES

Akkoyunlu, B., & Yilmaz-Soylu, M. (2008). Development of a scale on learners' views on blended learning and its implementation process. *The Internet and Higher Education*, *11*(1), 26–32. doi:10.1016/j.iheduc.2007.12.006

Allen, E. I., Seaman, J., & Garrett, R. (2007). *Blending in the extent and promise of blended education in the United States*. Washington, DC: Sloan Consortium.

Aspden, L., & Helm, P. (2004). Making the connection in a blended learning environment. *Educational Media International*, *41*(3), 245–252. doi:10.1080/09523980410001680851

Aycock, A., Garnham, C., & Katela, R. (2002). Lessons learned from the hybrid course project. *Teaching with Technology Today, 8*(6).

Banados, E. (2006). A blended-learning pedagogical model for teaching and learning EFL successfully through an online interactive multimedia environment. *CALICO Journal*, *23*(3), 533–550.

Beatty, B. J. (2010). *Hybrid courses with flexible participation-the hyflex design*. Retrieved from http://www.itec.sfsu.edu/hyflex/hyflex_course_design_theory_2.2.pdf

Bersin, J. (2004). *The blended learning book: Best practices, proven methodologies, and lessons learned*. San Francisco, CA: Pfeiffer.

Bliuc, A. M., Goodyear, P., & Ellis, R. A. (2007). Research focus and methodological choices in studies into students' experiences of blended learning in higher education. *The Internet and Higher Education*, *10*(4), 231–244. doi:10.1016/j.iheduc.2007.08.001

Bonk, C., Kim, K. J., & Zeng, T. (2005, June). Future directions of blended learning in higher education and workplace learning settings. In *Proceedings of World Conference on Educational Multimedia, Hypermedia and Telecommunications*, (pp. 3644-3649). IEEE.

Bonk, C. J., & Graham, C. R. (2012). *The handbook of blended learning: Global perspectives, local designs*. San Francisco, CA: Pfeiffer.

Boyle, T., Bradley, C., Chalk, P., Jones, R., & Pickard, P. (2003). Using blended learning to improve student success rates in learning to program. *Journal of Educational Media*, *28*(2-3), 165–178. doi:10.1080/1358165032000153160

Carmen, J. M. (2002). *Blended learning design: Five key ingredients*. Retrieved from http://www.agilantlearning.com/pdf/Blended%20Learning%20Design.pdf

Chen, C. Y., Pedersen, S., & Murphy, K. L. (2011). Learners' perceived information overload in online learning via computer-mediated communication. *Research in Learning Technology, 19*(2).

Daffan, E. A., & Rainger, P. (2006). A model for the identification of challenges to blended learning. *Research in Learning Technology*, *14*(1), 55–67. doi:10.1080/09687760500479787

Davis, H. C., & Fill, K. (2007). Embedding blended learning in a university's teaching culture: Experiences and reflections. *British Journal of Educational Technology*, *38*(5), 817–828. doi:10.1111/j.1467-8535.2007.00756.x

Dodero, J. M., Fernandez, C., & Sanz, D. (2003). An experience on students' participation in blended vs. online styles of learning. *SIGCSE Bulletin*, *34*(4), 39–42. doi:10.1145/960492.960522

Dziuban, C., Moskal, P., & Hartman, J. (2005). *Higher education, blended learning and the generations: Knowledge is power—No more.* Retrieved from http://www.sc.edu/cte/dziuban/doc/blendedlearning.pdf

Flanigan, R. (2012). Blended PD emphasizes differentiated instruction. *Education Week*. Retrieved from http://www.edweek.org/ew/articles/2012/10/24/09el-blendedpd.h32.html

Garrison, D. R., & Kanuka, H. (2004). Blended learning: Uncovering its transformative potential in higher education. *The Internet and Higher Education*, *7*(2), 95–105. doi:10.1016/j.iheduc.2004.02.001

Garrison, D. R., & Vaughan, N. D. (2008). *Blended learning in higher education: Framework, principles, and guidelines*. San Francisco, CA: Wiley.

Gerber, M., Grundt, S., & Grote, G. (2008). Distributed collaboration activities in a blended learning scenario and the effects on learning performance. *Journal of Computer Assisted Learning*, *24*(3), 232–244. doi:10.1111/j.1365-2729.2007.00256.x

Ginns, P., & Ellis, R. (2007). Quality in blended learning: Exploring the relationships between on-line and face-to-face teaching and learning. *The Internet and Higher Education*, *10*(1), 53–64. doi:10.1016/j.iheduc.2006.10.003

Graff, M. (2003). Individual differences in sense of classroom community in a blended learning environment. *Journal of Educational Media*, *28*(2-3), 203–210. doi:10.1080/1358165032000165635

Graham, C. R. (2013). Emerging practice and research in blended learning. In M. G. Moore (Ed.), *Handbook of distance education* (3rd ed., pp. 333–350). New York, NY: Routledge.

Hartnett, M. (2009) Factors undermining motivation in place-based blended learning. In *Proceedings of ASCILITE 2009*. Auckland, New Zealand: ASCILITE.

Hun Lim, D., Morris, M. L., & Kupritz, V. W. (2007). Online vs. blended learning: Differences in instructional outcomes and learner satisfaction. *Journal of Asynchronous Networks*, *11*(2), 27–42.

Kim, K., & Bonk, C. (2006). The future of online teaching and learning in higher education: The survey says. *EDUCAUSE Quarterly*, *29*(4), 22–30.

Koh, M. H., & Hill, J. R. (2009). Student perceptions of group work in an online course: Benefits and challenges. *Journal of Distance Education*, *23*(2), 69–92.

Laumakis, M., Graham, C., & Dziuban, C. (2009). The Sloan-c pillar and boundary objects as a framework for evaluating blended learning. *Journal of Asynchronous Learning Networks*, *13*(1), 75–87.

MacDonald, J., & Mcateer, E. (2003). New Approaches to supporting students: Strategies for blended learning in distance and campus based environments. *Journal of Educational Media*, *28*(2-3), 129–146. doi:10.1080/1358165032000165662

McGee, P., & Reis, A. (2012). Blended course design: A synthesis of best practices. *Journal of Asynchronous Learning Networks*, *16*(4).

Means, B., Toyama, B., Murphy, R., Bakia, M., & Jones, K. (2010). *Evaluation of evidence-based practices in online learning: A meta-analysis and review of online learning studies*. Retrieved from http://www2.ed.gov/rschstat/eval/tech/evidence-based-practices/finalreport.pdf

Mortera-Gutierrez, F. (2006). Faculty best practices using blended learning in e-learning and face-to-face instruction. *International Journal on E-Learning*, *5*(3), 313–337.

O'Toole, J. M., & Absalom, D. J. (2003). The impact of blended learning on student outcomes: Are there room on the horse for two? *Journal of Educational Media*, *28*(2-3), 179–190. doi:10.1080/1358165032000165680

Osguthorpe, R. T., & Graham, C. R. (2003). Blended learning environments: Definitions and directions. *Quarterly Review of Distance Education*, *4*(3), 227–233.

Palloff, R. M., & Pratt, K. (2005). *Collaborating online: Learning together in community*. San Francisco, CA: Jossey-Bass.

Power, T. M., & Morven-Gould, A. (2011). Head of gold, feet of clay: The online learning paradox. *International Review of Research in Open and Distance Learning*, *12*(2), 19–39.

Robertson, I. (2008). Learners' attitudes to wiki technology in problem based, blended learning for vocational teacher education. *Journal of Educational Technology*, *24*(4), 425–441.

Rossett, A., Douglas, F., & Frazee, R. V. (2003). Strategies for building blended learning. *Learning Circuits, 4*(7).

Rovai, A., & Jordan, H. (2004). Blended learning and sense of community: A comparative analysis with traditional and fully online graduate courses. *International Review of Research in Open and Distance Learning*, *5*(2).

Singh, H. (2003). Building effective learning programs. *Educational Technology*, *43*(6), 51–54.

Singh, H., & Reed, C. (2001). *A white paper: Achieving success with blended learning: 2001 ASTD state of the industry report*. Alexandria, VA: American Society for Training & Development.

So, H. J., & Brush, T. A. (2008). Student perceptions of collaborative learning, social presence and satisfaction in a blended learning environment: Relationships and critical factors. *Computers & Education*, *51*(1), 318–336. doi:10.1016/j.compedu.2007.05.009

Sridharan, B., Deng, H., & Corbitt, B. (2010). Critical success factors in e-learning ecosystems: A qualitative study. *Journal of Systems and Information Technology*, *12*(4), 263–288. doi:10.1108/13287261011095798

Stacey, E., & Gerbic, P. (2008). Success factors for blended learning. In *Proceedings ASCILITE Melbourne 2008*. Retrieved from http://ascilite.org.au/conferences/melbourne08/procs/stacey.pdf

Swan, K., Garrison, D. R., & Richardson, J. (2009). A constructivist approach to online learning: The community of inquiry framework. In *Information technology and constructivism in higher education: Progressive learning frameworks*. Hershey, PA: IGI Global. doi:10.4018/978-1-60566-654-9.ch004

Taylor, J. A., & Newton, D. (2012). Beyond blended learning: A case study of institutional change at an Australian regional university. *The Internet and Higher Education*, *18*, 54–60. doi:10.1016/j.iheduc.2012.10.003

Thompson, K. (2012). *BlendKit reader*. Retrieved from http://blended.online.ucf.edu/files/2011/06/blendkit_reader_2011.pdf

Vonderwell, S. (2003). An examination of asynchronous communication experiences and perspectives of students in an online course: A case study. *The Internet and Higher Education*, *6*(1), 77–90. doi:10.1016/S1096-7516(02)00164-1

Waddoups, G., & Howell, S. (2002). Bringing online learning to campus: The hybridization of teaching and learning at Brigham Young University. *International Review of Research in Open and Distance Learning*, *2*(2).

Wu, J. H., Tennyson, R. D., & Hsia, T. L. (2010). A study of student satisfaction in a blended e-learning system environment. *Computers & Education*, *55*(1), 155–164. doi:10.1016/j.compedu.2009.12.012

Zi-Gang, G. (2012). Cyber asynchronous versus blended cyber approach in distance English learning. *Journal of Educational Technology & Society*, *15*(2), 286–297.

ADDITIONAL READING

Beatty, B. J. (2010). Hybrid courses with flexible participation-the hyflex design. Retrieved from: http://www.itec.sfsu.edu/hyflex/hyflex_course_design_theory_2.2.pdf

Garrison, D. R., & Kanuka, H. (2004). Blended learning: Uncovering its transformative potential in higher education. *The Internet and Higher Education*, *7*(2), 95–105. http://cecs.anu.edu.au/files/flu_presentation/blended_learning/data/resources/Garrison_2004_The-Internet-and-Higher-Education.pdf. doi:10.1016/j.iheduc.2004.02.001

Garrison, D. R., & Vaughan, N. D. (2008). *Blended learning in higher education: Framework, principles, and guidelines*. San Francisco: Wiley.

Gorsky, P., Caspi, A., & Blau, I. (2012). A Comparison of non-mandatory online dialogic behavior in two higher education blended environments. *Journal of Asynchronous Learning Networks*, *16*(4). Retrieved from http://sloanconsortium.org/jaln/v16n4/comparison-non-mandatory-online-dialogic-behavior-two-higher-education-blended-environmen

Moskal, P., Dziuban, C., & Hartman, J. (2013). Blended learning: A dangerous idea? *The Internet and Higher Education*, *18*, 15–2. http://www.sciencedirect.com/science/article/pii/S109675161200084X. doi:10.1016/j.iheduc.2012.12.001

Thompson, K. (2012) *BlendKit Reader*. Retrieved from: http://blended.online.ucf.edu/files/2011/06/blendkit_reader_2011.pdf

Wu, J. H., Tennyson, R. D., & Hsia, T. L. (2010). A study of student satisfaction in a blended e-learning system environment. *Computers & Education*, *55*(1), 155–164. http://www.sciencedirect.com/science/article/pii/S0360131510000035. doi:10.1016/j.compedu.2009.12.012

KEY TERMS AND DEFINITIONS

Blended Learning: A mode of course delivery where 30%-70% of the instruction is delivered through an online medium.

Community of Inquiry (CoI): A group of individuals involved in a process of empirical or conceptual inquiry into problematic situations.

ESL: English as a Second Language.

Hybrid Flexible (HyFlex): A type of blended learning where learners have the flexibility of choosing their modality of participation on a week to week, or module by module, basis.

K-12: Kindergarten through 12th grade (High School).

Learning Management System (LMS): An online software system for the administration and delivery of online courses.

MOOC: A course where the participants are distributed and course materials also are dispersed across the web. The course is a way of connecting distributed instructors and learners across a common topic or field of discourse.

Wimba Live Classroom: A technology, by Blackboard, Inc., which enables synchronous interactions in an online classroom.

This work was previously published in Practical Applications and Experiences in K-20 Blended Learning Environments edited by Lydia Kyei-Blankson and Esther Ntuli, pages 178-190, copyright year 2014 by Information Science Reference (an imprint of IGI Global).

Chapter 66
Triumphs and Tribulations of the Flipped Classroom: A High School Teacher's Perspective

Frederick J. Carstens
Tapestry Charter School, USA

Milton Sheehan
Tapestry Charter School, USA

ABSTRACT

This chapter focuses on the experiences of a Social Studies teacher who has recently introduced the concept of the flipped classroom to his students at an inner city school in Buffalo, NY. Despite his technological issues and struggles with homework completion, his perseverance throughout this process provides valuable lessons for educators seeking to implement similar initiatives in their own classrooms. Ideas for improving student engagement and literacy in the flipped classroom as well as first hand accounts from his ninth grade students are discussed.

INTRODUCTION

I have been teaching ninth grade Global History and Geography at Tapestry Charter High School for the past five years. Tapestry is an Expeditionary Learning School (EL). The Expeditionary Learning model is unique in that it connects academically rigorous curriculum with real world issues and current events. As a teacher in an EL school, my students utilize case studies, projects, fieldwork and service learning as a means of learning their global history. By engaging in "learning expeditions," students learn in authentic and meaningful ways to produce high quality work (Expeditionary Learning, 2013). EL is a great way to harness students' curiosity about the world around them, while improving their academic skills and content knowledge through a variety of teaching methods. This year, I have expanded upon the teaching methods utilized within the Expeditionary Learning model with my attempts at using the flipped classroom approach.

DOI: 10.4018/978-1-4666-8246-7.ch066

BACKGROUND

Tapestry Charter School

When I was hired by Tapestry, I had no idea what a charter school was, or Expedition Learning for that matter. Since then however, I have come to realize that there are several aspects that make Tapestry Charter High School unique. These aspects include weekly professional development opportunities, student led conferences, team building trips and intensive experiences.

One of the primary differences between Tapestry and other traditional high schools is the professional develop opportunities afforded to its teachers. Tapestry sets aside two hours every Monday morning for professional development. Essentially, every Monday is a half-day for students, as classes start for students at 10:20 instead of the normal school daytime of 8:20. While some teachers may think that this is a waste of time, this professional development is unlike anything I have ever experienced elsewhere.

Typically, school administrators organize professional development. They will hire an outside firm to facilitate a lesson to teach their faculty about some new buzzword that is taking the profession by storm. This may only happen between 2-3 times a year, and despite their best intentions, many teachers are unengaged. At Tapestry, professional development is grassroots and teacher driven. Having this sort of professional development every Monday is beneficial because it allows teachers to hone their skills, share best practices and collaborate across grade level and within their departments. Teachers not only have a choice in what learning cycle they would like to participate in, but their input in the process is crucial to its success. Every teacher is engaged in his or her learner cycle. Every teacher is also empowered with the ability to make suggestions and lead the discussion.

Student Led Conferences (SLC's) are another worthwhile structure at Tapestry. Three times per year normal classes are suspended to accommodate this process. Student Led Conferences are similar to parent teacher conferences, except that the process is entirely student driven. During these hour-long appointments, students present their portfolios to their parents. These portfolios consist of student work samples and reflections upon their progress towards meeting their learning objectives. They receive feedback from their teachers and parents as to their strengths and areas in need of improvement. Although a very powerful structure, it does occupy between three to four days of classroom instruction.

Tapestry also differs from traditional high schools in the extracurricular opportunities that are afforded to its students. Every fall, Tapestry students and staff engage in overnight camping trips. Through well-structured team building activities and initiatives, students are able to bond with their teachers and peers in ways that would otherwise not the possible.

Then every spring, Tapestry provides students with enrichment experiences known as intensives. Intensives are designed to give students meaningful experiences outside the classroom. For three days students work on an intensive project that challenges them both academically and socially. Often these intensives involve students exploring possible career choices or working on service projects in the larger Buffalo community. Last year Tapestry students had 21 different intensive options, ranging from enrichment activities involving culinary arts to music production. In a school wide end of the year survey, more than fifty percent of our students pick intensives as some of their most memorable moments at Tapestry. This is a close second only to their teambuilding camping trips.

Intensives, Student Led Conferences, professional development, and team building trips are just a few of the things that make Tapestry different from traditional schools. While these are key elements that make Tapestry successful, all of these extra initiatives amount to the loss of precious seat time with the students. This subsequently puts pressure on teachers who must comply with New York State standards, and must ensure that students learn the required curriculum in order to be successful on state assessments. This becomes difficult when teachers lose anywhere from 8-14 days to these EL structures.

In order to make up for this lost time, I often find myself picking and choosing one to three topics from my curriculum every year. Since these are topics that I would have had time to teach at a traditional school, but cannot in this situation, this always creates a great deal of anxiety during exam week. All I can do during exams is have my fingers crossed, hoping that those topics do not reveal themselves in that year's final exam.

THE FLIPPED CLASSROOM

The flipped classroom model has intrigued me from the moment I learned about it last September, because no one wants to teach to the test, the reality is that state assessments have become a fundament part of any teacher's job. The idea of the flipped classroom has provided me with a new way to get students the content and skills they need.

Based on the summary guide presented to me by my school's curriculum coordinator Elizabeth Smallwood, (personal correspondence, September 20, 2012), a flipped classroom is:

- A means to INCREASE interaction and personalized contact time between students and teachers.
- An environment where students take responsibility for their own learning.
- A classroom where the teacher is not the "sage on the state," but the guide on the side."
- A blending of direct instruction with constructivist learning.
- A classroom where students who are absent due to illness or extra-curricular activities such as athletics or field trips, don't get left behind.
- A class where content is permanently archived for review or remediation.
- A class where all students are engaged in their learning.
- A place where all students can get a personalized education.

Initially sparking more questions than answers, this also led me to wonder:

- What is the best use of face-to face class time?
- What information could students gain on their own, using Internet resources, rather than listening to classroom lectures?
- How would the ability to replay lectures and explanations increase student obtainment of content information?
- What higher-level activities could take place in the classroom with the time saved?
- How could this help parents and others support students with their work?

These questions have helped guide my lesson planning.

GETTING STARTED

Tip #1: Backwards Planning

Before flipping a classroom, I would highly recommend backwards planning. This means that you will need to brainstorm the knowledge and skills you need your students need to master by the end of the lesson or unit. Then create learning targets based on this essential knowledge, and create summative assessments that align with those targets. By identifying what you want your students to know and creating the summative assessment and learning targets first, your lessons will be less ambiguous to your students.

Tip #2: Ample Time Allotment

It is important to give yourself a realistic timetable to create and implement a flipped lesson, especially if it is your first time flipping the room. I recommend starting the flipped routine on the very first day of school for two reasons. First, it gives you time over the summer to backwards plan, build up your website, modify your notes, and create amazing screencasts. Second, by getting students trained on how the flipped class model works from the beginning, you will be less likely to experience the classroom management issues that often occur when you transition from one routine to another.

If you are like me and cannot wait to try something new, then I recommend that you pick a topic or unit that gets little recognition on state assessments. I decided to start with Ancient Rome because this is rarely asked on the New York State assessment and I tend to find that students have a great deal of prior knowledge on this civilization. So this way, if my experiment went away, the stakes would not be as high as they might be when teaching another topic.

FIRST ATTEMPT TO INTRODUCE THE FLIPPED MODEL TO STUDENTS

When I first introduced the flipped model to my ninth graders, I purposely introduced it in small increments for several reasons. First, I wanted them to get used to the new structure, and to make it user friendly. I did not want them to have the excuse that, "Mister, your website did not work on my computer" or to give them any other technological excuse for not doing their homework. Since I started the flipped classroom three months into the school year, I was also fearful a new routine would upset the positive learning environment my classroom routines created. In order to accommodate these concerns, I initially went at a very slow pace in introducing the flipped model to my students.

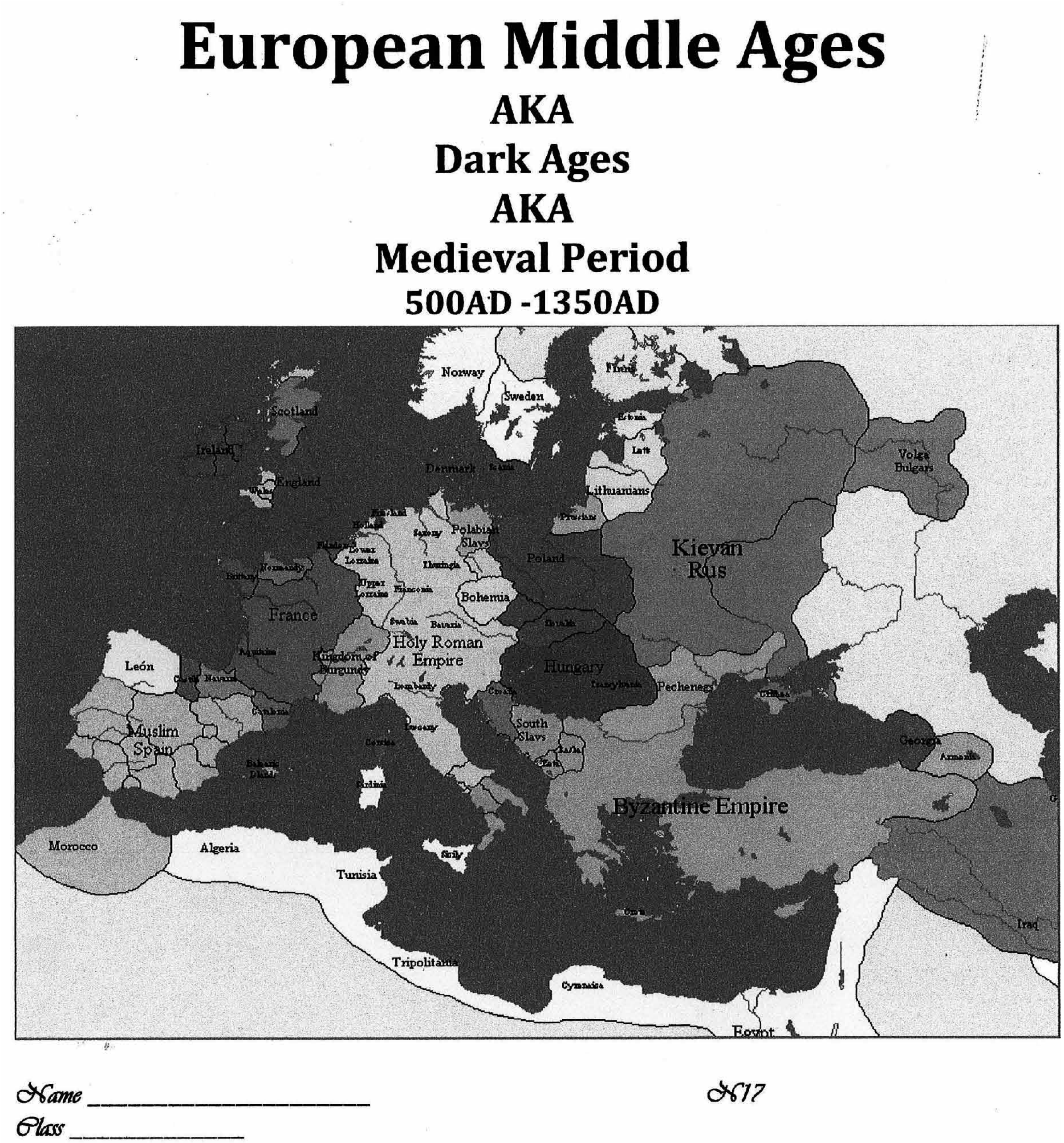
The first flipped lesson I created technically was not flipped. Since I had never used screencast before and I did not have a lot of planning time, I just modified a PowerPoint I previously used for in class lectures, and posted it on my website. However, without a screencast where I could add a voiceover explaining the slides however, I became nervous that my students would not understand the general bullet points of information I typically put into my slideshows during my traditional classroom lectures. To overcome this issue, I decided to add more notes.

At the time, my rationale for adding the extra notes was to help students better understand the content. When creating that lesson, and all the lessons since, I never had to start from scratch. That is the beauty of the flipped class; all of my lecture notes, PowerPoint's, and other materials can be and should be incorporated into my screen or podcasts. I stress the word "incorporate," because some adjustments needed to be made, but I was mindful not to make too many changes at once.

With what planning time I had, much of my focus was on creating better student note packets. I turned my old lecture notes into guided notes, with pictures, making it easy for students to follow along as they watched my PowerPoint (and future screencasts) at home. The cover pages became color-coded, with each color representing a unit of study. Blue represented Rome, yellow would become the Byzantine Empire and so on. Color-coding makes the packets easy to spot in what I like to call, "A black hole for a book bag." It is also important to number every page, and make sure your headings on the screen cast match the headings in the guided notes. This makes it easy for students to follow along as they follow the screen cast. Figure 1 shows the cover and a sample page of from the Ancient Rome packet I created.

I gave the students a note catcher and instructed them to visit my website, take the notes and bring them to class the next day. We talked about the

Figure 1. Student notes



importance of taking good notes and I even told them, "I don't care if you copy each other," because the homework was notes, and not a skill based assessment. I was looking forward to the next day, excited to see if there would be an increase in the amount of homework turned in.

As it turns out, with the flipped model, 75-80% of my students had the assignment fully completed and turned it in on time. The students had got their notes at home, and the project they complete the next day in class uses and reinforces the knowledge they got from the PowerPoint.

Further, the project allows me the opportunity to help them improve their literacy skills. In my mind, this was a flipped class.

The next day, I stuck with my same entry routine. Students completed a "Do Now" or "Bell Work" assignment as I walked around checking homework and taking attendance, but all of a suddenly I was perplexed. I was not sure how to go about grading their homework. For most teachers this may not have been a problem, but at Tapestry we have a standards based grading system. It is on a four-point scale, and we give two types of grades. Students receive an academic grade based on a specific long-term learning target for all summative assessments. Essentially this grade reflects what they know. The other grade they receive is a Habits of Work grade or H.O.W. grade. This represents the work ethic, and includes but is not limited to meeting deadlines, classroom attendance, participation, and behavior.

Going from packet to packet, writing down their grades on tracking folders, I realized that because their homework was essentially notes, I could not give them an academic grade. I also felt doing this everyday would inflate, or deflate their H.O.W. grades. I was also concerned about the kids that did not finish, or only finished half the notes. Forget about grading them, how was I going to make sure they got the information they had failed to get? As I realized the students that chronically chose not to come to class prepared made the same choice that day, and started to doubt how successful this model really would be.

Adding to my mounting anxiety were the results from the Do Now question. Students were supposed to describe the myth that helped explain the founding of Rome. The answer was straight from the previous night's notes. To my dismay, the percentage of students that got the answer correct was drastically smaller than typical Do Now solution.

Looking back on that day, adding those extra notes was a mistake on my part. I wanted the technology to excite them, and hoped it would fuel their intrinsic motivation for learning. Unfortunately, that first attempt was a bore to them. Those extra notes turned some kids off to the flipped model, especially my auditory learners. To make matters worse, I lectured for most of the class, out of fear of they did not understand the notes from the website. The only time left was used to explain the project, which was assigned for homework. This was not what I intended.

I make it a point at the end of the day to take five minutes and reflect on my teaching. I asked myself:

- What went well, and why?
- What did not go well, and why?
- What changes can I make to improve it for next year?

Walking away from that first attempt, I came to the conclusion that the class was not flipped. I left school that day with two regrets. First, I wished I had done a better job with my backwards planning. I should have used the questions from the summary reading the school's curriculum coordinator had given me. My second regret was that I wished I had not waited until December to start experimenting with it in my classroom. Despite my lackluster first attempt, I still saw promise using this method of teaching.

IF AT FIRST YOU DON'T SUCCEED, TRY, TRY, AND TRY AGAIN

Over the next two weeks I made other attempts at the flipped classroom, all with mixed results. Again, the lessons online consisted of PowerPoint presentations with guided notes, and most of the class consisted of teacher lecture, instead of practice and application. The closest I came to flipping the room was when I gave a PowerPoint lecture on the Roman "bread and circus" and "gladiatorial contests" for homework.

Typically, when teaching this unit, I would show a clip or two from Ridley Scotts' Gladiator movie, and have students take notes on how the gladiator games was used by the Roman Government as a means to control the masses. Determined to make the lesson more engaging and student centered, the next day I planned a classroom debate, and the question I used to guide the debate was, "Is the NFL the modern day bread and circus?" I got the idea after watching sports center. During a post game interview, a Kansas City Chief's lineman went off on a rant after the fans cheered for their quarterback getting knocked out of game because he was playing so poorly. The lineman said, "This is not the Roman Coliseum and we are not Gladiators."

After checking the completion of their guided notes, reading relevant articles on both the Romans and the NFL, I finally I had the students take out a blank sheet of paper and gave them thirty seconds to flush out their thoughts for the following questions:

1. If the gladiator games were held today would you go?
2. Why do you think the Caesars welcomed the games?
3. How is the NFL like the games?
4. Is it okay to cheer for violence?
5. Do we have anything else in our society that compares to the Romans Bread and Circus?

Before the class was able to complete those questions, the bell rang, so I collected their papers as an exit ticket, and we never did get the chance to discuss their ideas using the Socratic seminar like I had planned. Disappointed, I went home that night, and began to read over their answers. To my surprise, I was rewarded with answers that showed an abundance of analysis and evaluation. One student with special needs, answering question #3 wrote:

The NFL is not like the gladiator games because President Obama does not use the NFL to control United States Citizens.

This particular student certainly made the connection I intended without my explicitly placing it in his notes. Another student, one of my better writers, answered question #5 with this provocative response:

I feel many of my classmates will compare the Bread and Circus to boxing or mixed martial arts fighting… However, I believe a truer 21st century comparison to this ancient institution would be modern media. In the past, CNN would use reports to share meaningful news across the world. Now, they use their empire to gain profit, by reporting on celebrity court cases to gain viewership, which, in turn, brings economic gain to the company through advertising revenue…

After reading this cynical, yet fascinating response, I was devastated that I had run out of time. Those viewpoints, I believe, would have attracted and stimulated a noteworthy discussion. Due to my tight schedule, I knew I would not have time to take another day on this topic and therefore there would be no Socratic Seminar, yet I did make it a point to keep the comments to use as a model for next year.

It was at that moment that I decided to revisit the summary of the flipped model I received at the beginning of the school year. Particularly the section on questions all teachers should consider when flipping the room. *What is the best use of face-to-face class time?* The question was the one that most resonated with me. I was determined to have more one-on-one or, at least, more small group contact with my students, and a classroom where students have more of a choice or say in what and how they learn.

I made the decision to go 'all in' with the flipped classroom in my upcoming unit. I spent that weekend backwards planning and screen casting. As a teacher who tends to micro-manage, I knew I needed to let go of the reigns of instruction. Too often during those first attempts, I did not trust the system. I was fearful the majority's of students were not taking good notes, and therefore would not have the information needed to be successful on the state exam.

BEST USE OF FACE-TO-FACE TIME

The next unit would be on the Medieval Period. After pondering how to best use student-teacher face-to-face time, I decided to create a unit around a learning contract. This method would allow the students to work on higher-level activities during class time where I normally would be lecturing. The learning contract format I chose can be found in Appendix A.

Learning contracts can be found on the Internet in a variety of different formats. They are easy to create or modify. I was first introduced to learning contracts three years ago, but never used one because I thought they were too time consuming. By flipping my room I now had the time and a new tool to get students engaged in their learning. The contract I choose for this unit was based on a points system. I specifically allowed students the option to add a chose your own project, with teacher approval of course. It is important while running a flipped classroom to provide students a place to personalize their education. I believe adding a chose your own, helped accomplish that goal. It also allow for some differentiation by choice. I specifically outlined project ideas that would meet the creative needs, and learning styles for all students. The learning contract provides several ways students can connect to their multiple intelligences when learning about the middle ages.

With standards based grading, some students at my school tend to disregard their H.O.W. grades, and only focus on their academic grades. By using the flipped classroom, in conjunction with the learning contract, I now had a way to motivate them to improve their work ethic. Each student had one month to complete nine points worth of projects. The contract was a ticket to take the unit test. If all nine points were not completed on their contract, the student would not be allowed to take the test. They would be assigned an afterschool help class to complete their projects, once all nine points were accounted for, they could then take their test.

For twenty-one days straight, the students would go home every night complete a flipped lecture on the middle ages, and the next day, I would take ten minutes after my entry routine to answer any student questions or explain important concepts. I still included the PowerPoints, but I added background music, and "OmniDazzle" to spotlight important points displayed on the screen as my voiceover explained what was being shown. The students would then visit my student center. The student center consisted of folders containing rubrics for every contract project, a bin full of hanging folders containing leveled articles labeled by topic (Serfdom, Manorialism, Architecture, etc.). Inside each hanging folder were multiple articles on a specific topic. Having received the students Scholastic Reading Inventory (SRI) scores (Lexile/reading levels) from the literacy teacher, I made it a point to make sure the articles Lexile scores fit within their ranges. Also at the student center was a large contingent of art supplies, which student should use to complete their learning contracts. I felt this method was a better use of time because it freed me up to walk around the room, answer questions, check for understanding, and work on a one to one basis.

Another way the flipped method helped make better use of face-to-face time was in regards to teaching the Document-Based Question essay or DBQ. The Middle Ages unit has always been a unit where I would focus on student writing. In the past, before the flipped classroom I would have students complete the documents in class, go over the answers together, create an outline, then send them home to write the essay. No matter how many practice essays we would go over in class, I would always get a large contingent of student questions the next day and many unfinished DBQ essays. Now that the students were taking notes at home I had more class time to work with them on their writing skills and answer writing related questions they would typically have formulated at home. I decided to create three stations for this unit. Learning stations can help improve individual writing skills while preventing me from boring a portion of the class by teaching them skills they have already mastered.

With the flipped model and proper planning time, if possible, I strongly recommend bringing other content teachers in to help students grow. The English teacher and I have been collaborating since the beginning of the year. I brainstormed with her before writing this lesson. Together we agreed upon a common vocabulary that we would use when teaching literacy skills in each of our classes to help reinforce student learning.

During our common planning period, I sat down with the English teacher to discuss the specific writing skills that our students needed to improve. We came to the conclusion that transitions should be the focus of one station. I asked our school's literacy specialist if she would like to plan and monitor a station around transitions, which she was happy to do. I also analyzed essays written by students earlier in the year, and I determined that my higher functioning students could use some improvement with their analysis of the documents, and my mid-level students struggled with how to properly use and cite a document in the essay. I recruited the buildings AmeriCorps volunteer, who just so happened to be an English major, and I invited him to create a lesson on citing and using documents in an essay I created the station around document analysis.

As we implemented this lesson, we made it clear to the students that they would have two days to visit two stations. Unbeknownst to them, out the of the three stations one was a mandatory station that they would have to visit based on prior their performance in my class, and the discussion I had had earlier in the week with the English teacher. Then they would have to choose between the two remaining stations. We made it clear their choice should be based on what skills they needed to improve. If any students finished early, there was a fourth station for peer editing to take place. The stations themselves were student centered; the teachers in the room essentially were there to monitor student progress. I know many schools may not have AmeriCorps, or literacy resources available, and if that is the case you may want to consider using direction cards. Direction cards clearly state what each student should be doing at their station. They are easy to make and cut down the time wasted answering procedural questions. Even with extra teachers in the room, the use of direction cards at each station was helpful. In order for students to finish a station and move on, they had to complete a formative assessment questionnaire. They then would have to staple that questionnaire to their final essay, and use their answer in their essay. On the third day, students were able to write their essay in class, which allowed them to ask either the AmeriCorps volunteer or myself questions.

This lesson demanded a lot of work upfront on the part of the teachers, but the lesson itself kept the students engaged. I believe only focusing on a couple skills and not all of the skills needed to correctly write a DBQ essay made a huge difference. The skills not taught were scaffolded into future lessons. Without applying the flipped model during this unit, I would not have the three extra days to successfully implement this lesson. This was the lesson that washed away any and all apprehensions I had in regards to the flipped structure. After reading over the student's final drafts, I was in awe at how quickly they grew as writers. Although there was growth to be seen within all the students' paper, one particular student whose papers that stood out. She was a student that usually does well on multiple-choice tests, however her writing skills were subpar. Her thoughts were "choppy" and in desperate need of transitions. Simultaneously, she has not been able to properly use documents to support her outside information.

In response to the DBQ essay prompt, "discuss life during the feudal period," She wrote:

Violence was another problem people had to deal with during the feudal period. According to Document 1, "the Hungarians and other tribes burned down churches and then departed with a crowd of captives. There is no longer any trade, only never ending terror." Soon after there was so much chaos during this time, people looked for some type of order.

Overall, using the flipped classroom model for an entire unit in my mind was a great success. However, I would like to point out some changes I will be making to my lesson plans for next year. First, it is important to set clear deadlines when using learning contracts, especially with freshman. By setting deadlines, students will not feel as overwhelmed, and it will help space the grading out over three weeks. This is a lesson I learned after having them complete nine projects each, without deadlines. Before I knew it, I spent an entire weekend grading hundreds of projects. Another change I plan to make is in regards to Lexile scores. After students take the SRI in the beginning of the year, they are given their reading level. Their class advisor sits down with them and explains how they can use the score to improve their reading. Next year, I will attach the Lexile score to all of the articles in those research-hanging folders. This way, students can choose an article that is in their Lexile range, and use it to challenge themselves. By visiting Lexile.com, a teacher can get a Lexile range on any books or articles by typing in a couple of sentences.

SCREEN CASTING

It was during this unit that I delved into screen casting. I will not be going into great detail on how to screen cast, but will discuss throughout this section common mistakes to avoid. My original casts, though simplistic, were more advanced than those primitive power points I had used earlier. Originally, I started screen casting with QuickTime. Besides it already being installed on my computer, other major advantages are it costs nothing, and is simple to use. One downside for this software is that it is not equipped with a pause button. Any mistake during recording, may force me to start from the beginning. I highly recommend finding a quiet place when recording, and making sure your cell phone is off. When I posted those original casts, students could hear my dog barking in the background, or my ESPN app alerting me to another Buffalo Bills loss. Several times during class, if I wanted to gauge how many students actually were watching my videos, I would post a Do Now that would ask, "What animal sound could be heard during last night's video." Asking questions like that would give me a real-time look into how many watched and how many were just copying a friend's note packet. Regardless of the quality of the note packets, they served their purpose.

Recently, I switched to using Snagit, another free service. One advantage of Snagit over QuickTime is Snagit allows the user to screencast while having the speaker's face displayed in the corner, as they are lecturing. To me, this is more personable. There were times when using QuickTime that I felt like Oz, a voice behind the curtain. I am not at this point yet, but I have seen Camtasia used at a recent tech seminar I went to. It is the Rolls Royce of screen casting. It can virtually do anything you can think of, but it comes with a $299 price tag. Despite what software is being used, it is important to prepare notes or an outline of what needs to be presented in the cast. One recommendation I have for those teachers new to the field, or veterans switching into a new content area, is to start with reading excerpts from textbooks, while blending interesting anecdotes into the lecture.

Screen casting is also helpful with trying to incorporate Geo-Literacy skills. The Late Show with Jay Leno was a favorite of mine in high school. One of my favorite skits, was when Leno would take a small film crew out onto the streets and ask random citizens questions like "Where is the Statue of Liberty located?," or "What state is Washington D.C. in?" The people answering would give the most ridiculous answers. After becoming a teacher I promised myself that my students would never become pray for the likes of Jay Leno or Jimmy Fallon. One way I keep that promise is by displaying a map on the screen to help my students make geographic associations to people and events. For example, when referencing the Battle of Tours, I use a free Mac App called omnidazzle to magnify or put a spotlight on the area in France where the battle took place. It is important for all content teachers to download some kind of spotlighting tool. It is essential for screen casting, and many of the free screen casting software products do not include one. To download a free spotlighting tool whether for Mac or PC, run a quick search on Cnet.com.

My casting has evolved over time, and I have recently introduced Google Earth into my online lecture. Google Earth, is the tool needed for incorporating geographic literacy into a lesson, whether in a screen cast or in the classroom. While screen casting a lecture on the power of the Catholic Church, I have used Google Earth to display a 3D overlay of the medieval cathedrals, like Chartres in France. I have not done so this year, but in the future, I plan to use Google Earth in the classroom after a lecture on an ancient civilization and have students create Google Earth tours from our school to the historical sites of the civilization being studied. A Google Earth tour can be programmed so a class can see a 3D tour of anywhere in the world from a bird's eye view, down to street level all on a classroom projection screen.

Once I finished a screen cast, I would upload it to YouTube. I like YouTube because it is popular with the students, and I find many students already have created accounts. The upload time is quick and efficient. A user simply needs to drag and drop the video into YouTube's drop box, and there is no need to degrade the video quality in the process. After the video is uploaded, YouTube provides a link that I embed on my website. This allows students several ways to find their homework; they could either go to my website and use the link, or subscribe to me from their YouTube accounts, every time I post a new video, as subscribers, YouTube will send them an email notification.

Despite all of the pros for using YouTube, it is by no means perfect. Most of the first screen casts I created were between 15-30 minutes. This meant I had to go through an extra step on the YouTube website, by confirming an email stating that all videos I posted met the requirements of their website. Essentially, the company wants to make sure all videos were of original content, and no copyright laws were being broken. By keeping videos under 15 minutes this step is not warranted. Another concern about using this site was if questionable content in videos posted by others would pop-up off to the side, when students were watching my videos on their home computers? I did not want a risqué advertisement or inappropriate video appearing next to mine.

Due to this concern, I tried teachertube.com, which is essentially like YouTube without the suggested videos off to the side of the screen. The problem with teachertube.com is that its upload time takes a substantially longer than up loading the same video to YouTube. I may try it again in the future, but it seemed to be double the wait time when uploading. Until I find a hosting website with better capabilities than YouTube.

WHAT INFORMATION COULD STUDENTS GAIN ON THEIR OWN?

When constructing my day to day lesson plans for the Middle Ages unit, I was cognizant of a second question found in that flipped classroom summary: "What information could students gain on their own, using Internet resources, rather than listening to classroom lectures?" I remember being a high school student that loved the middle ages, but my teacher only spent a week covering the content, and left me wanting more. By using the flipped model, I can help make sure my students never have that feeling. I feel all students, regardless if they perform well in my class or not, connect with at least one civilization on some level. I use my flipped lessons as a way to enrich my teaching and provide resources for students that may wish to delve deeper in the content of a particular civilization. For example, during the Middle Ages unit one of my screen casts briefly discussed the role of Vikings. I knew many students find the Vikings to be of interest, so I told the students to visit my website to a link to history.com. They can access videos from the History Channel miniseries on the Vikings, and use their website to interact with the video content. During the bubonic plague lesson I had the students visit a link to a YouTube video where the band "History Teachers" created a spoof about the plague, by covering the Gwen Stefani Song, Hollaback Girl. Through the use of technology, and the Internet, there are abundant ways the flipped classroom can connect students to vital information, and all can be linked from your website.

CHALLENGES

Even the most preeminent planned lesson can face adversity. No matter how much planning teachers put into any lesson, challenges will always arise. As teachers, we continually have to contend with an infinite number of variables on a day-to-day basis that sometimes catch us off guard. To improve the future flipped lessons, it is a smart idea to have students reflect on their work. Periodically assigning students to write a self-reflection may not only supply them with insight to their metacognition, but it may also enlighten the teacher on challenges they may having with the class. Having students self-reflect is not time consuming, and both the student and teacher can gain a wealth of knowledge. I typically have students complete a self-reflection either as an entry ticket or an exit slip. They are short, sweet and to the point. For the first reflection, I simply posed two questions:

1. What grade would you give yourself for the pervious unit and why?
2. If you were a teacher using the flip classroom model, how would you improve it?

The top two suggestions given for improving the flipped model were to put time limits are put on my screen casts, and all screen casts should have music. From that point forward, every screen cast I recorded was 15 minutes or less, and I mixed music into the background. I did my best to match the music to the topic being studied. For example, I would play medieval monks chanting over my lesson on The Power of the Church.

Far too often when assigning traditional homework, students are tempted to cheat. Since most homework is skill based, it becomes nerve-wracking for teachers. Earlier, I mentioned how, in my first flipped situation, I didn't care if students copied each other. I simply wanted them to get the notes so they would have material to study, but freshman being freshman; a mob of students took to my nonchalant attitude on the subject literally. I was a month into flipping the class was when I received news of another setback into my experiment with the flipped classroom. Just before my third period class, the librarian called my room stating that "numerous" students were lined up at the student copy machine to photocopy the note catchers of other students. She was calling to get clarification, because the students claimed that I said it was O.K. for them to copy each other's homework. Needless to say, this was not what I meant, when I said I didn't care if they copied one another. The phone call made it clear that I would need to rethink how to introduce the flipped model to students, and be careful of what I say. Next year, when I introduce the classroom to a new class of freshmen, I plan to define what a flipped class is, show models of my screen casts and note-catchers so they get a feel for it, layout the grading policy, and have them take a student survey.

Looking back on this past year, the part of the flipped class I struggled with the most was how to properly grade. I do not want to punish kids by lowering their grades, yet, if I assign work, I want them to complete the work. So next year I decided on expanding my student center in the back of the room, and on the wall above the table, I plan on posting these two posters in large font.

1. What happens when I don't complete the homework?
   Answer: After Mr. Carstens checks everyone's homework; students that didn't complete the assignment will have to:
   - **Step 1:** Move to the back table and copy down the notes (More than two students will have to share a computer).
   - **Step 2:** Once the assignment is completed, have Mr. Carstens check your notes.
   - **Step 3:** Quickly and quietly transition into what the rest of the class is working on.
   - **Step 4:** Any classwork missed while you were copying the notes will have to be made up in Freshman Academy (After school help class).
2. If I don't do the homework, how does it affect my grade?
   Answer: For all homework assignments that are not finished on time, you will receive a **"1"** for a H.O.W. (prepared for class) grade. *This grade cannot be changed.*
   - However, you are still responsible for getting the notes (Refer back to Question #1)
   - **Remember H.O.W. Grades are important:** Have *INTEGRITY*, and complete the work on time.
   - If you are having technology issues or are struggling with the content, you need to see me during office hours.

I want to send the message that in my class everyone does the work. I know at first I maybe making more work for myself, but after a few months, it will pay off. For those students that are forgetful, I recommend using a website called remind101.com. This website creates a generic phone number for teachers that students can send texts to. By sending a text to this number, students are aligned with that teacher. Then, whenever a teacher assigns new homework, a mass text gets sent to students reminding them to complete their work. Remind101 is a great tool, but is only beneficial for kids with access to a cell phone.

I have also come to realize that the reason for some students not completing their assignments on a regular basis wasn't because of apathy, or a poor work ethic, but because of a lack of access. Despite the abundance of technology out there, it is important to remember that many students still lack the means of consistent access. After the Middle Ages unit, I gave a quick student survey (found in Appendix B).

Essentially, I asked students about their access to technology, including if they have a smart phone, or DVD player. The survey gave me a plethora of information, and I noticed that five students did not have access to a working computer at home, and for whatever reason never told me about it. In the future I plan on modifying the survey and having students complete it on the first day of school. Teachers should never abandon the idea of flipping their class because they are worried that students will not have access to the proper technology. There are always ways around this.

In a recent article of Educational Leadership, Sams (2013) suggested offering DVD's as a solution (pg. 18). Simply burn all of your screen casts onto DVD's, put them in a box in the back of the room, and let students know they are there when they need them. DVD's are inexpensive, easy to use, and virtually everyone has a player. Another solution could be flash drives. Students that attend Tapestry are required to buy a minimum 4GB flash drive. A teacher could upload all their screencasts to a school computer in the library, and students can just drag and drop the file into their flash drive in order to complete that night's homework assignment, or better yet, they can sit there and watch them on the school computer.

Currently, I am in the process of uploading all of my screen casts into Google Drive. I am doing this for two reasons. I put a lot of work into these videos, and I am fearful that one day my computer will crash and I will lose everything. Google Drive is free, and there is no flash drive, or external hard drive to lug around. The second reason is Tapestry students receive a free Gmail account at the beginning of their freshman year. This means I can share all of my videos with them and they would be able to access to files from most major devices. This is an advantage because occasionally, depending on school security filters or what teacher was in the computer lab or library last, students may have restricted access to YouTube. This periodically hindered students that wanted to stay and complete their assignment afterschool. Uploading all the videos to Google Drive circumvents this issue. On the other hand, I acknowledge that technology is changing rapidly which can be overwhelming at times. To help keep up, I tend to listen to tech podcast during my commute to work. They are free and easy to find on iTunes U (university).

WHAT HAS CHANGED?

Since implanting the flipped model, I have become more tech-savvy. First impressions go a long way with students, and I now realize screen casts need to be user-friendly from the beginning, and should be more than just a voice over and/or PowerPoint. My casting abilities have evolved since that first attempt at screen casting. By making the casts easier to access and use from the beginning, the less questions student will likely have, and the more likely they will continue to use it. Another change is how my students take notes; they are more detailed and precise. The flipped model grants them the ability to pause and copy down all the notes, unlike in a classroom setting.

I have seen an improvement in study habits. By having the screen casts accessible throughout the unit, students can go back and replay a particular concept before they take the summative assessment. Having students watch the lesson the night before, acts as a form of pre-teaching. The next day in class when they are working on skills based on the lesson, I find they have more thought provoking questions and are more engaged in the lesson. In the survey, students themselves rallied around the flipped model. When prompted to answer survey questions #14, *Do you think the flipped classroom has helped or hurt your learning? Explain.* One student responded, "It's helped my education because you put things in the videos that keep us up to watch them." He pointed out, "It's helped because I can stop the videos and replay them and take in information at my own speed," and May simply wrote, "it helps me learn because I can stop and think."

The quality of student work has also increased. Figure 2 is a scale model of a medieval gothic cathedral a student created for one of their learning contract projects. This student was able to apply the knowledge they learned from their research about flying buttresses and stained glass windows in a three dimensional form. If it was not for the flipped classroom allowing students to get the notes from home, I would never have been able to employ that type of project-based learning. Along with the cathedral, I also received some amazing "Serf Raps," and "Medieval paper bag Puppets with scripts."

COLLABORATION

It is important to share our best practices with colleagues whenever possible. As I mentioned in the introduction, Tapestry a structure in place that allows for continually professional development every Monday. Back in January, I was asked by my curriculum coordinator create a presentation modeling my use of the flipped classroom. Through those demonstrations, more teachers in my school are attempting to flip their classrooms. One of those teachers is Mr. Milton Sheehan a math teacher at Tapestry Charter High School. The next section of this chapter will look at the flipped classroom from a math teacher's perspective.

A Mathematics Flipped Classroom: By Milton Sheehan

Every teacher has a different style with which they teach. Classroom systems, personality, and expectations can vary drastically from one room to the next. For this reason, experiences with new and innovative techniques can also produce radically different results for each individual. My classroom structures and expectations lend themselves very well to the "flipped classroom" model. Each aspect of my classroom creates a specific dynamic, which I work hard to maintain every

Figure 2. Student's project

day. The following is a brief walkthrough of my experience thus far with flipping the classroom.

Probably the most important part of any classroom is the structures in place for daily routines. Every student I have has a working folder that they check as they enter the room. In these folders are all of the papers they will need for the day including the "do now," any worksheets, and the homework. I also return papers via these folders to save the time normally spent walking around handing out papers. After students have emptied their folders and taken a calculator, they are to sit down and begin working on the do now.

Following the same routine every day allows the students to know what is coming next. Once in their seats students are expected to complete a daily quiz and SAT prep question. The quiz consists of two questions from the previous night's homework. The first question is basic, while the second is more advanced. For example, from a unit on geometric transformations, the first question would ask students to translate a point using verbal phrases like, "translate the point X (1,4) three units right and two units down." The second question would press for more complex understanding like, "$X(1, 4) \rightarrow T_{(3,-2)}$." Utilizing a different notation requires a better understanding of the process in order to complete. As students work on the quiz and SAT prep, I walk around completing three tasks.

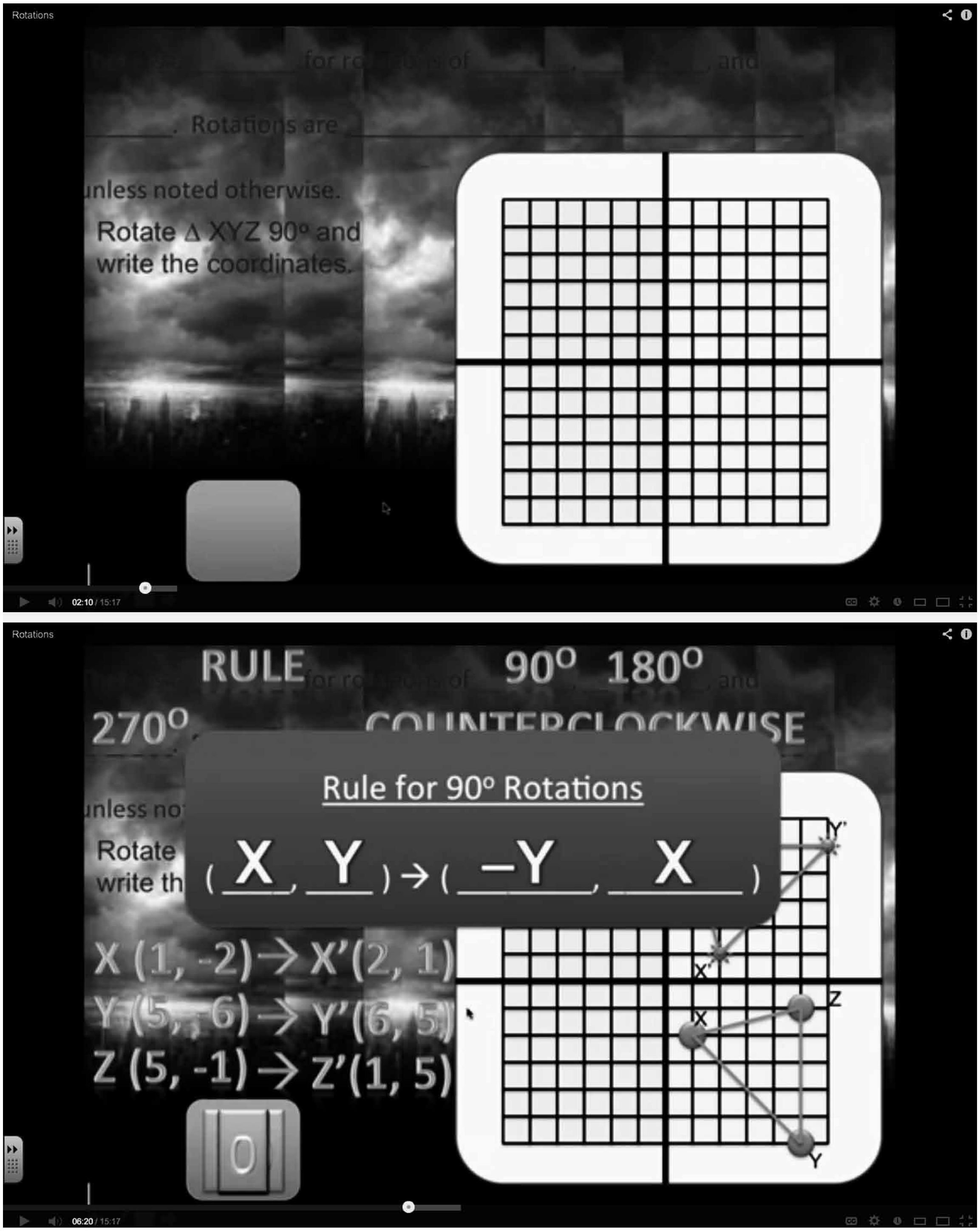
First, I check to see who has completed the homework; second, I check completed quizzes; and third, I group students according to quiz results. Students who are able to correctly answer both questions are in the "advanced" group, students with both questions incorrect compose the "basic" group, and students with a combination of correct and incorrect are the "proficient" group. This process usually takes somewhere around 8-10 minutes to complete. We then go over the SAT prep question together before the day's activity begins. Because students have already been grouped I begin by explaining the "advanced" assignment followed by "proficient" and then "basic." Students work through the day's activities until there are about five minutes left in class. At this point they complete an exit ticket before leaving.

Having a daily routine forces students to be prepared for what is coming next: check folders, complete do now, go over SAT question, practice activity, exit slip. This leaves little room for excuses during class. The same is true for my students outside of the classroom. They are all given my email and personal phone number at the beginning of the year with the expectation that if something comes up and they cannot complete an assignment they should contact me to avoid consequences. Additionally, I stay after school every day anywhere from 45 minutes to 2 ½ hours in case they need extra help.

There are multiple advantages and difficulties associated with a successful flipped classroom. Much of the work has to be done up front which is a huge time commitment, often times far exceeding that of planning a regular lesson. Creating a guided notes packet as well as a video for every lesson takes a substantial amount of time and effort, especially if you want the videos to be dynamic and interesting. A 15 minutes video may require an hour or more of work. This is in addition to creating practice activities to be completed in class along with grading of any assignments/quizzes/assessments. For my classroom I must create guided notes, a video, an entrance and exit slip, and three differentiated activities for each lesson. The light at the end of the tunnel is that if I create quality products, the future will only require fine-tuning of what I have already done.

There are also issues with students completing homework assignments. Initially, I had several students inform me that they had no access to the Internet at home. Through a bit of work, mostly on my part, we were able to find ways around each dilemma whether it involved using a smart phone or simply staying after to use a school computer for the 15-minute video. Even students who did not have Internet issues often did not get everything they could out of the homework videos. They

Figure 3.Screen cast used to get math notes



just blindly copied what appeared on the screen (Figure 3). This was a concern from the beginning and in order to curb such actions I had the students watch a video in class on effective note taking. Additionally, during my videos students are expected to pause and write notes as well as attempt problems on their own. To execute this, I include a timer on each slide that counts down from ten seconds during which students can pause before the lesson moves on. Some students utilize this, others do not, but it allows the motivated ones an opportunity to take control of their learning.

On the flip side, I have encountered more benefits than I had initially thought. My hope was that having students complete practice in class would increase their ability levels as well as confidence. Having a teacher available to help allows students to ask questions immediately rather than wait until the next class (when they either forget or are not afforded the opportunity). The experiences so far have exceeded my hopes. Not only have students' skills improved but their confidence in themselves and their classmates has as well. This welcomed side effect has also increased the amount of collaboration that occurs in the classroom. Students are aware of which group is "advanced," "proficient," and "basic." At first I was concerned that this knowledge would lead to ridicule of students who were having difficulty, and so I was surprised that the opposite held true. As a whole, students placed in the "advanced" group were willing to collaborate with no push from me. This is most likely because they knew that everyone in that group had been able to answer both quiz questions correctly. Those in the "proficient" group were also willing to collaborate but asked me to check things more regularly. The "basic" group was pretty much unwilling to work together, again, most likely because they knew their peers had not performed well on the quiz.

This increase in collaboration allowed me to spend more time with the "basic" and "proficient" groups, only occasionally checking in on the "advanced" group. Furthermore, as "advanced" students completed their work they were willing to help other classmates. *And other classmates were willing to accept their help!* This is a huge accomplishment in a non-Regents geometry class. For students to have trust in one another surpasses any expectations that I initially had. Furthermore, no single student was placed in the same group every day. In fact, most students varied between the three depending on the topic. This allowed each of them to feel "advanced" and "basic" at some point through the unit.

The most frequent question I am asked is "what if kids don't watch the video?" The structures and routines I have in place make this a workable scenario. Students who do not watch the video have little shot at the "advanced" group. Most of the time they end up in the "basic" group, which is where I spend the majority of the time. If there are a number of students who do not complete the homework, I take 10 minutes with this group and do a quick mini-lesson on the topic before letting them work on their own. Using this system, I had only a few experiences where unpreparedness created a problem. Moreover, lack of effort or lack of understanding on one student's part does not influence the learning of the rest of the class. If necessary, students can even go back and refresh their memory later in the year if they are so inclined.

As a whole, my experience with the flipped classroom thus far has produced desirable results. Student collaboration is up, student confidence is up, and student grades are up. As with anything in life, however, you get out what you put in. The amount of time necessary to prepare for and implement this instructional technique is extensive and at times stressful. Frustration can build if you make a mistake on the *last slide* of a 15-minute presentation and have to start over. The important thing is to remember that as with most teaching, videos will not be perfect, some activities will be unsuccessful, and some students will put forth less than acceptable effort. With this in mind, flipping the classroom creates more opportunities for students to take control of their learning than any other instructional method currently in practice.

CONCLUSION

Since September I have been experimenting with the flipped classroom model, and Mr. Sheehan shortly after. The concept have changed our approach to teaching; we are currently on pace to teach all of the required New York State content, and our students have taken control of their learning. They are more engaged in the lessons, and we can see a significant improvement in their literacy skills. We believe the improved literacy skills are attributed to the projects and stations we now have time to implement, thanks to the flipped class. Over the past year, this model has continued to evolve. This chapter has been an honest and open view into our experience with the flipped model. We are by no means an experts, and it is our wish that every teacher who reads this, does not repeat the mistakes we made, and can build off of our successes.

REFERENCES

Expeditionary Learning. (2013). *What we do*. Retrieved April 28, 2013 from http://elschools.org/our-approach/what-we-do

Sams, A. (2013). Flip your students' learning. *EL Educational Leadership*, *70*(6), 16–20.

KEY TERMS AND DEFINITIONS

Camtasia (techsmith.com): A top of the line, paid for software program that allows teachers to create and customize screen casts and videos.

Document-Based Question (DBQ): An essay prompt that uses historical documents to support the thesis.

Geo-Literacy: is the ability to understand and use geography skills to make help make thoughtful decisions that impact the world around us.

Google Drive: A free, Web-based data storage service provided by Google. It allows users to create, edit, and collaborate on documents, videos, and office based products in real-time.

iTunesU (itunes.com): A free catalogue of college courses provided by iTunes.

Learning Targets: Are the essential piece of knowledge or skill students need to learn. Lessons are based on the learning target. Formative, and summative assessments are used to determine whether the student has mastered them or not.

Lexile: Can either be a measure that is used to rate the difficulty level of a piece of information, or a person's reading ability.

Remind101 (remind101.com): A website that allows teachers to text students reminders for test and homework, while keeping students and teachers contact information private.

Scholastic Reading Inventory (SRI): A test used to evaluate a students' Lexile range.

Student Led Conferences (SLC's): Are similar to parent teacher conferences, except the student drives the discussion, and through reflection of their learning while utilizing a self-created portfolio.

This work was previously published in Promoting Active Learning through the Flipped Classroom Model edited by Jared Keengwe, Grace Onchwari, and James N. Oigara, pages 91-112, copyright year 2014 by Information Science Reference (an imprint of IGI Global).

APPENDIX A

Medieval Study

Directions: You will choose and complete any of the assignments as long as you earn a total of 9 points or more.

H.O.W. REQUIREMENTS - To earn the points you must:

- Follow the directions for each assignment
- Work is neat and high quality
- Show details and use examples from your research
- Use correct spelling and grammar
- Do your best!

** ***IF YOU DON'T MEET THE ABOVE H.O.W. REQUIREMENTS, YOU WILL BE ASKED TO REMEDIATE YOUR ACTIVITY IN ORDER TO RECEIVE YOUR POINTS.***

1-POINT ACTIVITIES:

a. Write a song that could have been sung by a serf working on a medieval manor.
b. Draw a picture that showcases the influence of medieval architecture.
c. Create flash cards for all the money words and add a picture to the flash cards to help you remember the word.
d. Read the story *Crusaders at the Walls*, and answer *Questions for Review* #1-5, and *Understanding the Story* #1-8.
e. Create a one-point project of your own. (must FILL OUT CREATE MY OWN FORM AND TURN IT IN TO be pre-approved by teacher.)

2- POINT ACTIVITIES:

a. Create a set of five baseball cards representing real life people living in the middle ages.
b. Create a timeline for the Middle Ages that include five significant events with a description for each event.
c. Create a two-point project of your own. (must FILL OUT CREATE MY OWN FORM AND TURN IT IN TO be pre-approved by teacher.)

3- POINT ACTIVITIES:

a. Create a Medieval Journal for a fictional person represented on the feudal pyramid, living during the Middle Ages. Must have a minimum of three entries.
b. Create three paper bag puppets and write a script for them to preform. Each puppet must represent a different person on the feudal pyramid.
c. Write a one-page research paper on feudalism. Must be typed, single spaced, 12 font, and turned in to "Turn-It-In.com.
d. Create a three-point project of your own. (must FILL OUT CREATE MY OWN FORM AND TURN IT IN TO be pre-approved by teacher.)

Learning Contract

NAME ________________________________
DATE _________________________________
I understand that I must complete the following activities (totaling 9 points) by __________________,
in order to take the unit test - T19.
I have chosen the following activities: Points:
____=_____
____=_____
____=_____
____=_____
____=_____
____=_____
____=_____
____=_____
____=_____
____=_____
____=_____
____=_____
____=_____
____=_____
____=_____
____=_____
Student's signature: ___________________________
Teacher's signature: ___________________________

APPENDIX B

Flipped Classroom Survey

This is the first year I have done the Flipped Classroom. Hopefully you noticed the difference. Notes and lectures are online, so more hands-on projects; and papers can be started in class. It allows more time in class to ask me questions, and for you to begin work on your major assignments. Keeping this in mind, please answer the following questions.

1. Do you have access to a computer at home? Yes/No
2. Do you have Internet access on your home computer? Yes/No
3. If so, what kind of Internet access do you have? Fast or Slow?
4. Do you have access to a smartphone with Internet access? Yes/No
5. Do you have access to both a smartphone and Computer with Internet? Yes/No
6. Do you have a working DVD player at home? Yes/No

7. If you don't have Internet access, but have a DVD player, would you take home a DVD with the homework videos on it?
8. How many times have you visited my website? Never, 1-2, 3-10, 10+
9. If you have never been to my website, or rarely go, why is that? Explain.
10. Do you plan on signing up to receive text messages for homework and tests? If not why?
11. Do you feel the work you turn into me is of a higher quality than previous years or for other teachers? Yes or No, explain.
12. How challenging is this course to you? 1. Toughest class I ever had, 2. Difficult but I am learning a lot, 3. Average, 4. Easy, but I am learning a lot, 5. Piece of Cake, I learned this material before.
13. Since September, do you think your writing has improved, especially when it comes to DBQ Essays? Yes or No and then rate your improvement: 4-By leaps and bounds, 3-it has improved, 2-somewhat improved, 1-is about the same, 0-got worse.
14. Do you think the flipped classroom has helped or hurt your learning? Explain
15. If you have been doing your homework, keep it up! But if you haven't been, what is your #1 reason why it doesn't get finished?
16. Have you ever watched my YouTube videos more than once? Yes/No and how many times did you watch it _______.
17. In regards to the YouTube videos, would you say I put too much information in them, just the right amount of information, or not enough information?
18. Have you ever used the YouTube videos to study for my test? Yes/No
19. Other than doing homework, have you ever used any of the other links I posted just because you are curious about the subject matter? Yes/No
20. What have your previous social studies teachers done to help you learn that I haven't? Don't say make it "fun," play more "games," or don't be "boring," be specific with your answers, describe and discuss.
21. Is there anything that needs to be changed or updated on my website to make it more user friendly?
22. What is the best thing about the flipped classroom?
23. What is the worst thing about the flipped classroom?
24. What changes do I need to make? Be specific!

Chapter 67
The Integration of Culturally Relevant Pedagogy and Project-Based Learning in a Blended Environment

Daniel Kelvin Bullock
North Carolina State University, USA

ABSTRACT

The use of blended learning environments is rapidly expanding in education. This chapter examines a teacher's enactment of the New Tech Network educational model, which utilizes a blended learning environment, and the teaching strategies she used to engage students and gauge student achievement. Detailed teacher interviews, classroom observations, and analyses of student assignments were the sources of data for the study. The findings centered on the integration of culturally relevant pedagogy and authentic instruction within this learning environment and the implications of this integration. Recommendations for future research include a more expansive study of the use of blended learning in social studies and different means of integrating culturally relevant pedagogy and authentic instruction into blended learning.

INTRODUCTION

It has been noted that traditional teaching methods, such as completing worksheets, reading from textbooks, and memorizing information, are overly utilized in social studies (Levstik, 2008). Additionally, the content taught in many social studies classes lacks the cultural diversity that reflects the demographics of the United States and the global community. These issues are often exacerbated in urban settings where there may be a higher proportion of African American and Latino American students and, hence, more differences between the culture acknowledged in the social studies curriculum and the culture of the students. It is possible that concerns of engagement, diversity, and achievement in social studies classes may be addressed by project-based learning and the blended learning environment within the New Tech Network (NTN) educational model.

DOI: 10.4018/978-1-4666-8246-7.ch067

The NTN model centers on project-based learning in a small high school (less than 100 students per grade level) and technology-rich (1:1 student to computer ratio) environment (NTN, 2014b).

In this chapter, findings from a qualitative case study are utilized to demonstrate how a teacher's enactment of the New Tech Network model was effectively used to engage diverse students in social studies and help them to master curricular content. In the fall of 2012, a researcher conducted interviews, observed classes, and analyzed documents to gain insight into the pedagogical practices and beliefs of Ms. Olivia Jordan (pseudonym), the Engagement High School 2012-2013 Teacher of the Year. This study occurred in a social studies classroom for an entire instructional unit centered on the lasting impact of the Civil War and Reconstruction on an urban area in North Carolina. The objectives of this chapter are to:

- Describe how Ms. Jordan utilized the blended learning environment within the New Tech Network model to engage students and ensure student mastery of curricular content;
- Explore how culturally relevant pedagogy and authentic instruction contributed to Ms. Jordan's success in this learning environment.

BACKGROUND

There is substantial evidence that students tend to like social studies classes the least amongst all school courses (Shaughnessy & Haladyna, 1985, as cited in Heafner, 2004; Goodlad, 1984, as cited in Ladson-Billings, 2001). Heafner (2004) noted, "Many teachers struggle with the lack of student interest in the content which translates into a lack of motivation to learn. This is especially prevalent in social studies classrooms" (p. 43). This lack of interest may be true for a variety of reasons. First of all, the instructional methods that are used in many social studies classes tend to be non-collaborative in nature. The National Assessment of Educational Progress (2010) noted that direct lecture, reading from the textbook, and taking tests and quizzes that assess a student's ability to retrieve memorized information were typical teaching methods utilized in social studies. Additionally, social studies content often lacks an acknowledgement or celebration of student culture (Ladson-Billings, 2001). In an increasingly diverse society, it is very important to make sure the social studies curriculum has cultural relevance for students and will prepare them for life in a multicultural society.

In this section, an overview of scholarly literature is provided that has been written on engagement and achievement in social studies. Specifically, there is a focus on authentic instruction and assessments, blended learning environments, project based learning, and culturally relevant pedagogy, which have been found to engage students in social studies and to promote their academic achievement.

Authentic Instruction and Assessment in Social Studies

Research shows that students' interest and engagement increases when learning is connected to authentic, real-world problems (Newmann, King, & Carmichael, 2007). Through authentic instruction and assessments, students are engaged in activities that require them to use skills and perform tasks that have relevance for life outside of school. Newmann, Bryk, and Nagaoka (2001) also explained that there was evidence "that when teachers organize instruction around assignments that demand higher order thinking, in-depth understanding, elaborated communication, and that make a connection to students' lives beyond school, students produce more intellectually complex work" (p. 2). This authentic intellectual work has been found to heighten student engagement and achievement (Carmichael & Martens, 2012).

It is the notion of addressing real social questions or problems that makes authentic instruction and assessment so compelling in social studies. For example, if students wanted to increase their understanding of current conflicts over immigration policies or American involvement in foreign affairs, Wiggins (1993) suggested that students could conduct oral histories of relevant community members (as cited in Mathison & Fragnoli, 2006). Similarly, Avery (1999) described an effective social studies assignment on migration where students collected information on their family's move to the region, compared their findings with the research of classmates, and wrote an essay where they summarized the significance of their findings and themes. In these examples of authentic instruction, students utilized critical thinking and collaborated with peers and community members to address social issues. These types of instructional strategies heighten interest and achievement in social studies classes.

Authentic instruction goes hand-in-hand with assessment as students learn to evaluate their work in comparison to a standard (Sleeter, 2005). The process of constructing effective authentic assessments consists of defining expectations for achievement, communicating those expectations with students, and evaluating final products in light of prior communication. Authentic assessments also incorporate real-world issues and skills that have meaning outside of the classroom.

It has been argued that the move towards more authentic instruction and assessment will not be effective with populations of students that have typically experienced difficulties with traditional learning methods (Newmann, Bryk, & Nagaoka, 2001). This idea rests on the rationale that students, who have not mastered the basic knowledge that has been provided through traditional means, will not have the foundation to build the complex understanding that is achieved through authentic instruction. Newmann et al. (2001) explained the misconception that:

> *… it is widely believed that more sustained attention to didactic methods is essential. From this perspective, the best way to teach is to present students with the desired information and ask them to memorize it, whether this be facts, definitions, algorithms, vocabulary lists, rules of communication, procedures… and so on. Through various drills, exercises, and tests, students are expected to recall and repeat what they have memorized. (p. 9)*

Yet, their research revealed that, "students exposed to teaching that demands complex intellectual work are likely to do as well or better than students exposed to basic-skills-only instruction" (Newmann, et al., 2001). Levin, Newmann, and Oliver (1969) found this to be true in high school social studies, in particular (as cited in Newmann et al., 2001).

Furthermore, Newmann et al. (2001) supported the notion that traditional teaching methods (i.e., didactic instruction) should not be totally discarded to make room for authentic instruction. Instead they proposed the idea that, "Significant intellectual accomplishments build on prior knowledge that has been accumulated in the field… This is usually the central focus of direct instruction in basic skills" (p. 15). Hence, didactic methods still have a place in a classroom that utilizes authentic instruction. Direct instruction might be utilized, in moderation, to provide a concise baseline of information upon which students may construct new knowledge through authentic instruction.

Blended Learning Environments

In 21st century learning, it is vital that teachers utilize online tools, resources, and information to provide authentic learning experiences for students. Blended learning environments may be ideal, because they include the "integrated combination of traditional learning with web-based online approaches" (Oliver and Trigwell, 2005, p. 17, as cited in Sharma, 2010). Research shows that blended learning aligns with accepted notions of how individuals acquire knowledge because it often incorporates visual stimulation, a sense of academic community, differentiation, practicality, and an ability to spark curiosity (Pregot, 2013). Furthermore, critical thinking skills are frequently more evident in online environments than in face-to-face settings (Pregot, 2013). This is likely due to the fact that students may be able to take more time to reflect on and research responses to a provocative question outside of class than within the time allotted in a normal class period.

Research is beginning to show that students are learning better in online environments and it may be advantageous to employ more hybrid courses (Young, 2002, as cited in Mansour and Mupinga, 2007). Hybrid learning, which is synonymous with blended learning, was utilized in Doering and Veletsianos's (2008) study of Adventure Learning (AL) in five elementary classrooms in three schools in a Midwestern city:

Adventure Learning (AL) is a hybrid distance education approach that provides students with opportunities to explore real-world issues through authentic learning experiences within collaborative learning environments (Doering, 2006; Doering, 2007; Doering & Veletsianos, 2007)… Within the program students are faced with real-world problems while they identify and pose questions, analyze data, interact and collaborate with colleagues and experts, and take action within their own community. (p. 25).

The majority of the teachers in this study utilized AL in social studies instruction. For example, one teacher challenged students to create Adventure Learning activities to spread knowledge and awareness on the social effects of climate change. Students shared ideas and developed their plans online in collaboration zones and eventually published electronic presentations that were available on the World Wide Web. After reviewing findings, researchers hypothesized that the flexibility of the AL hybrid curriculum, combined with the social, authentic, and interactive aspects of the learning environment, made it effective for teachers and students.

Project-Based Learning

Project-based learning as it is utilized in the New Tech Network model, is a prime example of authentic instruction and assessment within a blended learning environment. It "begins with the vision of an end product or presentation" and "creates a context and reason to learn and understand the information and concepts" (Buck Institute for Education [BIE], 2009). The Buck Institute for Education (2009) defines project-based learning as "an extended process of inquiry in response to a complex… problem" where "students learn key academic content (and) practice 21st Century Skills" through the creation of a project (para. 1).

As early as 1918, there were efforts to describe a method of instruction, which centered on the creation of projects. F. E. Heald, who was a specialist in agricultural education for the U.S. Department of Agriculture, wrote a report where he made suggestions that educational projects should include contracts and an alignment with work done at home (Kliebard, 2004). Also, in 1918, William H. Kilpatrick published an article in *Teachers College Record*, entitled "The Project Method," which became a centerpiece for debate in education (Kliebard, 2004). In the article, Kilpatrick (1918) defined a project as a "whole-hearted purposeful activity" that is "the typical unit of the worthy life in a democratic society" and should be "the typical unit of school procedure."

There was not much literature written on the "Project Method" or "project based learning" in America before the topic was rejuvenated in the 1990's. This was when the Buck Institute for Education (BIE), which was created in 1987 as a non-profit organization dedicated to educational research and development, began to research and focus on project based learning due to its successful implementation in various schools in the western

United States (specifically California) (BIE, 2011). The BIE created its own project based learning model and developed instructional materials to assist schools in implementing it (BIE, 2011). This particular model became a leading approach for project based learning due to its adoption by the NTN and other educational reform organizations. Ultimately, the model and materials created by BIE have an impact on schools as they are used as a framework to help teachers execute project based learning (BIE, 2011). The NTN (2013c) has also developed resources such as the "Project Idea Rubric" to assist teachers with the implementation of project-based learning.

Project based learning has been implemented in the social studies in various forms for many years. John Dewey, while he did not coin the phrase "project based learning," indirectly advocated this type of learning through his scholarship and lab school (Kliebard, 2004). Dewey believed that, historically, knowledge was created as humans tried to solve real-world problems (Kliebard, 2004). For example, architecture was an outgrowth of people's desire to build durable, reliable dwelling places. Thus, when Dewey started his school at the University of Chicago, which was officially called the University Laboratory School, the students were involved in a variety of activities that were rooted in current and historical real-world problems (Kliebard, 2004). While learning about a particular time period, some students constructed buildings and devices that were utilized by people in that era (Mayhew & Edwards, 1936 as cited in Kliebard, 2004).

Some scholars have also utilized PBL in the social studies and experienced positive results compared with traditional practices. For example, Parker, Mosborg, Bransford, Vye, Wilkerson, and Abbott (2011) conducted a study on the usefulness of project based learning in the instruction of AP US Government and Politics. They utilized projects where students had tasks such as advising "a new nation just emerging from a long dictatorship about the various forms and features of constitutional democracy" and proposing "public policy and action that will improve society" (Parker et al., 2011, p. 541). They found that students who engaged in project based learning performed as well or better than students who used traditional learning methods on the AP exam (Parker et al., 2011).

There have also been a number of studies conducted on the use of project based learning in elementary social studies. In their study of second grade social studies, Halvorsen, Duke, Brugar, Block, Strachan, Berka, and Brown (2012) found that students from low socioeconomic-status (SES) schools "made statistically significant gains in social studies and content literacy" and "showed no statistically significant differences from the students in the high-SES schools" when they implemented their projects (p. 198). The particular projects that were used in the study included an economics project that focused on raising money for a local charity and a civics project that centered on studying a local park and making recommendations for improvements to a local government official (Halvorsen et al., 2012).

Although some scholars have noted the successes of project based learning in the social studies, other researchers have reported a lack of scholarship in the field. For example, Summers and Dickinson (2012) mentioned their surprise in conducting their study when they found that "social studies (project based instruction) research was unexpectedly sparse" (p. 83). Walker and Leary (2009), in their quantitative study of project based learning implementation in various subjects also noted, "There is… a clear need for additional quantitative controlled studies in… social science… and a less dramatic need for work in the sciences" (pp. 21-22).

Critiques of Project Based Learning

There have been a number of critiques of project based learning. Kirschner, Sweller, and Clark (2006) argued that problem-based learning (and consequently project based learning), which was labeled as minimally guided instruction, was an ineffective teaching strategy because learners needed more direction to understand challenging content. Research was cited from various scholars in cognitive studies to support this notion (Kirschner et al., 2006). However, Hmelo-Silver, Duncan, and Chinn (2007) responded to this critique by explaining that problem-based learning and inquiry learning approaches (such as project based learning) were "highly scaffolded" and thus "powerful and effective models of learning" (p. 99). To identify these instructional techniques as minimally guided was misleading, erroneous, and would likely lead to misconceptions about the benefits of the approaches.

Halvorsen et al. (2012) also posed possible concerns with project based learning:

Others might wonder whether it is possible to curricularize (i.e. instantiate in formal unit and lesson plans) for widespread use an approach to learning that is, by definition, somewhat dependent upon the specific students, classroom, and community in which the learning takes place. (p. 204)

Halvorsen et al. (2012) essentially resolved this issue in their study by "providing… support to teachers," "aligning project-based units to specific learning standards," and making efforts to curricularize project based learning so that it could be replicable (p. 204).

Some researchers have also argued that project based learning was more appropriate for gifted learners and not necessarily a proven instructional strategy for raising the achievement levels of struggling learners (Mergendoller, Maxwell, & Bellisimo, 2006). For example, Diffily (2002) argued that, "Project-based learning (wa)s particularly suited to the needs of gifted children" (p. 40). She explained that this type of instruction lent itself to gifted students expanding their knowledge on a particular topic by investigating it in depth (Diffily, 2002). Furthermore, since students were assigned different roles in the project, there would be no stigma attached to a gifted student working on something different, or more complex (Diffily, 2002). This was important to note because the purpose of using project based learning at Engagement High School was to increase the previous performance of a low performing school. If it was not proven that this was an effective method of increasing student engagement and achievement for struggling learners, then one should have questioned why it was being used.

Hertzog (2007), in her study of the use of project based learning in two 1st grade classrooms, argued an opposing point from Diffily. Hertzog (2007) believed that the critical thinking skills employed through project based learning were the types of skills commonly utilized in gifted education. In her study, she researched the effects of implementing project based learning in elementary classrooms composed of students from low socio-economic status (Hertzog, 2007). She found that students were definitely more engaged and better behaved during the projects, but teachers were not sure if students learned more. Filippatou and Kaldi (2010) employed pre and post-tests in their study of the effectiveness of project based learning with primary school students with learning disabilities in Greece. They found that students with learning disabilities made gains in academic performance, motivation, and their ability and efficacy in working in groups while learning through projects. MacArthur et al. (2002) also conducted a study on the use of this pedagogy with general education and special education elementary students and found that both groups made significant gains in their knowledge of the subject matter. Also, Thomas (2000) in his research on project based learning, found that it "had value for enhancing the quality of students' learning in subject matter areas" (p. 35) and seemed "to be equivalent or slightly better than other models of instruction for producing gains in general academic achievement and for developing lower-level cognitive skills in traditional subject matter areas" (p. 34). The conflicting conclusions of some of these scholars prompted me to conduct further research on the possible benefits or disadvantages of project based learning.

Again, with our society becoming increasingly diverse, it is advantageous for us to analyze project based learning and authentic instruction and assessment through a lens of cultural relevance. Ultimately, the pedagogy that is enacted with students will need to take into account their cultural background and experiences.

Culturally Relevant Pedagogy

Culturally relevant pedagogy is a viable framework for rethinking authentic instruction and assessment in social studies classes. Essentially, culturally relevant pedagogy is a methodology that results in high achievement, cultural competence, and socio-political consciousness in students from diverse cultural and racial backgrounds (Ladson-Billings, 1995a). Ladson-Billings (1995a) described the achievement of students in classrooms utilizing culturally relevant pedagogy in various ways as she stated:

Students in these classrooms were at or above grade level on standardized achievement tests. Fortunately, academic achievement in these classrooms was not limited to standardized assessments… students demonstrated an ability to read, write, speak, compute, pose and solve problems at sophisticated levels--that is, pose their own questions about the nature of teacher- or text-posed problems and engage in peer review of problem solutions. (p. 475)

Subsequently, cultural competence was described as "a way for students to maintain their cultural integrity while succeeding academically" (Ladson-Billings, 1995a, p. 476). Similarly, in her writings on culturally responsive teaching, Gay (2002) stated, "when academic knowledge and skills are situated within the lived experiences and frames of reference of students, they are more personally meaningful, have higher interest appeal, and are learned more easily and thoroughly" (p. 106). Ladson-Billings (1995a) emphasized that teachers helping students to develop socio-political consciousness, identified and helped students to understand the "political underpinnings of the students' community and social world" (p. 477).

During her study of eight elementary teachers in California, Ladson-Billings (2001) described how culturally relevant pedagogy might appear in social studies. She noted that one teacher encouraged students to discover information by conducting oral histories and creating migration maps with family members. This instructional style supported the teacher's philosophy of "history as a way of uncovering truths" (p. 206). A second teacher used a conversation with students on community problems to fuel a project where they proposed renovation ideas to the local city council. The project required the students to research the historical uses of community space and how the area could be more useful to members of the neighborhood. Both of these were examples of authentic instruction or, more specifically, project based learning, and culturally relevant pedagogy being utilized simultaneously.

Various scholars have conducted studies and written articles on the idea of culturally relevant pedagogy since Ladson-Billings framed the idea in 1995. Essentially, researchers have found that educators who utilize culturally relevant pedagogy share similar "conceptions of self and others," "conceptions of knowledge," and structures of "social relations" in the classroom (Ladson-Billings, 1995a, p. 478). In regards to the ideological resemblance within teachers' conception of self and others, Ladson Billings (1995a) found that the teachers believed that all the students were capable of academic success, saw their pedagogy as art, saw themselves as members of the community, saw teaching as a way to give back to the community, and believed in a Freirean notion of "teaching as mining" (1974, p. 76) or pulling knowledge out (pp. 478-479). Several scholars have corroborated these findings while researching successful educational experiences of minority students in America. Irvine (2009) provided the example of an elementary teacher who had a class, composed of predominantly African American and Latino American students, learn about the concept of classification by using vegetables. When the students became discouraged because they did not recognize some of the images they were using, the teacher decided to refer to something she heard the students speak about in a non-academic conversation—cars. Thus, the teacher was able to use a topic that was familiar with students to teach the concept of classification. This example reflected the teacher's conception of self and others because the teacher did not accept the fact that students could not learn the concept of classification because the first teaching effort failed. She believed the students could learn and used a creative method for helping the students construct an understanding of the desired concept.

Teachers that utilize culturally relevant pedagogy also tend to create a collaborative atmosphere that ultimately educates both the student and teacher. Ladson-Billings (1995a) noted that exemplary teachers develop healthy student/teacher relationships, show an ability to connect with all types of students, create a supportive classroom community, and encourage students to take responsibility for each other's education. Again, various scholars have found that successful teachers of minority students create a collegial classroom environment. Milner (2011) discussed how a white male science teacher, Mr. Hall, successfully implemented culturally relevant pedagogy by focusing on building relationships with students and embracing them as family members. Milner (2011) documented the following quote from Mr. Hall:

I like the family aspect because I mean if family's not important to you, then what [or who] is? I mean family should be the thing that's most important to everybody. And I mean that for some people it's not, so hopefully in here they kind of get that aspect… I care about everybody; I love them all… just like I would my own [biological children]. (p. 85)

The notion of caring relationships is vital to the social relationships found in culturally relevant pedagogy. In her study of a teacher implementing this methodology, Irvine (2009) noted the tendency of culturally relevant teachers to form compassionate relationships with students. She stated, "If you have a true, caring relationship with your students, you will know what their interests are, what information they relate to" (p. 61). Gay (2002) also described one of the essential elements of culturally responsive teaching as "demonstrating caring and building learning communities" with students (p. 106).

Finally, Ladson-Billings (1995a) discovered that teachers that implement a culturally relevant pedagogy have similar epistemologies about knowledge. The teachers tend to believe "knowledge is not static; knowledge must be viewed critically; teachers must be passionate about knowledge and learning; teachers must scaffold… to facilitate learning, [and] assessment must be multifaceted" (Ladson-Billings, 1995a, p. 481). This understanding of knowledge connects to Marshall's (2001) research in which she found successful teachers of African American students had the "the recognition that no knowledge is sacrosanct" (p. 108). Banks (2006) also elaborated on the notion of the contingent nature of knowledge by stating:

Much of the knowledge institutionalized within the schools and the larger society neither enables students to become reflective and critical citizens nor helps them to participate effectively in their society in ways that will make it more democratic and just. This chapter proposes and describes a curriculum designed to help students to understand knowledge as a social construction and to acquire *the data, skills, and values needed to participate in civic actions and social change. (p. 203)*

Irvine (2009) has also noted that, "knowledge and meaning are constructed." This contrasts with a traditional transmission model of knowledge that values the facts that are presented in social studies classes as the most valuable information for students to acquire and utilize.

It is equally important to understand that within this model the teachers must value the backgrounds and experiences of students to help them obtain the knowledge and skills necessary to improve society. Ladson-Billings (2001) borrowed an idea from Giroux and Simon's (1999) writing on critical pedagogy as she explained educators who implement culturally relevant pedagogy "strive to incorporate student experience as 'official' content" (p. 202). Howard (2003), in his study on the importance of critical teacher reflection, noted how "Teachers need to understand that racially diverse students frequently bring cultural capital to the classroom that is oftentimes drastically different from mainstream norms and worldviews" (p. 197). Teachers should recognize the value of this capital and build upon it. For example, in Ladson-Billings's (1995a) study, a teacher provided an opportunity for students to utilize outside knowledge and interests (i.e., basketball and cooking) for a project in which they shared their expertise in a domain of their choice. As the teacher allowed students to utilize information that extended beyond the curriculum, she exemplified a conception of knowledge that valued the experiences and wisdom of her students.

A teacher utilizing culturally relevant pedagogy should also utilize innovative assessment methods. In Ladson-Billings' (1995a) study, there were teachers that prompted students to conduct oral histories, create migration maps, and present plans for community restoration. In Tyson's (2002) research, children's literature was used to inspire students to "develop understandings of social action and ways of thinking about social action in their own communities" (p. 50). Various activities like journal writing, class discussions, and research assignments helped students to gain deeper knowledge of social action and civic responsibility (Tyson, 2002).

Critiques of Culturally Relevant Pedagogy

Despite the large body of research that has been developed to substantiate culturally relevant pedagogy, it is not without its critics. Hirsch (2010) has argued that the proper path of educating for social justice involves teaching a core body knowledge in all subjects. Eisner (2002) summed up Hirsch's viewpoint as an understanding that "not all content is created equal" (p. 65). Hirsch (2010) noted that, "The chief cause of our schools' inefficiency is… curricular incoherence" (p. 36). Essentially, Hirsch's argument stems from the belief that centering learning on students and their backgrounds may lead to them not learning information that will be vital for cultural capital and social change.

Yet, this argument, with certain interpretations, could support a rationale where educators ignore injustices in curriculum. It should be the primary goal of American education, and specifically the social studies, to enhance our democracy. This enhancement can only occur as social issues (which often lie beyond the traditional body of knowledge) are studied and analyzed. This does not mean that certain traditional ideals should be avoided (i.e., democracy), but that some long-established historical points might be sacrificed (i.e., one dimensional portrayals of historic figures). Efficiency, thus, becomes a secondary concern to the broader goal of a more developed democracy and engaged citizenry.

Summary

Current literature shows that there are efforts being made to reform instruction and assessment practices across all disciplines. This task is particularly important in social studies, where there is a reputation for not engaging students. Authentic instruction and assessment methods will likely become more common in schools in the coming years. In this study, I hope to bolster this area of research that has been sparsely documented and help to increase our understanding of how a teacher might maximize the use of project-based learning in a social studies classroom.

THE CASE (STUDY) FOR PROJECT-BASED LEARNING AND CULTURALLY RELEVANT PEDAGOGY

Research shows that students lack interest in social studies for a number of reasons (teaching methods, lack of diversity in content, etc.). In this case study, the researcher investigated how a successful teacher of U.S. history engaged students in social studies content and gauged their academic success. This teacher, Ms. Jordan, taught at Engagement High School (EHS)—a school founded upon the New Tech Network (NTN) model.

New Tech Network model

The NTN model was developed by the New Technology Foundation (now known as the New Tech Network) after the success of Napa New Technology High School. This high school was formed in 1996 after local educational and business leaders met to address the concern that students were not "graduating with the skills needed to meet the needs of the new economy" (NTN, 2014a, para. 2). New Tech Network (2014a) reported that:

As Napa New Technology High School thrived, local business leaders and education advocates came together to ensure the school's long-term success and sustainability by establishing the New Tech Foundation. In 2001, New Tech was awarded a $6 million grant [and] charged with launching 14 schools over three years. From this initial launch, New Tech has continued to grow… Today, our name is New Tech Network and we support 120 schools in 18 states and Australia. (para. 4)

The New Tech Network (NTN) model centers on project based learning in a small school and technology-rich environment. New Tech Network (2014b) defines project-based learning as "contextual, creative, and shared" where "students collaborate on projects that require critical thinking and communication" (para. 2). The small school settings are considered to be high schools with less than 100 students per grade level, while the technology-rich environment implies a 1:1 student to computer ratio. The technology-rich component also consists of the Echo learning management system:

Echo is... designed to support Project-based learning (PBL), facilitate communication and collaboration, and improve teacher practice. Teachers, students, and parents at New Tech high schools use Echo on a daily basis to access course resources, project plans, assignments, a multi-dimensional gradebook, online groups, and an extensive library of instructional resources for teachers. (New Tech Network, 2014d, para. 1)

The NTN model may be considered a blended learning environment due to the fact that students use Echo on a daily basis to access course resources, communicate virtually, and collaborate on projects. Additionally, a significant portion of course content is accessed beyond the school, as students have continuous access to curricular materials, rubrics, instructional videos, etc. The model is intended to create a higher level of engagement amongst students by helping them to "gain the knowledge and deeper learning skills they need to succeed in life, college, and the careers of tomorrow" (NTN, 2014b, para. 1).

Engagement High School

In 2007, the New Technology Foundation model was selected as a transformation model to be implemented at a school in an urban district in North Carolina. This model was intended to help increase student achievement. Using the NTN model, a new school would be created within the existing, traditional school that would provide an additional, innovative educational opportunity for the students in the area. The school, named Engagement High School (pseudonym), was housed within the larger, traditional school, but had a distinct principal and faculty. Although it was intended to serve the same population as the larger school, the students would only be admitted to Engagement High School (EHS) through an application process. The school was officially classified as a "Redesigned STEM High School" and was the site of my qualitative research study.

The student population at EHS is about 94% Black, 2% Asian, 2% Hispanic, and 2% White; approximately 51% of the students receive free or reduced price lunch. There are no more than 100 students in each grade level. The school's campus consists of one wing of one hallway of the larger, traditional school and a large modular unit on the southern part of the campus that houses five classrooms. The average class size is 21 students. The school's culture is themed around "Trust, Respect, and Responsibility;" these ideas are emphasized in each classroom and serve as the foundation of school rules. All of the core classes are considered "honors" or "Advanced Placement". In addition to fulfilling standard graduation requirements for the district, students are required to complete 150 hours of community service and participate in an internship. EHS's first graduating class had a 100% graduation rate and 97% college acceptance rate. The second graduating class had a 97% graduation rate.

Method

This qualitative research study focused on two primary research questions: 1) how does a social studies teacher in an urban school enact the New Tech Network educational model with her students, and 2) which teaching strategies does she use to engage students and gauge achievement? According to Creswell (2007), qualitative research should be conducted when a problem or issue needs to be explored in a complex, detailed manner and methods such as interviews and observations best serve the purpose of addressing that problem. In this case, the problem that needed to be explored was the lack of engagement in social studies. The researcher decided that it would be helpful to study a successful teacher to understand how he or she was able to utilize the New Tech Network model to engage diverse students in social studies. Three common methods of qualitative data collection (interviews, field observations, and document analysis) were used.

Specifically, case study methodology was employed for this research, as the methods of data collection included an exploration of a particular educational model (the New Tech Network model) in a bounded environment (one urban, secondary social studies classroom). According to Stake (1995), this type of case study is categorized as "instrumental," because it developed from an interest in an issue. In this particular case, there was an interest in the utilization of the New Tech Network model in an urban setting and the prospect of increasing engagement and achievement in social studies classrooms. The researcher decided that it would be ideal to study a teacher that had experienced success in the model and utilized strategies to spark student engagement. After investigating possible sites, Engagement High School (EHS) was found to be the only school in the area that satisfied the criteria of the researcher. Once EHS was selected as the site, Ms. Olivia Jordan (pseudonym), was found to be an ideal teacher for the study because of her recent selection as the 2011-2012 Initially Licensed Teacher of the Year and reputation for engaging students in U.S. History. Thus, the prospective sample was selected using Merriam's (1998) idea of "purposeful sampling" (p. 61). There was much that could be learned from studying Ms. Jordan, who had been able to continually capture the interest of students in social studies and enhance their learning.

Data Collection

Data collection began in the fall of 2012 as the researcher received a signed, formal agreement from Ms. Jordan to participate in the research. This agreement included information on the purpose and scope of the study and what would be requested of the teacher. It was also decided that U.S. History would be the most appropriate course for the study because of the fact that it served the 11th grade students at EHS with more diverse learning needs. Next, the researcher conducted a pre-interview with Ms. Jordan on topics such as the NTN educational model, the Honors U.S. History course, student engagement and achievement, her educational philosophy, and the successes and challenges of project based learning in the social studies.

The study consisted of data collection that lasted throughout the duration of a single project-based unit and an accompanying extension activity. The unit (including the extension activity) lasted for five weeks. Within that time period, two interviews were conducted with Ms. Jordan at the beginning and middle of the project. The interview questions focused on the implementation of the project, student engagement, and student achievement. Audio recordings were also collected and transcribed. Finally, there was a post-interview with Ms. Jordan after observations were completed to reflect on the project.

Twelve observations were conducted every other day, consecutively. The semi-structured observation protocol was based on "questions of interest" that were developed from the research questions. For example, the researcher looked for evidence of student engagement, achievement, and how the New Tech Network model was enacted. Specifically, for student engagement, notes were recorded of the types of activities in which students participated and the quality and duration of their participation. The researcher also noted occurrences that were specific to culturally relevant pedagogy, including the social relationships in the classroom and evidence of student achievement, cultural affirmation, and socio-political consciousness. As such, field notes were scripted verbatim during the class observations in the researcher journal.

Finally, the researcher collected all documents that were distributed to students throughout the project and additional documents that reflected the utilization of the NTN model. Merriam (1998) noted that "finding relevant materials is the first step" in effectively using documents in case study research (p. 120). Documents such as the project rubric, graphic organizers, class readings, written assignments, quizzes, tests, etc. were all collected.

Data Analysis

Following data collection, the extensive process of coding findings for the study began. First, the researcher read through the transcribed interviews and observations and made notes on general points that were raised by Ms. Jordan and ideas that emerged from the observations (Merriam, 1998). Then, connections were drawn between the different issues that were raised in the interviews and observations and preliminary categories were created (Merriam, 1998). Next, the researcher reviewed the documents that were collected, categorized them according to their purpose, structure, and content, and found connections between the documents and the preliminary categories for the observations and interviews. After reviewing those categories, the researcher identified specific categories that generalized the findings from the study and could be used to interpret the results. Those codes were compared and weighed against each other to understand which codes took precedence in the data and which codes were correlated or subordinate (Merriam, 1998). This allowed the data to be presented thematically via tables and text.

FINDINGS

After analyzing the qualitative data collected in the study, the researcher found that there were five interconnected themes that emerged: real world application and relevance, the utilization of scaffolding strategies, accountability and structure in student collaboration, positive teacher/student interactions, and the benefits and challenges of technology.

Perhaps the most important theme to emerge in this study was the prominence of real world applications for the history taught in Ms. Jordan's classroom. She made a concerted effort to ensure that students could find connections between historical content and current events. During the pre-interview, she emphasized that this was a feature of the New Tech Network model, "One of the key components of this model is to implement with fidelity project based learning in which students take real world situations and create products or projects, which address those issues." In terms of culturally relevant pedagogy, Ms. Jordan's use of real world issues enhanced student achievement, cultural competence, and socio-political consciousness (Ladson-Billings, 1995a). She accomplished these ends by a variety of methods that included incorporating content that was culturally relevant to students, inviting community members to be a part of instruction, using the community as a center-piece of the curriculum, and providing opportunities for students to learn outside of the classroom.

Ms. Jordan also utilized a number of cognitive scaffolds to ensure her students mastered the curriculum. This is a technique often implemented by teachers of culturally relevant pedagogy (Ladson-Billings, 1995a) and schools that utilize project-based learning (NTN, 2013d). Hmelo-Silver, Duncan, and Chinn (2007) explained the necessity of some traditional approaches to teaching in the midst of innovative strategies like project based and inquiry learning:

A mini-lecture or benchmark lesson presenting key information to students is used when students understand the necessity of that information and its relevance to their problem-solving and investigational practices. Such just-in time direct instruction promotes knowledge construction. (p. 100)

From the first day of the project, Ms. Jordan incorporated teaching strategies that could be considered traditional, such as literacy activities, graphic organizers, visual aids, questioning, and discussions to engage students in the historical content.

Within her classroom Ms. Jordan embedded a strong sense of accountability and structure to support student collaboration. There were various levels of support she included to ensure students were held accountable and were responsible for each other's learning. These levels of support included accountability measures by the teacher, group contracts and division of responsibilities in classroom assignments, meetings to reinforce group roles, the requirement that students had to complete their homework to continue the project in groups, and various project tasks and responsibilities that were vital for the finished product.

The nature of the communication between Ms. Jordan and her students was another important theme. Culturally relevant pedagogy emphasizes the important of positive, caring relationships between students and teachers (Irvine, 2009; Ladson-Billings, 1995a). Ms. Jordan constantly encouraged students, engaged them in discussions to help them learn content, and used conversations as a means of evaluating their understanding of content.

Technology is listed as one of the three primary elements of the New Tech Network model. Specifically, the NTN website (2014b) states:

The smart use of technology supports our innovative approach to instruction and culture. All classrooms have a one-to-one computing ratio. With access to Web-enabled computers and the latest in collaborative learning technology, every student becomes a self-directed learner who no longer needs to rely on teachers or textbooks for knowledge and direction. We use Echo, an online learning management system to create a vibrant network which helps students, teachers, and parents connect to each other, and to student projects across the country. (para. 3)

Despite the positive perspective of technology touted in the website, through interviews and observations, the researcher quickly realized that Ms. Jordan was not able to utilize technology in a manner that reflected the ideals of this statement. There were a number of broken laptops throughout the project that prevented a one to one student to computer ratio. This lack of working computers hindered Ms. Jordan's ability to utilize the Echo learning platform and technological teaching strategies she wanted to use. Despite these challenges, Ms. Jordan found other ways to use technology as a collaborative and instructional tool.

DISCUSSION

The purpose of this study was to research how a social studies teacher in an urban school enacted the New Tech Network model, engaged students, and ensured student mastery of curricular content. My central research questions were:

1. How does a social studies teacher in an urban school enact the New Tech Network educational model with her students?
2. Which teaching strategies does she use to engage students and gauge achievement?

Five themes emerged from the study, which described how Ms. Jordan enacted the NTN model with her students and the strategies she used to engage them and gauge achievement. After analyzing these themes, the researcher developed five assertions (Table 1) that further organized and refined the findings. These assertions demonstrate how Ms. Jordan's success in engaging students and supporting student achievement rested in her ability to integrate culturally relevant pedagogy (Ladson-Billings, 1995a) into project based learning (BIE, 2009) via the New Tech Network model (NTN, 2014c).

A more detailed discussion about each assertion and the implications for students is provided below.

The use of real world applications that were culturally relevant ensured that the content focused more deeply on the culture and community of the students. Project based-learning within the NTN model seeks to address real world problems that would likely be addressed by adults, as well (NTN, 2014c). With this approach, teachers are able to connect students with people outside of the school that would be interested in the students' solutions and ideas. This aligns with a culturally relevant pedagogy, which utilizes the interests of the students, concerns of the community, and social issues to engage and educate students (Gay, 2002; Ladson-Billings, 1995a). Specifically, culturally relevant teachers tend to embody a conception of self in which they see themselves as members of the students' community, moving them to incorporate issues or concerns from the community into the curriculum (Ladson-Billings, 1995a).

In her teaching, Ms. Jordan was able to successfully blend project-based inquiry and culturally relevant pedagogy in a way that made real world problems culturally relevant. Ms. Jordan saw her-

Table 1. Five emergent themes and five thematic assertions

5 Themes	5 Thematic Assertions
Real World Application	• The use of real world applications that were culturally relevant ensured that the content focused more deeply on the culture and community of the students.
Scaffolding/Teaching Strategies	• The scaffolding strategies that were utilized provided differentiation for a diverse group of students.
Accountability	• The accountability measures incorporated into the project by the teacher led to high completion rates and opportunities for authentic civic engagement for all students.
Teacher/Student Interactions	• The teacher/student interactions created a classroom community that was highly collaborative.
Benefits and Challenges of Technology	• Operational technology was an effective tool for securing student engagement.

self as a member of the students' community as she made their city and community a focal point of the project. The entire project on the Civil War and Reconstruction was focused on the role and growth of their city during that time period. The city was a hub of African American progress in the late 1800's, which provided an important cultural anchor for the students. Ms. Jordan was able to incorporate community members into the project, including a colleague who spoke to the class about her experience growing up in the city during urban renewal. Ms. Jordan also set up an opportunity for students to present their ideas for revitalizing a historic part of the city to a county redevelopment team. She was effective in taking the idea of a real world problem and situating it in the lives of her students.

Ms. Jordan was able to successfully adapt existing curriculum content of the unit for the benefit of her students. The North Carolina standard course of study competency goal for this U.S. History unit states that students should "analyze the issues that led to the Civil War, the effects of the war, and the impact of Reconstruction on the nation" (North Carolina Department of Public Instruction, 2014). Ms. Jordan adapted the content inferred in this competency goal to accommodate the racial and gender demographics of her students. For example, she incorporated learning opportunities about the roles of women during this time period as she highlighted the importance of individuals like Harriet Beecher Stowe, Harriet Tubman, and Mary Tepe. It is also important to note that Ms. Jordan did not ignore the experiences of white males as she sought to include multiple perspectives about the past. As she helped students to "identify political and military turning points of the Civil War" (NCDPI, 2014), she was sure to include a wide range of people and events, both well known and not so well known. Overall, the adjustments she made to the curriculum led to a deeper and richer understanding of the content by the students.

The scaffolding strategies that were utilized provided differentiation for a diverse group of students. Culturally relevant pedagogy emphasizes the importance of adapting teaching strategies to fit the needs or interests of students (Gay, 2002; Irvine, 2009; Ladson-Billings, 1995a). In Ladson-Billings' (1995a) study, this resulted in a teacher creating an assignment in which students chose the topic they would present. Students created presentations on subjects like basketball, cooking, singing, reading, or mathematics.

Project based learning, as promoted by the New Tech Network, stresses the importance of students obtaining information through diverse sources of information (NTN, 2014c). These sources might include data from the teacher, online services, guest speakers, or other students (NTN, 2014c). There is also a great deal of student choice built into the content and process of the project to differentiate based on student needs.

Ms. Jordan used a number of pedagogical strategies to diversify the learning opportunities for her students. Very similar to the example provided in Ladson-Billings' (1995a) study, Ms. Jordan allowed students to choose an area of interest within the scope of the project. Students were able to decide whether or not they wanted to specialize in creating the battles map, blog, or timeline for the website. She also provided additional tutoring to help the students develop their skills in creating their portion of the final project. Ms. Jordan used diverse instructional strategies to help students with varying learning styles grasp the content of the unit. She provided opportunities for students to analyze primary sources and images, view flipped classroom videos, engage in discussions, conduct online research, and complete graphic organizers to visualize information. The variety of learning activities gave students ample chances to enhance their understanding of the Civil War and Reconstruction.

The variety of scaffolding strategies that Ms. Jordan used provided students multiple opportunities to learn the content. When students were being exposed to information in a variety of ways, it increased their opportunities for developing understanding. For example, Ms. Jordan spoke about one of her students with limited English proficiency being able to learn the concept of the northern blockade strategy in one of our interviews. She stated:

So, for instance, two classes ago they did a flipped classroom video (for homework) on what a blockade was and we broke down what it meant and we talked about the Anaconda plan. Michael (pseudonym) was able to answer the question about the Mississippi River (and the blockade). That's because he did the homework and he knew what that meant.

Ms. Jordan had gone over the blockade strategy in class via a PowerPoint presentation, but the flipped video really helped Michael to understand the concept.

There were a number of instances in the unit when Ms. Jordan would engage in short discussions with students to ensure they understood the material. At one point, Ms. Jordan was working with students to complete a graphic organizer of the advantages and disadvantages of the north and south during the Civil War. One of her female students did not understand some of the information. Ms. Jordan asked her simple, probing questions to scaffold her understanding up to a point where she internalized the relationship of the advantages and disadvantages.

The accountability measures incorporated into the project by the teacher led to high completion rates and opportunities for authentic civic engagement for all students. The NTN project rubric, which outlines how teachers should structure projects, encourages teachers to provide opportunities for students to organize their work in teams, communicate with group members, and develop work plans and deadlines (NTN, 2014c). These accountability strategies support opportunities for student success.

Similarly, proponents of culturally relevant pedagogy explain the importance of teachers believing that all students can learn and "they accept nothing less than high-level success from them" (Gay, 2002, p. 109). Ladson-Billings (1995a) described the various means that teachers used to hold students accountable for learning in her study, including standardized tests, project presentations, and encouraging "students to learn collaboratively and be responsible for another" (p. 480). These accountability measures helped to ensure that students did, indeed, learn the material that they were supposed to learn.

Ms. Jordan incorporated multiple accountability strategies that helped to ensure the success of all students. First of all, she required that students consistently complete their homework assignments to remain in their project groups. The project was structured in a way that would have made it very difficult to complete individually. This requirement served as motivation for students to do what they needed to do to remain in their groups, and resulted in some group members calling students at home when they were absent to check on their project progress. Ms. Jordan also gave quizzes through the project to check for understanding. If students did not perform well on the quizzes, they were required to re-take them during lunch so they would have an opportunity to receive a higher grade. Students also had the opportunity to go on a field trip to view the film *Lincoln* if they maintained a passing grade in the class.

The implications of these practices were numerous and noteworthy. The rate at which students completed homework increased from earlier in the school year. Students had internalized the idea that if they did not complete their homework, they could possibly lose the privilege of working in groups to complete their project. Quiz scores also increased from the previous year. When asked about the evidence of achievement in her class, Ms. Jordan commented on both of these positive changes as she stated:

[There are] higher homework return rates. They've been turning in their homework on time. [There are] higher quiz scores. I can honestly say this year my Road to the Civil War quiz had the least amount of retakes that I've ever had. I think it has to do with the fact that I revamped it.

Students also demonstrated their achievement through the completion of the projects. All students in both classes were in groups that completed and presented the projects and addressed all of the requirements on the project rubric. As part of the extension activity, students created proposals that could be shared at a county redevelopment meeting. Again, all students participated in the creation and presentation of the revitalization proposals, which indirectly taught students that they were not only accountable to each other, but also to their community.

Yet, all was not perfect in the world of achievement during this project. Although Ms. Jordan did a wonderful job of adapting content and pedagogy to make them culturally relevant, she failed to align her unit assessment with these practices. This resulted in a low average for students' test scores. The test included multiple-choice questions that focused on more traditional information. And, as it was a multiple-choice assessment, students were not given an opportunity to explain the rationale behind their answers. Furthermore, about 20% of the material on the test was on information that was covered prior to the Civil War and Reconstruction unit. Students were not prompted to review individuals or topics like Dorothea Dix or the Seneca Falls convention to prepare for the test. I am certain all of these factors contributed to the lower test scores on the assessment. Yet, despite all of these concerns, Ms. Jordan had plenty of other structures in place to ensure students were successful in this unit.

The teacher/student interactions created a classroom community that was highly collaborative. Teachers that practice culturally relevant pedagogy should create classroom environments that encourage collaboration and demonstrate the fluidity of the teacher/student relationship (Irvine, 2009; Ladson-Billings, 1995a). Ladson-Billings (1995a) described how one of the teachers in her study would often ask students if they had consulted their peers before asking her a question. By using this practice, she was reinforcing the idea that the students had valuable knowledge of their own, and they were capable of teaching each other. Irvine (2009) explained how a teacher was struggling to explain "classification" to students, but succeeded after using an idea that was obtained from the students. Similarly, proponents of the NTN model encourage teachers to organize projects in ways that allow students to work with each other and utilize print and electronic resources to find information (NTN, 2014c). As students use resources outside of the teacher, they are less likely to perceive the teacher as being the sole source of knowledge in the classroom.

Ms. Jordan utilized numerous techniques to create a positive and collaborative atmosphere in her classes. First of all, she always spoke to students in a respectful manner and celebrated instances when they mastered information. There were plenty of occasions when she would shout, “See, you know this!” or “Great job!” as a student completed an assignment. Through all of my observations, I did not witness Ms. Jordan say anything to students that would be considered disrespectful, condescending, or demeaning. She treated the students as equals. She also listened to the students and borrowed ideas for instruction from them. For example, she stated in an interview that the idea for comparing the secessions in the U.S. following the election of 1860 and the proposed secessions following the 2012 election originated with the students. She also provided opportunities for students to lead the class as they reviewed warm-up questions and tutorials for selected group members so that they would be enlightened and empowered to inform the rest of their team. In so many ways, her classroom epitomized student-centered instruction.

The positive teacher/student interactions Ms. Jordan nurtured resulted in a productive learning environment in the classroom. Students followed Ms. Jordan’s positive approach and spoke to her and other students in a respectful manner. Throughout my observations, I only noted one instance of disrespect towards the teacher. During one of Ms. Jordan’s PowerPoint presentations, she called on a student that appeared to be asleep and asked him a question about the content she was covering. The student responded with a sarcastic comment. Ms. Jordan proceeded to ask another student the same question and receive a correct response. After class, Ms. Jordan spoke to the student about the comment and how it could have been handled differently. Even with this challenging situation, she was able to address the student’s behavior constructively and respectfully.

Operational technology was an effective tool for securing student engagement. Technology is a vital facet of the NTN educational model. In the NTN model, students are expected to utilize the online learning system, Echo, to connect with their teacher and other students and find resources that are helpful for the implementation of project-based learning (NTN, 2014c). When working on projects, students may use technology to conduct research and/or construct final products. NTN touts that project-based learning combined with the effective use of technology leads to higher student engagement and academic success (NTN, 2014b). Culturally relevant pedagogy emphasizes the need for students to develop technological skills to be able to actively participate in a democracy (Ladson-Billings, 1995b). In contemporary classrooms, it is very likely that a teacher carrying out culturally relevant pedagogy is also using technological tools.

Technology was a major part of Ms. Jordan’s instruction. Students used computers to communicate with each other, exchange resources, research information, create battle maps, build timelines, craft blogs, and generate websites. Students also viewed videos that were created by the teacher to reinforce their understanding of historical concepts. Additionally, students used computers to research and draft proposals for how to revitalize a historic area of their city. The process of creating these proposals was, perhaps, the main method that Ms. Jordan used to tie culturally relevant pedagogy and technology together.

Of course, there were also some notable concerns with technology in Ms. Jordan’s class. During any given class period, there were at least five non-working computers in her laptop cart. Hence, there ended up being a 2:1 student to computer ratio instead of the 1:1 ratio that is supposed to be a standard component of the NTN model. Most importantly, Ms. Jordan was not able to utilize the Echo online learning system very often since all the students did not have individual working computers and to access the materials or submit assignments.

Despite the concerns with technology, the classroom computers were still useful as tools of engagement for students. When asked about the parts of the unit that students exhibited the most interest in, Ms. Jordan replied, "I think the most exciting thing for them was putting the final thing (project) together that last day… They were engaged when we had to take the battles and put them onto the map and put them into the website." Students were engaged as they worked on the different parts of their project websites throughout the unit. In sum, computer technology enabled higher levels of engagement when it was utilized in a collaborative manner.

Summary

The five themes that emerged in my study had various implications for the students. Because of the manner in which Ms. Jordan implemented project-based learning, her students, who were predominately African Americans and Latino Americans, were engaged and able to experience academic success in terms of higher quiz scores, homework completion, and project completion. In our increasingly diverse society, we must consider what the implications of this study could be for social studies, in general.

IMPLICATIONS

For many years, there has been a concern about the lack of engagement and interest amongst students in social studies classrooms (Shaughnessy & Haladyna, 1985, as cited in Heafner, 2004; Goodlad, 1984, as cited in Ladson-Billings, 2001). The lack of interest is especially concerning because social studies classrooms should be places where students learn to analyze, evaluate, and effectively participate in our political and social systems (Parker, 2008). We should think critically about the future of our society if students are not being prompted to assess our democracy and develop ideas for how it may be enhanced.

Additionally, efforts are being made to transform the nature of schools via school reform movements and the use of more online learning environments. The use of the NTN educational model has multiplied tremendously over the past ten years. There were approximately 14 NTN schools in 2004 and there are over 120 NTN schools, today. This model is intended to increase the engagement and educational outcomes of students through project-based learning in small school and technology-rich environments (NTN, 2014b). Thus, the model may have potential for social studies, where some teachers have struggled with student engagement.

In this study, Ms. Jordan had notable success as she utilized project-based learning and a blended learning environment to teach students in an urban setting about the Civil War and Reconstruction. Overall, Ms. Jordan provided a strong example for implementing project-based learning and culturally relevant pedagogy in a hybrid-learning environment to ensure students from diverse backgrounds experienced academic success and developed political and social awareness.

The findings of this study confirmed those of Halvorsen et al. (2012). In both cases, teachers were strategic about implementing instruction that was inspired by students' lives. The methods that might be used to replicate these practices include utilizing teacher education programs to emphasize blended learning, project-based learning, and culturally relevant pedagogy and providing professional development to experienced teachers. Teacher education programs provide excellent opportunities for college professors to inspire future teachers to think about how education might impact the social and political lives of students. Additionally, Avery et al. (2002) found that exceptional professional development sessions dedicated to authentic instruction helped teachers to utilize "higher order thinking" skills and develop "deep knowledge" of subject matter (p. 53).

RECOMMENDATIONS FOR FUTURE RESEARCH

This study showed the possibilities of integrating culturally relevant pedagogy and project-based learning in a blended-learning environment. However, there are a number of ways that this research could be extended to further substantiate the findings. The sample size in this study was limited to one social studies teacher at an urban school that utilizes project-based learning. Future researchers should continue to examine how teachers effectively use project-based learning to educate diverse students in social studies. There are numerous schools in the United States that implement project-based learning in blended-learning environments similar format to NTN. These schools could serve as sites to identify exceptional teachers with practices worthy of replicating. Furthermore, these practices could be included in the training that teachers typically receive when they start teaching at schools that use project-based learning.

It would also be helpful if future studies included quantitative measures of student achievement to accompany qualitative descriptions. Halvorsen et al. (2012) used a mixed methods approach in their recent study. This methodology enabled them to collect pre and post-test data on students and compare post-test results with students from high SES schools. The fact that students from low SES schools performed as well as students from high SES schools was a noteworthy finding for researchers concerned with closing the achievement gap. This also begs the point of including students and student data in research. This study focused on the practices of teacher. However, it would be very helpful to understand the impact of the teacher's pedagogy on the students by examining the students, themselves.

Lastly, research should be conducted on the various ways that project-based learning and culturally relevant pedagogy could be integrated into schools. In this study of Ms. Jordan, she was utilizing the model that the school had adopted and she inadvertently incorporated culturally relevant pedagogy as she was trying to address the needs of the students. However, there could be other ways of studying teachers' use of project-based learning and culturally relevant pedagogy in social studies. For example, researchers could seek out teachers searching for innovative ways to educate diverse students in social studies. Then, they could work with these teachers to develop project-based learning units aligned with culturally relevant pedagogy that could be implemented in their classes (Halvorsen et al., 2012). Studying the implementation of these units would enable researchers to investigate the effectiveness of these approaches in any school. It might also be helpful to examine the integration of project-based learning throughout schools that have adopted project-based learning as its instructional approach. Ms. Jordan noted in our study that:

I would say it (the NTN model) is a great model. And, I've seen it work where the entire school community has bought into the model… (However) if the kids don't have the buy in, then (it could be a problem). Today, a kid was just telling me that 'This is the only class I'm doing a project in.' And, that really made me upset because I'm pulling teeth to get them to have enthusiasm about they're presentation, and they're just doing worksheets in their other classes. So, it's like, if only one class a day they actually have to collaborate, that's why every class is like starting from scratch.

CONCLUSION

Ms. Jordan enacted the NTN model with her students by utilizing culturally relevant pedagogy within project-based learning. This study helps to fill a void in the research literature regarding the integration of project-based learning in social studies classrooms at schools with a predominately African American population. In this age of school reform (that often impacts schools with high proportions of African Americans and/or Latino Americans enrolled), it is vital that researchers investigate the best practices that teachers are using to implement innovative educational approaches and to support student success. Again, this study yielded the finding that culturally relevant pedagogy and project-based learning can work in a complementary fashion to ensure the engagement and achievement of diverse students.

The findings of this study on project-based learning and culturally relevant pedagogy demonstrated how one teacher's adaptation of social studies curriculum content and differentiated learning experiences led to higher quiz scores, assignment completion, collaboration, and engagement amongst her students. These implications were very encouraging. Perhaps one of the most inspiring realities that emerged from this study was the possibility of replicating the results. Ms. Jordan strategically utilized pedagogical practices that can be developed within current and future teachers. From this point, scholars should continue to research how culturally relevant pedagogy and project-based learning can be effectively integrated in various learning environments and how this integration can be cultivated amongst more educators.

REFERENCES

Avery, P. G. (1999). Authentic assessment and instruction. *Social Education, 63*(6). Retrieved from National Council for the Social Studies website: http://publications.socialstudies.org/se/6306/630612.html

Avery, P. G., Freeman, C., & Carmichael-Tanaka, D. (2002). Developing authentic instruction in the social studies. *Journal of Research in Education*, *12*(1), 50–56.

Banks, J. A. (2006). *Cultural diversity and education: Foundations, curriculum, and teaching* (5th ed.). Boston: Pearson.

Buck Institute for Education. (2009). *What is PBL?* Retrieved from Buck Institute for Education website: http://www.bie.org/about/what_is_pbl/

Carmichael, D. L., & Martens, R. P. (2012). Midwestern magic: Iowa's statewide initiative engages teachers, encourages leadership, and energizes student learning. *JSD the Learning Forward Journal*, *33*(3), 22–26.

Creswell, J. W. (2007). *Qualitative inquiry & research design: Choosing among five approaches*. Thousand Oaks, CA: Sage Publications.

Diffily, D. (2002). Project-based learning: Meeting social studies standards and the needs of gifted learners. *Gifted Child Today*, *25*(3), 40–43, 59.

Doering, A., & Veletsianos, G. (2008). Hybrid online education: Identifying integration models using adventure learning. *Journal of Research on Technology in Education*, *41*(1), 23–41. doi:10.1080/15391523.2008.10782521

Eisner, E. W. (2002). *The educational imagination*. Upper Saddle River, NJ: Prentice Hall.

Filippatou, D., & Kaldi, S. (2010). Transporting pedagogy: Implementing the project approach in two first-grade classrooms. *International Journal of Special Education*, *25*(1), 17–26.

Gay, G. (2002). Preparing for culturally responsive teaching. *Journal of Teacher Education*, *53*(2), 106–116. doi:10.1177/0022487102053002003

Giroux, H. A., & Simon, R. (1989). Popular culture and critical pedagogy: Everyday life as a basis for curriculum knowledge. In H. A. Giroux & P. McLaren (Eds.), *Critical pedagogy, the state, and cultural struggle* (pp. 236–252). Albany: State University of New York Press.

Halvorsen, A., Duke, N. K., Brugar, K. A., Block, M. K., Strachan, S. L., Berka, M. B., & Brown, J. M. (2012). Narrowing the achievement gap in second-grade social studies and content area literacy: The promise of a project-based approach. *Theory and Research in Social Education*, *40*(3), 198–229. doi:10.1080/00933104.2012.705954

Heafner, T. (2004). Using technology to motivate students to learn social studies. *Contemporary Issues in Technology & Teacher Education*, *4*(1), 42–53.

Hertzog, N. B. (2007). Transporting pedagogy: Implementing the project approach in two first-grade classrooms. *Journal of Advanced Academics*, *18*(4), 530–564.

Hirsch, E. D. (2010). Beyond comprehension: We have yet to adopt a common core curriculum that builds knowledge grade by grade - but we need to. *American Educator*, *34*(4), 30–36.

Hmelo-Silver, C. E., Duncan, R. G., & Chinn, C. A. (2007). Scaffolding and achievement in problem-based and inquiry learning: A response to Kirschner, Sweller, and Clark (2006). *Educational Psychologist*, *42*(2), 99–107. doi:10.1080/00461520701263368

Howard, T. C. (2003). Culturally relevant pedagogy: Ingredients for critical teacher reflection. *Theory into Practice*, *42*(3), 195–202. doi:10.1207/s15430421tip4203_5

Irvine, J. J. (2009, Fall). Relevant: Beyond the basics. *Teaching Tolerance*, *36*(45). Retrieved from http://www.tolerance.org/

Kirschner, P. A., Sweller, J., & Clark, R. E. (2006). Why minimal guidance during instruction does not work: An analysis of the failure of constructivist, discovery, problem-based, experiential, and inquiry-based teaching. *Educational Psychologist*, *41*(2), 75–86. doi:10.1207/s15326985ep4102_1

Kliebard, H. M. (2004). *The struggle for the American curriculum (1893-1958)*. New York: Routledge.

Knoll, M. (1997). The project method: Its vocational education origin and international development. *Journal of Industrial Teacher Education*, *34*(3), 59–80. Retrieved from http://scholar.lib.vt.edu/ejournals/JITE/v34n3/Knoll.html

Ladson-Billings, G. (1995a). Toward a theory of culturally relevant pedagogy. *American Educational Research Journal*, *32*(3), 465–491. doi:10.3102/00028312032003465

Ladson-Billings, G. (1995b). But that's just good teaching! The case for culturally relevant pedagogy. *Theory into Practice*, *34*(3), 159–165. doi:10.1080/00405849509543675

Ladson-Billings, G. (2001). Crafting a culturally relevant social studies approach. In E. W. Ross (Ed.), *The social studies curriculum: Purposes, problems, and possibilities* (pp. 201–215). New York: SUNY Press.

Levstik, L. S. (2008). What happens in social studies classrooms? Research on K-12 social studies practice. In L. S. Levstik & C. A. Tyson (Eds.), *Handbook of research in social studies education* (pp. 50–62). New York: Routledge.

MacArthur, C. A., Ferretti, R. P., & Okolo, C. M. (2002). On defending controversial viewpoints: Debates of sixth graders about the desirability of early 20th-century American immigration. *Learning Disabilities Research & Practice*, *17*(3), 160–172. doi:10.1111/1540-5826.00042

Mansour, B., & Mupinga, D. M. (2007). Students' positive and negative experiences in hybrid and online classes. *College Student Journal*, *41*(1).

Marshall, P. L. (2001). *Cultural diversity in our schools*. Belmont, CA: Wadsworth.

Mathison, S., & Fragnoli, K. (2006). Struggling for good assessment in social studies education. In E. W. Ross (Ed.), *The social studies curriculum: Purposes, problems, and possibilities* (3rd ed., pp. 197–215). New York: State University Of New York Press.

Mergendoller, J., Maxwell, N., & Bellisimo, Y. (2006). The effectiveness of problem-based instruction: A comparative study of instructional methods and student characteristics. *Interdisciplinary Journal of Problem Based Learning*, *1*(2), 49–69. doi:10.7771/1541-5015.1026

Merriam, S. B. (1998). *Qualitative research and case study applications in education*. San Francisco, CA: Jossey-Bass.

Milner, H. R. (2011). Culturally relevant pedagogy in a diverse urban classroom. *The Urban Review*, *43*(1), 66–89. doi:10.1007/s11256-009-0143-0

National Assessment of Educational Progress. (2010). *2010 Civics assessment*. Retrieved from http://nationsreportcard.gov/civics_2010/context_3.asp

New Tech Network. (2014a). *Our story*. Retrieved from New Tech Network website: http://www.newtechnetwork.org/our-story

New Tech Network. (2014b). *What fuels our success*. Retrieved from New Tech Network website: http://www.newtechnetwork.org/newtech_model

New Tech Network. (2014c). *Project-based learning*. Retrieved from New Tech Network website: http://www.newtechnetwork.org/sites/default/files/resources/ntn_project_rubric.pdf

New Tech Network. (2014d). *Learning Management System*. Retrieved from New Tech Network website: http://www.newtechnetwork.org/services/learning-management-systems

Newmann, F. M., Bryk, A. S., & Nagaoka, J. K. (2001). Authentic intellectual work and standardized tests: Conflict or coexistence? *Consortium on Chicago School Research*, 1-48. Retrieved from http://ccsr.uchicago.edu/sites/default/files/publications/p0a02.pdf

North Carolina Department of Public Instruction. (2014). *U.S. history standard course of study*. Retrieved from http://www.dpi.state.nc.us/curriculum/socialstudies/scos/2003-04/067eleventhgrade

O'Brien, J. (1997). Statewide social studies performance assessment: Threat or treat? *Social Studies*, *88*(2), 53–59. doi:10.1080/00377999709603747

Orfield, G., & Lee, C. (2006). *Racial transformation and the changing nature of segregation*. Cambridge, MA: The Civil Rights Project at Harvard University.

Pahl, R. H. (1995). Six-hat social studies. *Social Education*, *59*(3), 154–157.

Parker, W. (2008). Knowing and doing in democratic citizenship education. In L. S. Levstik & C. A. Tyson (Eds.), *Handbook of research in social studies education* (pp. 65–80). New York: Routledge.

Pregot, M. V. (2013). The case for blended instruction: Is it a proven better way to teach? *US-China Education Review*, *3*(5), 320–324.

Sharma, P. (2010). Blended learning. *ELT Journal*, *64*(4), 456–458. doi:10.1093/elt/ccq043

Sleeter, C. E. (2005). *Un-standardizing curriculum: Multicultural teaching in the standards-based classroom*. New York: Teachers College Press.

Stake, R. E. (1995). *The art of case study research*. Thousand Oaks, CA: Sage Publications.

Summers, E. J., & Dickinson, G. (2012). A longitudinal investigation of project–based instruction and student achievement in high school social studies. *Interdisciplinary Journal of Problem-based Learning*, *6*(1), 82–103. doi:10.7771/1541-5015.1313

Thomas, J. W. (2000). A review of research on project-based learning. *The Autodesk Foundation*, 1-45. Retrieved from http://www.bobpearlman.org/BestPractices/PBL_Research.pdf

Thornton, S. J. (2001). From content to subject matter. *Social Studies*, *92*(6), 237–242. doi:10.1080/00377990109604009

Tyson, C. A. (2002). "Get up offa that thing:" African American middle school students respond to literature to develop a framework for understanding social action. *Theory and Research in Social Education*, *30*(1), 42–65. doi:10.1080/00933104.2002.10473178

U.S. Department of Education, Office of Planning, Evaluation and Policy Development. (2010). *A Blueprint for Reform: The Reauthorization of the Elementary and Secondary Education Act*. Retrieved from http://www2.ed.gov/policy/elsec/leg/blueprint/blueprint.pdf

Walker, A., & Leary, H. (2009). A problem based learning meta analysis: Differences across problem types, implementation types, disciplines, and assessment levels. *Interdisciplinary Journal of Problem-based Learning*, *3*(1), 12–43. doi:10.7771/1541-5015.1061

ADDITIONAL READING

Banks, J. B., & Banks, C. A. M. (Eds.). (1995). *Handbook of research on multicultural education*. New York: Macmillan.

Cox, G., Carr, T., & Hall, M. (2004). Evaluating the use of synchronous communication in two blended courses. *Journal of Computer Assisted Learning*, *20*(3), 183–193. doi:10.1111/j.1365-2729.2004.00084.x

Doering, A. (2006). Adventure learning: Transformative hybrid online education. *Distance Education*, *27*(2), 197–215. doi:10.1080/01587910600789571

Garrison, D. R., & Anderson, T. (2003). *E-learning in the 21st Century: A framework for research and practice. Falmer*. London, UK: Routledge Press; doi:10.4324/9780203166093

Gay, G. (1995). A multicultural school curriculum. In C. A. Grant & M. Gomez (Eds.), *Making school multicultural: Campus and classroom* (pp. 37–54). Englewood Cliffs, NJ: Merrill/Prentice Hall.

Howard, G. R. (1999). *We can't teach what we don't know: White teachers, multiracial schools*. New York: Teachers College Press.

Kirschner, P., Strijbos, J., Kreijns, K., & Beers, P. J. (2004). Designing electronic collaborative learning environments. *Educational Technology Research and Development*, *52*(3), 47–66. doi:10.1007/BF02504675

Ladson-Billings, G. (1994). *The dreamkeepers: Successful teach- ers of African-American children*. San Francisco: Jossey- Bass.

Levin-Goldberg, J. (2009). Five ways to increase civic engagement. *Social Studies and the Young Learner*, *22*(1), 15–18.

Lorenzetti, *J.P. (2004).* For quality and cost effectiveness, build a hybrid program. *Distance Education Report, 8*(21), 1-2, 7.

Martorella, P. (1997). Technology and social studies, or: Which way to the sleeping giant? *Theory and Research in Social Education*, *25*(4), 511–514. doi:10.1080/00933104.1997.10505828

Maxwell, N. L., Bellisimo, Y., & Mergendoller, J. (2001). Problem-based learning: Modifying the medical school model for teaching high school economics. *Social Studies*, *92*(2), 73–78. doi:10.1080/00377990109603981

Maxwell, N. L., Mergendoller, J. R., & Bellisimo, Y. (2005). Problem-based learning and high school macroeconomics: A comparative study of instructional methods. *The Journal of Economic Education*, *36*(4), 315–329. doi:10.3200/JECE.36.4.315-331

Oliver, M., & Trigwell, K. (2005). 'Can "Blended Learning" be redeemed?'. *E-learning*, *2*(1), 17–26. doi:10.2304/elea.2005.2.1.17

Ravitz, J. (2009). Introduction: Summarizing findings and looking ahead to a new generation of PBL research. *Interdisciplinary Journal of Problem-based Learning*, *3*(1), 4–11. doi:10.7771/1541-5015.1088

Saxe, D. W. (1992). Framing a theory for social studies foundations. *Review of Educational Research*, *62*(3), 259–277. doi:10.3102/00346543062003259

Takaki, R. (1993). *A different mirror: A history of multicultural America*. Boston: Little, Brown.

Tanner, D. (2001). Authentic assessment: A solution or part of the problem? *High School Journal*, *85*(1), 24–29. doi:10.1353/hsj.2001.0020

Van Sickle, R. L. (1990). The personal relevance of the social studies. *Social Education*, *54*(1), 23–27.

Vinson, K. D., Gibson, R., & Ross, E. W. (2004). Pursuing authentic teaching in an age of standardization. In K. Kesson, S. Mathison, E. W. Ross, & K. D. Vinson (Eds.), *Defending public schools* (Vol. 2, pp. 79–95). Westport, CT: Praeger.

Wade, R. C. (1993). Content analysis of social studies text- books: A review of ten years of research. *Theory and Research in Social Education*, *21*(3), 232–256. doi:10.1080/00933104.1993.10505703

Wiggins, G. (1989). A true test: Toward more authentic and equitable assessment. *Phi Delta Kappan*, *70*(9), 703–713.

Wiggins, G. (1990). The case for authentic assessment. *Practical Assessment, Research & Evaluation, 2*(2). Retrieved from Practical Assessment, Research, & Evaluation website: http://pareonline.net/getvn.asp?v=2&n=2

Young, J. R. (2002). 'Hybrid' teaching seeks to end the divide between traditional and online instructions. *The Chronicle of Higher Education*, *48*(28), 33.

KEY TERMS AND DEFINITIONS

Authentic Instruction: Learning opportunities that challenge students to utilize skills and perform tasks that have relevance for life beyond school.

Blended Learning Environment: Learning environment that consists of face-to-face and online learning opportunities.

Culturally Relevant Pedagogy: Instructional methodology that results in high achievement, cultural competence, and socio-political consciousness in students from diverse cultural and racial backgrounds.

Echo Learning Management System: Online learning management system utilized by New Tech Network Schools.

Hybrid Courses: Courses that incorporate elements of face-to-face and web-based instruction.

New Tech Network (NTN): A nonprofit organization that provides professional development for schools to assist with the implementation of its instructional model; this instructional model centers on project based learning, but also includes a 1:1 student to computer ratio.

Project Based Learning: A method of learning in which students work in groups to create a project/presentation that addresses a real-world problem posed by the teacher.

This work was previously published in Exploring the Effectiveness of Online Education in K-12 Environments edited by Tina L. Heafner, Richard Hartshorne, and Teresa Petty, pages 359-384, copyright year 2015 by Information Science Reference (an imprint of IGI Global).

Chapter 68
Starting with the Learner:
Designing Learner Engagement into the Curriculum

Jonathan E. Taylor
Troy University, USA

ABSTRACT

The central thesis of this chapter is that in order for effective learning to occur, teachers must facilitate learner engagement, and in order to do so, learning resistance has to be conceptually understood, acknowledged, identified, and addressed as a part of the curriculum for any given class, course, or program. This chapter provides a comprehensive overview of the literature on learning resistance, identifies three significant disjunctures between the theory and practice of curriculum development and instructional systems design, and analyzes the relationship between learning resistance and that theory-practice gap. The failure to see motivation and learning as an integrated whole, the mass production of curriculum, and the hesitance to teach something that cannot be measured are all discussed in detail, and suggestions are made for mitigating the negative effects of each.

STARTING WITH THE LEARNER: DESIGNING LEARNER ENGAGEMENT INTO THE CURRICULUM

"Wherefore, admitting that I will make use of certain principles which are to be found in the books of the philosophers, I would none the less maintain that they truly and rightfully belong to our sphere and have a direct bearing on the art…" (Quintilianus, c. 45-c. 95 A.D., from the *Institutio Oratoria*). Some liberty has been taken here with Quintilian's quote (he was speaking of the art of oratory), but the spirit of it has been retained. A significant portion of this chapter is dedicated to providing information pertaining to learning resistance, while the overarching purpose of the chapter is to address curriculum development. For those looking forward to immediately being immersed with terminology and thought that falls most regularly within the traditional "sphere" of curriculum design, some patience may be in order.

Nonetheless, the presentation of the former will be brought to bear upon the latter. The central thesis of this chapter is that in order for effective learning to occur, teachers must facilitate

DOI: 10.4018/978-1-4666-8246-7.ch068

learner engagement, and in order to do so, learning resistance has to be conceptually understood, acknowledged, identified, and addressed as a part of the curriculum for any given class, course, or program.

While there are many different ways to approach the concept of curriculum, the approach here will be mainly directed toward Instructional Systems Design (ISD). This is the case because an instructional system is a "vehicle which generates an essentially reproducible sequence of instructional events and accepts responsibility for efficiently accomplishing a specified change from a given range of initial competencies…" (Corno, 1977, p. 235). As such, ISD is a fundamental curricular tool in nearly all large organizations, particularly those in workplace educational contexts. Certainly it is not the only way (or even the best way) curriculum may be approached, but due to its influence and the volume of learners subjected to it, it requires a vital share of the curriculum discussion as a whole.

Many of the most prominent and frequently used instructional design models do, in fact, acknowledge the importance of learner characteristics as well as other contextual factors. This can be seen at least as early as 1949 in Tyler's statement that, "to have a thorough understanding of possibilities and difficulties involved in drawing interpretations about educational objectives, [one should] jot down data about groups of students with whom you are familiar, formulating a comprehensive set of data about their needs and interests (p. 15).

The Instructional Development Institute Model (Wittich & Schuller, 1973) has, as a second step, *analyzing setting*, which includes learner characteristics. The Air Force Instructional Design Model (1975) uses the term *system requirements* to refer to learners, instructors, and other environmental and contextual factors (Dick, Carey, & Carey, 2009). Smith and Ragan (1993), in their model, include an analysis step, which involves an examination of the learning environment, the learners, and the learning task. Kemp, Morrison, and Ross (1994) recommend that learner characteristics be taken into account, and the Dick and Carey Model (Dick, Carey, & Carey, 2009) provides that designers should analyze learners and contexts. Willis's R2D2 Model (Willis, 1995), has gone a little further. Its constructivist basis resulted in a model that not only acknowledged learner and contextual factors, but suggested that these factors must be continually assessed throughout the entire design process. Verduin (1980) and Cennamo and Kalk (2005) more directly and thoroughly than most others, also expressed the need to take the *affective domain* into account.

Since at least lip-service has been paid to the idea of learner characteristics and/or contexts in many of the prominent curriculum and instructional design models, this chapter is, in some ways, not so much an indictment of a prevalent gap in the literature as it is an indictment of a pervasive, albeit unintentional, inadequacy in the practice of curriculum design.

It is the author's position that a number of different factors have given rise to this inadequacy and the unintended consequences of its outworking, and this chapter will provide an examination of three of these factors. However, before getting into the specific nature of the disconnect between curriculum design models and the practice of curriculum design and its use, a brief overview of learner engagement and a rather more comprehensive overview of learning resistance need to be provided.

Of some magnitude is the lack of sufficient instruction for teachers, trainers, and instructors in the phenomenon of learning resistance and how it relates to all aspects of education. The need to fill this gap is a foundational premise for this chapter, and taking this into account, the first half is used to provide an overview of the theoretical framework for learning resistance. Following this, the common failure to take learning resistance seriously, at least from the point of curriculum design, and three of the more easily detectable potential antecedents of this failure will be discussed. The chapter will culminate with a suggested paradigm shift and some specific recommendations for acknowledging learning resistance and designing it out of the curriculum as a part of the curriculum design process.

Learning Engagement and Learning Resistance

Learning engagement is used here to refer to "a psychological process, specifically, the attention, interest, investment, and effort students expend in the work of learning" (Marks, 2000, pp. 154-155). It includes both *cognitive investment* (Fredricks, Blumenfeld, & Paris, 2004) and *psychic energy* (Csikszentmihalyi, 1990), and it implies a learner's openness to learning in a given context (for a brief discussion of the relationship between openness and resistance, see Taylor, 2010). Learning requires a degree of willingness to mobilize the necessary energies (i.e., physical, emotional, and psychological), and learners who are willing to commit to this in any given learning context can be said to be engaged. Walberg (1995) defines engagement as the "extent to which students actively and persistently participate in learning" (p. 56). (Tyler (1949) referred to this, without using the word, when he wrote, "Education is an active process [and] it involves the active efforts of the learner himself" (p. 11). The concept of learner engagement should not be confused with *student engagement*, which is a term that has been written about often and refers to a student's overall engagement in the greater culture of the learning institution (for a review, see Trowler, 2010).

Learning engagement and learning resistance can be seen as two end points on a continuum (see Figure 1), and while it is conceivable that a learner might be completely neutral in a given learning situation, this tends to be a more theoretical than practical consideration largely because the point of intersection between passive engagement and passive resistance would be very difficult to detect. Using engagement as a starting point is consistent with positive psychology, but can result in the learner's difficulties being marginalized or even ignored. It is because of this that learner engagement is used here as the desired learner characteristic but is addressed through its opposite pole – learner resistance. There may be some debate as to the efficacy of focusing on the more negative end of the spectrum in order to achieve the more positive end, but there are solid grounds for doing so and they will be addressed later in this chapter.

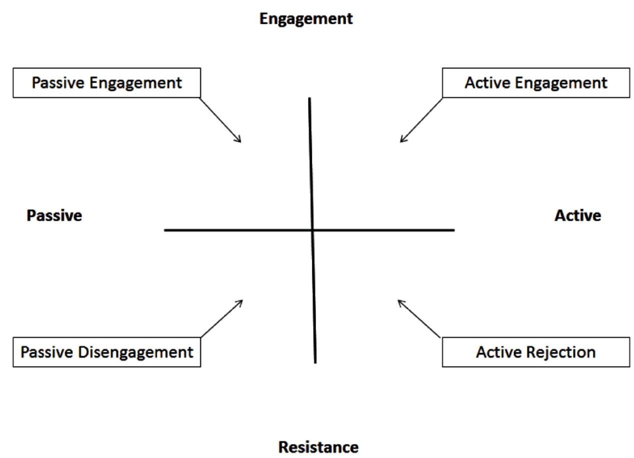
One of the chief difficulties in studying learning resistance is getting past the false dichotomies that mire it within the literature of educational psychology, sociology, anthropology, workplace education, and the many other fields from which it is addressed. Atherton (1999) expresses this well in saying, "to speak of 'resistance to learning' is in some measure to beg the question" (p. 77). An examination reveals a construct so varied in meaning and inconsistent in use, that it is difficult to determine how to clarify the term and integrate its various lines of scholarship into a coherent whole. The terms *resistance* (Brookfield, 2006; Illeris, 2007, 2011), *mislearning* (Jarvis, 1992), *defense* (Illeris, 2007, 2011) *blocking* (Illeris, 2007, 2011), and *turn-off* (Jenson, 1969).

Resistance to learning has been addressed in many contexts including, specifically, in relation to the U.S. Board of Education's interaction with the native Alaskan Inupiats (Wexler,

2006), communicative language teaching (Little & Sanders, 1990), workplace training skills

(Illeris, 2003), workplace mandatory training contexts (Taylor, 2010), science education (Moscovici, 2003; Seiler, Tobin, & Sokolic, 2003), library instruction (Antonelli, Kempe, & Sidberry, 2000), ESL education (Alatis, 1974), reading education (Boldt, 2006), and educational administration (Janas & Boudreaux, 1997). In the adult education field, it has been examined in the context of literacy (Quigley, 1997), general teaching practices (Brookfield, 2006), learner

Figure 1. Learning engagement-resistance continuum



1. **Passive Engagement** – The learner is not resistant to the class or the content but is not actively mobilizing energy for learning in the learning context.
2. **Active Engagement** – The learner is purposefully mobilizing energy toward learning in the learning context.
3. **Passive Disengagement** – The learner is purposefully resisting and emotionally/psychologically closed to the learning activity (course or content), but is not actively mobilizing energy toward that resistance in the learning context. Resistant behaviors and cognitions are present but behaviors are typically not overt.
4. **Active Rejection** – The learner is purposefully mobilizing energy for resistance in the learning context. Resistant behaviors and cognitions are present but behaviors are typically overt.

self-direction (Hiemstra & Brockett, 1994), and critical pedagogy (Giroux, 2001). In the Communications field it has been addressed, in some form or another, by Burroughs (2007), Burroughs, Kearney, and Plax (1989), Goodboy and Bolkan (2009), McLaughlin, Cody, and Robey (1980), and Zhang (2007).

Despite this broadly-distributed attention, learning resistance as a phenomenon has not been addressed well as a broadly constructed phenomenon. This is unfortunate because in its present state, a relatively similar construct is being picked at from a multitude of directions with little or no acknowledgement or integration.

The purpose of this section is to provide a comprehensive, though not exhaustive, overview of the extant research and literature on learning resistance. To date, the work here consists of comprehensive reviews of the learning resistance literature from the fields of Education, Educational Psychology, Sociology, Communications, Anthropology, Human Resource Development, and Workplace Training & Development. Furthermore, it is addressed from motivational, psychoanalytical, cognitive, behavioristic, critical, and workplace training theoretical perspectives.

Defining Learning Resistance

Learning resistance, as a construct is very "slippery" and does not seem to "sit still in the analytic categories we develop" (Field & Olafson, 1999, p. 4). There are likely many reasons this is the case, but certainly one of the more noteworthy potential reasons is the different types of value that have been assigned to resistance. In this section, a broad array of perspectives will be examined culminating in a concise and somewhat simple working definition for the purposes of the curricular analysis offered here.

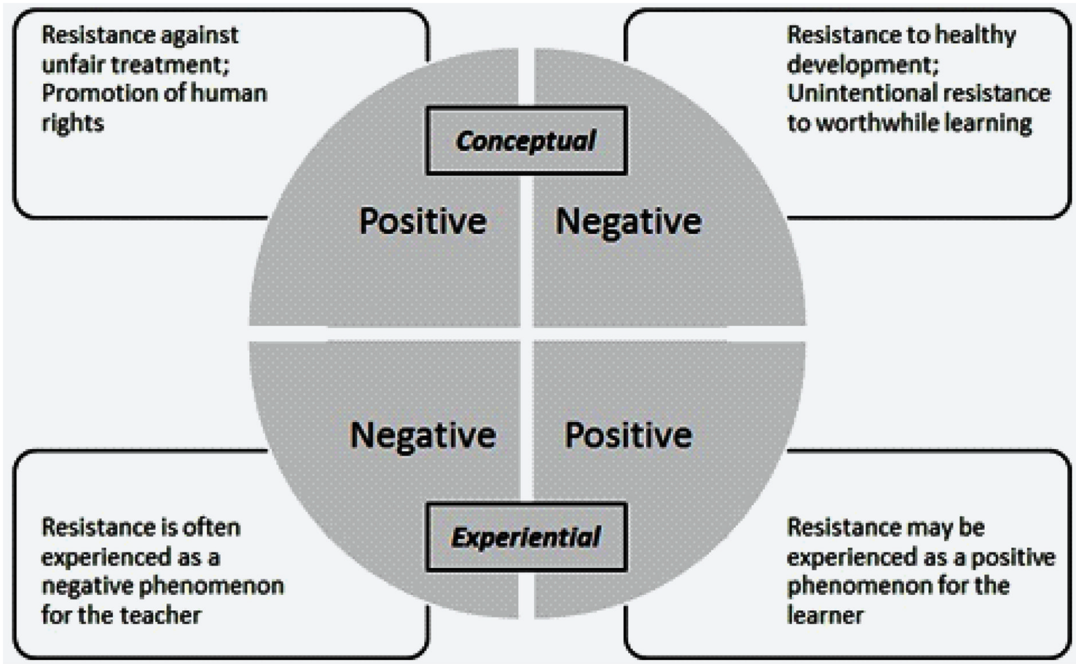
Resistance as a Negative Construct: A more traditional view of learning resistance, framed largely upon psychological and cognitive perspectives, is that resistance to learning is a negative force in learning contexts. An example of such a perspective is Caplin's (1969) reference to the resistant student as "one who fails to apply himself to the learning tasks of the school" (p. 36). Using the term *turn-off*, Jenson (1969) refers to it as "increasing inhibition of the very behaviors that promote learning" (p. 10). This view has continued to be expressed, though to a lesser extent. Long (1994) referred to it as a "force that opposes or retards," McFarland (2001) referred to it as an "endemic problem" (p. 612), and used words such as "disruptions" and "defiance" (p. 614). Also in keeping with the traditional classroom view of resistance is Henson and Gilles's (2003) description of students who have "inhibiting beliefs" and therefore "opt out of learning opportunities by removing themselves or sabotaging instruction" (p. 260).

Writing from the perspective of the college classroom and the interaction between the teacher and student methods of communication, Burroughs et al. (1989) consider resistance to be all "off-task" behavior in a classroom. Off-task, as they use it, can be seen as loosely comparable to resistance, and is the opposite of on-task behavior, which is any facilitated or permitted behavior that is a constructive part of the learning process in the classroom. It is important to note that while critical perspective definitions of "constructive" behavior almost always include resistance, to Burroughs et al, off-task seems to refer to more of a teacher-centered approach and does not highlight the positive aspects of student resistance, at least not as a primary focus. Even Brookfield (2006), who later addresses resistance in a different light from a critical theory orientation, presented learning resistance as something that often should be mitigated through teaching strategies.

Resistance as a Positive Construct: Approaching from an almost opposite perspective, others have viewed learning resistance as a positive and necessary phenomenon, and something that should, at least within certain contexts, be encouraged by the teacher. Giroux (1983, 2001) is probably the most widely known in adult education circles, but others take this view as well (e.g., Moore, 2007). Resistance in these instances involves learner resistance to the status quo and social norms of those in power. Education can be a "technology of power" (Foucault, 2001, p. 125), and as such, educational efforts should not be faced with indiscriminant acceptance. Approaching from this direction, resistance is rooted in a battle between those who are dominant and those who are dominated (Cowles, 2001; Field & Olafson, 1999; Giroux, 1983; 2001; Moore, 2007; Quigley, 1997). It should not escape notice, however, that many of those writing of resistance as a positive dynamic for the learner (i.e., resisting the status quo) have also written about the "negative" effects of learners resisting critical aspects of learning, in effect, agreeing that while resisting the status quo is a good thing, being resistant to being taught to resist the status quo might be best avoided (e.g., Brookfield, 2005).

Resistance as Both a Positive and Negative Construct: Taken together, these views form a more complex understanding of the value of learning resistance. From a conceptual standpoint, resistance can be understood as a positive phenomenon when it is engaged against a negative force

Figure 2. The value of learning resistance



(i.e., resistance of bad is good), and as a negative phenomenon when it stands in the way of positive learning experiences, and acts as a drag on learning that is beneficial for the individual and/or society. From an experiential perspective, resistance can also be viewed in a positive and negative light. For the learner, resistance can often be experienced as positive in that it relieves tension, provides emotional shelter, and often preserves identity (Illeris, 2007, 2011). For the teacher, resistance is most often experienced as negative in that it tends to make the task more difficult. Figure 2 presents this dualistic value structure.

There have been a relative few who have attempted to address resistance as a more neutral term. Canagarajah (1993) distinguished between *opposition* and *resistance*, where resistance is more radical and political in nature and opposition as a more unclear and ambiguous phenomenon. Jing (2006) used Canagarajah's definition of resistance as 'ambivalent student opposition' in her research in an effort to "broaden the sense of resistance as a relatively neutral oppositional force" (p. 97). Both Illeris (2007) and Jarvis (1992) used differentiated terms under a broader conceptual umbrella, and more recent work by Taylor (2010) has also attempted to cast a broader net. Illeris (2007) used the term Resistance Potential in a more positive way, while using the terms blocking, and defense to represent different facets of the more "negative" side of resistance. In this chapter, the term *Defensive Resistance* is used to refer to what has traditionally been viewed as the more negative side of resistance, while the term *Critical Resistance* will be used to refer the more positive aspects of resistance.

Resistance as a Unified Concept: Both sides of this coin have been examined here because they are, in many ways, a related concept. Notwithstanding, Taking into account the multiple views of learning resistance while at the same time recognizing that there is indeed significant overlap in the various conceptions, the definition provided here casts the net broadly enough to provide for the overlap without losing practical efficacy. At the most basic level, *learning resistance can be considered a state in which a learner is not open to learning in a specific learning situation as demonstrated through either active rejection or passive disengagement*.

This definition is flawed in much the same way as the proposed typology in that in attempting to be comprehensive, some of the useful nuances may have been sacrificed and, going back to Atherton's sentiment, it may "beg" a new set of questions. Despite this weakness, this broader conception of learning resistance permits a researcher to assimilate and integrate a much broader and richer array of academic and professional literature on the topic, and, perhaps more importantly, reconcile an extensive range of knowledge and apply it toward very specific ends.

Resistance Viewed from Outside the Positive Psychology Framework

It would seem that the rise of positive psychology (Seligman, 1998) and its general practice of avoiding deficit models brought with it a tendency, for better at times and perhaps worse at others, of avoiding negative terms across the board and considering them out of vogue. While there is not much, at least in the overt sense, in the literature decrying the use of the word resistance, it has been voiced often enough to the author that it bears mention here.

Constructs such as love of learning (McFarlane, 2003), learner resilience (Carr & Claxton, 2002; Quirk, Thornbery, Power, & Samuel, 2012), and learner engagement (Marks, 2000) have been addressed as more positive terms that indirectly provide understanding of learning resistance even if the term resistance was avoided in the work.

Approaching the topic from this direction has been beneficial in many ways, but to be clear, the point of view being expressed here is that the general approach of avoiding negative terms such as rejection and resistance might be advantageous in many cases, but when used exclusively, is not an adequate way to address learning resistance in the classroom.

Focusing on the learner's behavior and cognitions in a given case (i.e., resistance), is paramount to legitimizing the experiences and feelings of the learner, while generally approaching from a point of "what is going well" steps widely around the learner's point of view. Furthermore, focusing on the strengths of the learner as the primary means of mitigating resistance presupposes that any random solution is the precise fit for any particular problem (although the literature on this is couched in terms of strengths and weaknesses rather than problems and solutions). If a learner is resisting in a given learning environment because, for instance, the learning environment is too distracting, approaching this problem by addressing all of the positive aspects of human learning (i.e., which one of these things might be improved to facilitate the natural strengths of the learner) might likely be the long way around the problem. Additionally, this places the focus almost entirely on motivational *approach* goals (Schunk & Zimmerman, 2007), while completely ignoring *avoidance* goals (2007) and the specific reasons a given learner may be resisting in a particular situation.

To use the word *resistance* is to actually address what the learner is doing, for good or bad, working the problem from that end, and therefore can be considered a highly learner-centered approach. It is the author's view that to ignore the learner's reason for resisting the learning is to ignore the learner.

Categorizing Resistance

One of the few coherent attempts to bring order to the conceptions of resistance is the typology provided by Atherton (1999). Atherton grouped learning resistance into two types – *situational* and *ulterior*. Situational resistance refers to the more localized and contextualized factors that may cause a learner to resist, (i.e., classroom distractions) while ulterior resistance refers to the type of resistance brought about when an individual learner is prompted to change his or her schema about a given aspect of life. Atherton uses the word *supplantive* to describe learning that requires a significant change of viewpoint (p. 78), but this type of learning is similar to Piaget's (1951) accommodative learning, and on a grander scale, similar to the paradigm shift central to Transformational Learning theories (Illeris, 2007, actually considers Transformative Learning to be an additional level of learning distinct from accommodative learning). This typology provides a great service to those who wish to study learning resistance because it provides a framework for connecting the volumes of work directly or indirectly addressing resistance. Despite its usefulness, it fails to adequately cover all of the different angles from which resistance has been addressed in the literature.

Quigley (1997) likewise made a strong contribution to resistance scholarship when he described three types of resistance derived from his research. He wrote of three different causes of resistance – those who resist because of teachers, those who resist because of the school system, and those who resist because of boredom. A noteworthy strength of Quigley's accounting is that it was empirically rather than theoretically derived, but a limitation of his research-based typology is that it reflected a highly specific learning and learner context (literacy). Thus, while Quigley's typology also contributed to an understanding of resistance, it had a failing similar to Atherton's in that it did not account for the broad range of perspectives from which resistance has been studied.

By closely examining an extensive volume of scholarship from multiple fields addressing learning resistance, and then attempting to make sense of it as a whole, the author has come to see such an attempt at ordering the concept as the single, most effective tool for clearly understanding what has been learned about resistance. This categorization is presented here to the reader, not as an airtight conception, but as a useful frame upon which to understand what has been learned about resistance and what more might be learned.

The interdisciplinary literature provides a detailed accounting of learning resistance that can be arranged into four very broad, and potentially overlapping, categories – *Environmental*; *Cognitive-Psychological*; *Sociocultural;* and *Epistemological* resistance. These categories are based upon the general correlates (potential antecedents) of such resistance rather than the form the resistance happens to take in a given instance. This is an important distinction because resistance manifested in any particular way, in terms of behavioral and learning outcomes, could be the result of very different factors. This particular quality is shared by both Atherton's and Quigley's categories.

Caplin (1969) writes that, an "adequate understanding of resistance demands careful analysis of causes" (p. 37). This statement is as true for those viewing resistance as a negative phenomenon as it is for those holding a positive view, and the following typology can further one's understanding toward that end.

Environmental Resistance: Environmental resistance is resistance that is brought about because of factors in the environment of the learner during or near the specific learning event (localized). Examples of this would be loud and distracting classrooms or classrooms with poorly controlled temperatures. The word *localized* is used here to mean relative to the time of the learning situation. Long-term, systemic problems with the learning environment fall under the other types of learning resistance. While environmental concerns in this context would often have to do with the settings of learning, it could also include immediate life circumstances of the learner, located in close proximity to the learning situation (i.e., an argument with one's spouse just prior to the class). Environmental aspects of resistance are addressed, at least in part, by Atherton (1999) and Brookfield (2006). Environmental resistance has the distinction of the being the easiest to identify and respond to in the classroom.

Cognitive-Psychological Resistance: Cognitive-Psychological resistance is characterized by largely internal factors. It should be noted that the vital influence of the *social* aspects is not denied in this category; rather it is acknowledged and/or assumed, but not focused upon. Cognitive and/or psychological resistance is related to issues of self-efficacy (Bandura, 1986; Schunk, 1995), learned helplessness (Maier & Seligman, 1976), disinterest/boredom (e.g., via discussions of interest; Schraw, Flowerday, & Lehman, 2001; Schraw & Lehman, 2001; Shaw, Caldwell, & Kleiber, 1996), identity (Illeris, 2007, 2011; Torrance, 1949), and overconfidence or presumption (Taylor, 2010; Jarvis, 1992, respectively).

Jenson (1969) connects learner "turn-off" to a lack of readiness, which he defined in terms of both *growth readiness* and *cumulative learning theories* (Gagne, 1965, 1968). These terms and the related theories attached to them center on early childhood and are therefore somewhat limited in scope, when looking at lifelong learning. However, it might be useful to think of a *psychological or emotional readiness* rather than a developmental readiness, when considering adult learners. The author views psychological and emotional readiness as the psychological and emotional ability to be open to learning. There are many reasons why a learner might not be psychologically and emotionally open to learning such as feelings of vulnerability, low self-efficacy, anger, anxiety, and other common emotions.

An examination of the literature reveals that in recent years, cognitively-based approaches have been infrequently utilized to explain resistance within the field of adult education. Even a cursory browsing of the adult education literature reveals that the predominate focus of our field, in terms of learning resistance, has been that of critical theory and social constructionist views of learning (e.g., Giroux, 1983). The third type of learning resistance provided below tends to lean heavily on these foci.

Sociocultural Resistance: Sociocultural resistance – to borrow a term popularly attributed to Vygotskian ideas (Vygotsky, 1978) – refers to learning resistance that has as its source, social or cultural dynamics. Although the theoretical framework for critical theory is drawn from the work of philosophers such as Athusser (1971), Bourdieu (1977), Bowles and Gintes (1976), Giddens (1984), Bernstein (1977), Habermas (2003), and Foucault (2001), one of the more widely-read educational proponents of learning resistance as a vehicle of social change is Giroux (1983, 2001). Giroux's call for *radical pedagogy* continues to echo through the halls of the discipline. Going back much further, those such as Myles Horton (1998) and Paulo Freire (1996) left a strong heritage for those wishing for a more democratic society and more freedom in learning. Quigley's (1997) work mentioned earlier in this paper also falls mostly under this category, as does much of Brookfield's (2005) more recent work, and, in its own way, the work of those writing of transformative learning (i.e., Mezirow & Associates, 2000).

Epistemological Resistance: Epistemological resistance refers to learning resistance caused by a disconnect or mismatch between the learner's and teacher's conception or understanding of (a) what learning is and/or (b) what criteria should be used to evaluate truth claims. An example of both the former and the latter can be taken from a large-scale qualitative study conducted by Paulus et al., (2009) in which undergraduate university students indicated both a confusion about what exactly learning was, and also a variety of impressions about who one should use as a source of authority in competing knowledge claims. On multiple occasions students wrote in blogs that they did not learn anything new and then, almost immediately, moved on to document, in detail, a number of things they learned that they had not previously known. There was also a prevalent theme of disregarding the content the professor had provided in exchange for different information they had been provided from parents, friends, and personal experience.

This type of resistance might also exist in the workplace in cases in which the employees are using quite different criteria for evaluating truth claims than their employers and, by extension, their instructors and trainers (Salaman & Butler, 1990). If, for example, an individual believes that learning is about obtaining a physical skill, the ability to do something, and that individual is placed in a leadership class in which her or she is subjected to a lengthy instructional sequence on some form of leadership competency, the mismatch between the understanding of knowledge between the employee and employer could have significantly negative effects in terms of training efficacy.

The literature is replete with hypothesized causes of learning resistance. While many of these have been included under the specific types as provided above, a general list of those most commonly found in the literature are listed in Table 1.

There is some overlap in the proposed causes listed below, and a closer examination of the literature from which they were culled leads one to suspect that different learning contexts breed different causes of resistance.

Mitigating Learning Resistance

Of course how one chooses to deal with resistance in the classroom depends largely on how one views resistance to learning itself. For those who view it in a positive light, it is to be encouraged, facilitated, perhaps guided, but not discouraged or denied. For our purposes here, the following paragraphs focus on mitigating the negative effects of resistance to learning. This does not render the discussion of positive learning resistance provided here irrelevant because, as noted earlier, even those using critical theory approaches to engender critical awareness in learners, address learner resistance to critical awareness.

Learning Support: Moore (2007) provides six strategies to "promote learning." The first is to increase social learning experiences by promoting peer teaching and group projects. This is encouraged because such social experiences promote group construction of knowledge, allow observational learning, and encourage emulation. Second, instructional methods should be varied in ways that avoid a strictly lecture-based format, and utilize different types of media to aid in the learning process. Third, expectations for student success should also be varied to include more diverse methods of expression such as interpretation of theatrical, dance, musical, or artistic work, and/or the performance of actual work performance in real-world environment. The idea of using theatrical devices for learning has been written about before and has been applied to subjects as traditional as library education (Antonelli, Kempe, & Sidberry, 2000).

Fourth, opportunities should be provided for students to capitalize on their own personal strengths and interests. Fifth, the "overt use of sociocultural situations and methods that provide authentic contexts and enculturation into an academic disciplinary community" is encouraged. (p. 37). Finally, Moore suggests the use of course material that highlights the valuing of diverse cultures, ethnicities, and genders.

Structural Support: Bell, Morrow, and Tastsogloul (1999) view resistance as being based in structural barriers that emphasize the authoritative nature of teaching, and the submissive nature of learning as the passive reception of "objective" knowledge. Because of this, the many possible strategies for mitigating resistance to learning should address some aspect of this negative, authoritarian view of learning.

Behavioral Support: Zuna and McDougall (2004), emphasizing positive behavioral support, provide three approaches for decreasing student resistance in the classroom. They suggest that teachers use research-validated methods for shaping behavioral causes of such resistance,

Table 1. Suggested causes of learning resistance

Cause	Author
Resistance to dominant culture	Giroux, 1983, 2001; Moore, 2007; Ogbu, 1991; McNamee, Atwood, Noddings, & Taylor, 2002
Conflict between old and new learning	Salaman & Butler, 1990
Discomfort due to accommodative learning	Atherton, 1999
Cultural mismatch	Seiler, Tobin, & Sokolic, 2001
Immersion in the learning experience	Moscovici, 2003
Disliking courses, administration, and/or educational system	Atherton, 1999; Quigley, 1997
Lack of interest, disinterest, and boredom	Sun, 1995; Quigley, 1997
Low self-esteem; fear of the unknown; dislike of the teacher; irrelevancy of the material; inappropriate level of required learning	Brookfield, 2006; Quigley, 1997
Development of the personal will; differentiation from others; successful development of personal identity	Caplin, 1969; Rank, 1945; Lecky, 1945
Examination culture in school; mismatch of teacher and learner goals	Jing, 2006
Mismatch between learner's life experience and formal education	Quigley, 1997
Resistance to change study methods and habits	Dembo & Seli, 2004
Failure to "buy in" to learning objectives	Illeris, 2003
Teacher immediacy	Burroughs, Kearney, & Plax, 1989; Burroughs, 2007

utilize more efficient and desirable alternatives to achieve the same outcome that the problematic behavior has been serving, and emphasize "simple antecedent changes to the environment that often [lead] to substantial improvements in behavior" (p. 18). These authors take a decidedly behaviorist approach to mitigating resistance to learning.

Plax, Kearney, McCroskey, and Richmond (1986) have provided a very long list of Behavioral Alteration Techniques (BATs) all of which utilize either verbal control or nonverbal immediacy. Examples of these techniques are *teacher reward*, *peer reward*, *guilt*, and *normative rules*, and others. Teacher immediacy, as previously mentioned has demonstrated in empirical studies an effectiveness in reducing resistance and modifying behaviors (Burroughs, Kearney, & Plax, 1989).

Torrance (1949), writing from a psychological perspective, provided a list of 17different techniques for reducing resistance to learning behaviors and cognitions. Like the above BATs, Torrance's list is also too long to list out in paragraph form, but an example is *creating a permissive, non-blaming objective group atmosphere.*

Instructional Support: Antonelli, Kempe, and Sidberry (2000) recommend using unusual methods for teaching otherwise routine subject matter. The authors propose using "theatrical techniques" such as voice, humor, movement, costume, props, music, and rehearsal (p. 177) to teach course materials, which, in their case, was library instruction. These techniques seem to address situational resistance rather than ulterior resistance, and primarily focus on the facilitator making the class and learning experience more interesting for the learner. It is doubtful as to whether using theatrical methods would have positive effects on more systemic ulterior resistance such as resentment.

Brookfield (2006), who has written about both situational and ulterior resistance (although he did not use that terminology), advises teachers to first evaluate whether or not the learner resistance might, in fact, be justified. To mitigate resistance to learning he suggests that teachers (a) build a case for learning, (b) facilitate learning situations in which those with low confidence or low self-efficacy can experience success early on, and (c) approach all resistance with the understanding that it is a normal part of learning and that students do have the right to resist. Students cannot be forced to learn and any teacher who wants to adequately reduce resistance in his or her classroom must first dispel one-dimensional, exclusively negative views of resistance.

Raney (2003), using the term resistance in the same manner in which Illeris uses the term *resistance potential*, proposes that students learn best when active resistance (what is referred to in this chapter as critical resistance) is involved. He encourages teachers to provoke thinking from students because this thinking will cause them to experience more illumination and to learn how to think on their own. He further claims that "students [are] most likely to retain and appreciate knowledge when it is presented as a thing sought (and fought) for rather than as a morsel to be gulped blindly, baby-bird style." To accomplish this, Raney intentionally assigns reading assignments in his literature class that will disappoint and frustrate the students.

He used an example of a story that did not seem to have a "good" ending in that it did not answer questions arising from the story. The ensuing frustration and resistance on the part of the students created a large amount of conversation, and a strong desire to understand the story and why it was written the way it was.

Interdisciplinary Support: Caplin (1969) calls for an interdisciplinary team approach which would include such specialists as a psychologist, physician, school nurse, social worker, and school teacher. Despite this interdisciplinary approach, Caplin maintains that the "major burden falls upon the teacher, for it is she who usually has the earliest opportunity to identify the symptoms and make significant contribution to the child of setting in motion the action that can free him…" (pp. 38-39). He sets out the following "prescription" for mitigating in-class resistance: children are respected no matter what their level of performance; mistakes do not ever earn ridicule; students are never humiliated; response to errors and inaccuracies is the "earnest effort of the teacher and the class to overcome them;" and one child's gain is never another's loss (p. 39).

Affective Support: Illeris (2003) describes some of the difficulties that low-skilled workers have in relation to increasing their education or engaging in the learning required for a job change. He describes defense behaviors in these workers brought on by job counseling recommendations, and placement in a class, by saying that "they usually thought that the placement in which it had resulted was reasonable enough in spite of everything. However, they still experienced it as placement, and this implied humiliation and a negative attitude, which they felt deeply." The problem in this case, according to Illeris, was that the counseling in question did not continue until the worker had completely "bought into" the idea him or herself. By "placing" the individual in a class, the counselors created a situation in which the workers developed a defensive posture prior to even beginning the learning situation. Facilitating "Buy in" then, is the key to reducing this type of resistance.

Theory-Practice Issues in Curriculum Design and Instructional Practices

So where does this information on learning resistance lead the curriculum designer? It leads toward an understanding that, in a practical sense, learning is not about *acquiring* content, it is about *accepting* content. Teaching then, is not about getting people to know *how* to do something but about getting people to *agree* to actually do it on a prolonged basis. This is simply said, but to embrace this idea requires a significant paradigm shift for the educator and curriculum designer.

Taking into account the holistic nature of learning, the necessity of learner engagement, and the implications of learner resistance, the only effective teaching is teaching that acknowledges these dynamics prior to the actual teaching encounter, studiously analyzes the learner population, and designs resistance mitigation into the curriculum right along with the content. An examination of the literature would seem to indicate that this last statement is a bit non-revelatory. However, an examination of large-scale practice, particularly in the workplace, would indicate that it is, perhaps, the single most overlooked and marginalized principle in the entire practice of curriculum and instructional system design.

At the beginning of the chapter, a disjuncture was pointed out between the theory and practice of curriculum design in terms of the reality of learning resistance, as an educational dynamic. This was attributed to at least three specific factors, all of which will be addressed at length in the following pages. Chief among them is the fallacy of viewing the learner's motivation and engagement as something distinct from the learner's learning. Additionally, the mass production of education via a highly fragmented real-world ISD practice is problematic. Finally, the tendency for assessment to drive the process by which actual learning objectives are chosen in the first place creates a dynamic in which priorities become badly misaligned.

Taking all of this into consideration, the purpose of the latter half of the chapter is twofold. The purpose here is to (1) point out a naturally occurring disjuncture between the curriculum and ISD literature and the practice it seeds, and (2) outline a well-grounded but practicable way forward in course development and instruction via the introduction of some principles for analyzing learner characteristics and using that knowledge to integrate resistance-mitigation directly into the course content.

It has been previously noted that the nature of the problem addressed in this chapter is that of a theory-practice gap. While academic writing generally requires support using academic sources, the very nature of pointing out a theory-practice gap requires that one use information gleaned from years of practical experience in real-world settings. This experience is not easily cited (if citing is possible at all) and so often is left out of scholarship, and this is quite possibly one of the reasons theory-practice gaps exist in the first place. That discussion is outside the scope of this paper but it is important to note that the points made in this section are a confluence of the academic scholarship in curriculum and ISD, and decades of experience in working with institutional and organizational learning environments to address learning resistance. Those experiences have provided a great deal of revelation about the actual practice of curriculum design.

Distinctions between Motivation and Learning

In practical terms, it is fundamentally problematic to view motivation as a phenomenon distinct from human learning. Perhaps more candidly than anyone, Danish Educational Psychologist Knud Illeris has stressed the inadequacy of separating out aspects of a process as distinct objects. He further pointed out the importance of avoiding the tendencies of educational academic fields to use, as a stepping off point, one single aspect of human learning when trying to explain human learning as a whole (2002, 2007, 2011). In keeping with this he identified three overlapping and dialectic dimensions of human learning, the *Cognitive*, the *Social*, and the *Emotional* (2002). He later changed this terminology (2007) to *content*, *incentive*, and *environment*, but his original terminology has been retained here because it requires less exposition. He writes that, "…all learning involves these three dimensions, which must always be considered if an understanding or analysis of a learning situation is to be adequate" (2007, p. 25). This view is entirely consistent with notions such as Vygotsky's (1978) *dialectical development* and Bandura's (1977) *triadic reciprocation*, both foundational frameworks in educational scholarship. Likewise, on the curriculum end of things, it should not escape notice that Illeris's educational triad very closely resembles Tyler's (1949) claim that *subject matter*, *student*, and *society* must all be taken into account in the development of curriculum.

Speaking to motivation, specifically, Illeris claims that the connections between learning and motivation "…can only be separated analytically, as the motivation or drive (for or against or of any other kind) will always be an integrated part of both the learning process and the learning product…" (2003, p. 26). He further writes that:

Even when two persons apparently have learnt the same, they have not if there is a difference of any importance in their motivation. They may be able to immediately answer the same questions correctly and the like. But if learning is driven by an intrinsic motivation it is more resistant to oblivion, and the learning results may be applied in a broader scope of situations and to a bigger extent be involved in new learning, than if the motivation has been extrinsic. (p. 26)

This sort of dichotomizing, referred to in this section, is not entirely uncommon in academics and Illeris has indicated that it is connected in many ways, to the evolution of psychological science. "In my opinion, it is one of the most severe mistakes of psychological research that – in order to be 'really scientific' – it has been inclined to split apart mental constructs which operate in an integrated way" (p. 25).

Motivational theory itself, when taken together, seems to point toward a holistic view of learning. For instance, *Approach* and *Avoidance* goals (Schunk & Zimmerman, 2007) provide a framework by which all human learners are motivated in every learning situation, albeit they may be motivated *not* to learn rather than to learn.

The question must be asked then, what contribution does this tendency to separate motivation from learning make to curriculum design practices? The answer to that question is a simple one. By coming to see the two as distinct (practically, not analytically), practitioners are enabled to (a) focus more on one aspect than on the other, (b) to split responsibility for each of the two allegedly distinct constructs between various persons or divisions within the educational setting as is so commonly done in large-scale curriculum design, and (c) conveniently set aside affective elements when measurement is problematic. The latter two of these form the intersection of this problem with the other two addressed in the following paragraphs.

Curriculum designers and teachers alike cannot afford to view motivation as someone else's problem, or even as their own problem to be handled as a separate event. For instance, in the workplace, there is a common assertion that the punitive steps in place for failing to follow the policies and the procedures sufficiently serves to motivate students to learn what is taught and to do what is learned. Experience does not, however, align with this. Even in higher education it is possible to teach very solid teaching methods in a teacher training course without having even one student (teacher) agree that those methods are useful enough to actually implement.

Unfortunately, the criteria for whether or not these theories were "learned" by the students have to do with the ability of the students to articulate in some way that they are aware of the information, not that they have embraced the information.

This type of thinking is the impetus for a passive form of teaching and facilitating that fails to meet the learner where he or she is and actively work to assist that student toward engagement and openness. Of course the openness suggested here refers to an openness to learn in a given context, not openness in all cases to precisely what is being taught. Even so, it should not be forgotten that all teaching carries an agenda along with it. There is discussion in the literature regarding the ethics of adult education as it becomes enmeshed in workplace training and human resource development and management (see Hatcher & Bowles, 2006, for a discussion on this), and unquestionably there are ethical implications for what a teacher agrees to teach. However, whether it is an attempt to facilitate traditional critical thinking skills, a critical awareness of social justice, or a new company policy, teaching always involves some sort of facilitation, and facilitation by its very nature is engaged in with an end in mind. Interest, motivation, and engagement are not phenomena distinct from human learning that can be introduced at separate occasions and then be blended together into a successful learning outcome concoction.

Curriculum in a Box

The mass production of learning experiences required by very large organizations, government institutions (e.g., military; federal, state, and local governments) and to some extent, educational institutions that are more and more often constricted by accreditation and certification standards, also places a burden on the efficacy and integrity of the curricular process. To be clear, this is not to say that those who are involved in this process have any choice in the matter, nor is it to say that this type of practice cannot be done well, or in the least done more, rather than less well. It is simply to recognize that while this practice is, perhaps, unavoidable in many real-world settings, it does have the potential to lead toward certain flawed outcomes. It is the author's view that the first step in mitigating these flaws is to become deeply aware of their existence and their nature. This chapter, in part, is an effort toward that end.

The reason the mass production of curriculum presents the potential for significant problems in the learning process, is that the very effort of capturing any given content and setting it up in a way in which any given teacher, in some cases, even teachers and instructors without any subject matter knowledge, can present it for any given students, requires that one adopt a view of knowledge (and therefore also of learning and also teaching) similar to what Freire (1996) called "banking education." That is, that knowledge is some static thing that can be packaged and transmitted directly to the brain of the learner via some form of direct instruction.

Additionally, the practice of designing curriculum for very large groups of learners to be taught by a large group (over time) of somewhat generic instructors (those either pressed into service, lacking subject-matter knowledge, or lacking a passion for teaching), largely negates the entire principle of analyzing learner characteristics or learning context, or in the very least renders it more theoretical than actual. The natural division of labor that often occurs in this process requires the curriculum designer to produce a product that a different set of teachers may be teaching, and to rely on some other party to ensure that the teachers are adequately trained to teach the content. This plan may not dictate disaster but it is inherently flawed because it facilitates, and often forces a more reified division of labor that coincides with the problem of separating motivation from learning as a whole, to potentially produce a dynamic in which one group of individuals is responsible for designing the curriculum, another set of individuals is responsible for the teaching, and yet another distinct category of individuals (or organizational structures such as reward and punitive measures) is responsible for motivating the learners. The final result can be a cold, clinical collection of information which is, admittedly, very nicely organized and packaged, being fed with varying levels of skill and acumen, to a group of learners who are presumed to be pre-motivated by some feat of organizational engineering (i.e., policies, rules, punishments, and rewards). Something as integrated and holistic as human learning could have difficulty in this type of structure.

Disinclination to Teach what Cannot be Measured

This is perhaps the most significant and far-reaching problem in curriculum and ISD, both because it has severe outcomes and because it is so firmly rooted in the curriculum process itself. Posner and Rudnitsky (2006) provide a very clear evidentiary statement by saying that, "Evidence is defined as an outward sign; therefore, by definition, evidence of learning must be observable" (p. 199). They go on to say that evaluators should, "look for this evidence in observable student behaviors or observable products of student work" (p. 199).

More specifically, Dick, Carey and Carrie (2009) are quick to emphatically point out that, "…test items must correspond one to one with the performance objectives" (p. 132). This, of course, refers to criterion-referenced tests (CRT). CRT's embody a behavioristic approach to learning in that they expressly measure the ability to "perform specific competencies" (Seels & Glasgow, 1998, p. 83). In their list of steps for developing outcomes and assessments, Cennamo and Kalk (2005) finish up with "develop[ing] assessments for *each* outcome and subskill" (emphasis added) (p. 40). Verduin (1980) says this in a more general way by referring to the "key" as "specify[ing] clear, concise goals for learning and then specify[ing] some *measures* to see if the new behaviors are present after the learning experiences have taken place" (emphasis added) (p. 133).

It must be stressed that the problem here is not with the idea of measurement, in and of itself. Rather the problem arises, in practice, when the requirement for learning objectives to be behaviorally assessed creates a situation in which the assessment itself begins to determine what actually makes it onto the objective list to begin with. Posner and Rudnitsky (2006), a few pages after their strong statement on the necessity of learning evidence being observable student behavior, say, in respect to affective elements of learning, "It may not always be reasonable to expect a person who has learned an affect to supply behavioral evidence of that effect on demand" (p. 203). Dick, Carey and Carey (2009), when referring to the affective aspects of learning write that, "usually there is no direct way to measure a person's attitudes" (p. 135). Glasgow and Seels write that affective objectives are "measured by criterion items that are often voluntary and indirect" (p. 94). The debate regarding the emphasis on behavior objectives is not a new development (for a brief but informative overview, see Ornstein & Behar, 1995), but continues to be largely unresolved and, in the author's experience, almost completely divorced from actual practice. For such a prolific problem, the nature of it is quite simple. The curriculum design process, by a preponderance of the literature, promotes the creation of well-defined learning objectives, the clear connection of objectives to specific assessment measures, and the evidence of curricular and instructional effectiveness via that observable behavior of students.

This chain of expectations, when coupled with the extreme difficulty and impracticable nature of evaluating affective aspects of learning, creates a situation in which no matter what lip-service is paid to addressing the affective elements in curriculum design, the practice of curriculum design will quietly step around the affective. In essence, the mantra, perhaps not spoken quite so plainly, is to "only teach what you can assess." This, on the face of it, seems so common sense that it passes (and is reified in practice) without much notice. It is, however, in the face of real-world practice and what is known about human learning and motivation and most particularly, learner resistance, a misstep of staggering proportion. Taking into account the holistic nature of human learning, the pervasive presence and power of learning resistance, and the ultimate goal of education to bring about long-term change, the mantra should instead be "teach what you must; evaluate what you can."

This measurement factor, taking into account the tendency that separating motivation from learning has toward subsequently separating responsibilities for each, along with the tendency that the mass production of curriculum has on further establishing concrete divisions of labor, combine to produce something of a "perfect storm" for the overall process, which can often (though certainly not always) result in a series of *dis*abling and termin*ated* objectives.

Implications for Curriculum Design

Accepting, as a point of departure, that engaged learning is the only acceptable kind of learning in any educational or training context, and that engaged learning requires that learner resistance be acknowledged and addressed, certain concrete changes need to be made in the way curriculum is designed and implemented. Three of the most noteworthy will be addressed in this section, corresponding with the three dynamics addressed in the previous section.

Human Learning as a Holistic Phenomenon

First, curriculum designers must recognize that the actual content cannot be divorced from the individual learner's perception of it. That is to say that learning is situated (Lave & Wenger, 1991). Therefore, when designing curriculum, content development must occur at all times with regard for the learner's perception of it and potential resistance toward it.

Admittedly, this constructivist view of learning does not entirely mesh with much of the behaviorist curriculum and ISD models extant in the literature. There have, in recent years, been curriculum and ISD models derived from constructivist orientations (R2D2 Model) but it may be that the long history of more mechanistic models has rendered any change in practice nominal. Contributing to this was the curricular design shift in the late 1960's and early 1970's. Atkin (1971) rather strongly identified this by saying, "make no mistake; ["behaviorist objectives people"] have replaced the academicians and the general curriculum theorists…" (p. 369).

To make a significant difference in mitigating learning resistance, content must be engineered and couched in terms that are specific to the perception and situated nature of the learners to which it is to be presented. For instance, in police training, a course on tactical communications could be said to have a certain fixed domain content. However, depending on the circumstances surrounding the event, the training might be perceived by the officers in the course as punishment or reward. Furthermore, the content itself will be perceived as punitive or rewarding. How this "fixed" content is specifically shared with the officers will directly affect its acceptance by those officers.

Curriculum designers should not be permitted to engage in their craft without a comprehensive education in the philosophy and social, physiological, and psychological sciences of human learning. One's philosophy of education is the foundation of every other decision made in curriculum design whether or not that philosophy is explicit. While there are those who admit to enjoying philosophy and those who claim to eschew it, everyone possesses "one" and to possess it without fully exploring it and identifying it is, as Kegan (1994) put it, to be *had* by one's beliefs rather than to *have* them.

In much the same way, one's understanding of the social, physical, and psychological sciences always drives all the higher-level decisions, which include all aspects of the standard curricular and ISD models. Whether explicit or not; whether accurate or not; our understanding of these realities dictate all of our moves in this arena. As such, Curriculum designers should be required to have a comprehensive understanding of all of these disciplines as they relate to human learning. Again, while this may seem to be rather intuitive, it is very often not the case in real-world practice.

Since so many curricular and ISD models are based on behaviorist or neo-behaviorist frameworks, or at least in practice still bear out the effects of those frameworks, a solid understanding of human cognition and the effects of social learning could serve to balance the inherent weaknesses of the accurate but limited explanatory power of behaviorist learning models.

Of special significance, as noted in this chapter, is the need for designers to be thoroughly educated in the area of learning resistance, and more broadly, affective aspects of human learning. Rather than be the peripheral footnote they so often are (at least in practice) they need to be seen as the *driving force* of all learning. It needs to be understood that motivation and learning are inseparable and that to learn something, at least the type of learning that seems to be desired, is more than knowing something; it is accepting something. By extension, therefore, teaching is more than getting someone to know something; it is getting someone to accept something. This can sound crass when put this way, but it is important to speak frankly about it because it is the crux of a very important matter. The idea of the curriculum designer and teacher having an agenda is just a basic truth that does not conflict with even the views of social justice-oriented critical pedagogy, since at the heart of critical pedagogy is a desire for the learner to think critically, and, as an example, "….it is important that the ground be properly prepared by teachers' building the best case they can as to why critical thinking is important" (Brookfield, 2012, p. 81). Even in these cases, a teacher is trying to express not only the content of the course (critical thinking) but that the content has merit and should be embraced to some degree.

Designing and Teaching as an Integrated Whole

Second, the delivery of the content, that is, the actual teaching/training element, also cannot be divorced from the curriculum design process. Once one comes to accept that the actual content of the curriculum, presumably the most static of the parts, must be engineered with the learner's perceptions in mind, it is an easy and logical step to accept that the actual teaching of the material also cannot be a distinct and independent piece of the curriculum design process. The theoretical sound of this gains an operational clarity as soon as one examines standard practice on how instructors/trainers/teachers are selected and trained.

While there are doubtless exceptions, the author's exposure to training organizations all across the United States has revealed some very similar dynamics. Instructors are very often pressed into service either under the "other duties as assigned" clause, because of an urgent need, to provide a job for someone whose position was just eliminated, or because of some routine (but random) organizational rotation of personnel. The fact that many of these situations may arise out of well-intentioned plans or policies, does not in the least mitigate the negative affect the practice has in educational terms.

Based on the affective nature of learning and learning resistance, as a real-world dynamic, what the content is and how it is designed, cannot be effectively divorced from how it is taught. The fragmented nature of the overall curriculum and ISD process, further exacerbated by the systemic features of everyday, contemporary working life, result in a gulf between the design of the curriculum, and the actual facilitation involved in having the students learn the material. The proposed solution is to take teaching seriously and see it as more than the idle transmission of pre-packaged content to a group of passive learners who are presupposed to be naturally engaged.

To take teaching seriously, something that is difficult to do without a thorough understanding of the complexities of human learning, organizations and institutions must carefully select teachers and instructors based on merits, not the least of which is a passion for teaching and instructing. Additionally, teachers must be provided comprehensive training in how to teach, and that training must also begin with a fundamental understanding of how human beings learn. Simply put, pre-packaged materials, to include lesson plans, no matter how well done, cannot be assumed to be effective as stand-alone components in an ISD process. Not in theory; not in practice.

Using Assessment as a Subservient Tool

Of all the claims made in this chapter, it is likely that none will be received with quite so much discomfort, and perhaps outrage, than the proposition here that assessment should not be driving the curricular process. The reader should be warned, in fact, that the suggestions made here might well approach heresy (as the author was recently told), and even back as far as the very early 1970's those questioning the behavioristically-driven obsession with measurement were not kindly received. Atkin (1971) wrote that those "who have a few doubts about the effects of the tide [behavioral objectives] had better be prepared to be considered uninitiated and naïve, if not slightly addlepated and antiquarian" (p. 369).

When taking the literature as a whole, a somewhat simple pattern emerges. First, objectives should be set for the course. Second, learners' learning should be assessed to ensure that objectives are being met. Third, objectives should have a type of one-to-one correlation with assessment items or modules.

This leads to what is possibly an unintended consequence. When taking these precepts together, one arrives with a naturally emerging principle that if there is an item that does not appear on the assessment, than it should not appear in the curriculum. This is usually stated the other way around but the implication is bi-directional, to the great misfortune of educational endeavors. It is unfortunate because not every objective is easily measurable, and, to go further, it could be that, in a practical sense, some objectives might not be measureable at all. Atkin (1971) pointed out that it is a "primary flaw" to assume "that those attributes which we can measure are the elements which we consider most important" (p. 374). He goes on to say, "the behavioral analyst seems to assume that for an objective to be worthwhile, we must have methods of observing progress" (p. 374). So what works in the theoretical world might have some serious flaws in the real world. This is borne out in the literature regarding affective aspects which are at best difficult to assess (Dick, Carey, & Carey, 2009), and at worst, lacking tangible evidence (Posner & Rudnitsky, 2006).

The end result of this is that a fundamental aspect of learning (the affective domain) is given lip-service in the most well-known models, but very seldom really given any purchase in the facilitation of learning content. This might work if it were not for what a clear understanding of human learning at large, and learning resistance specifically, mandates – learning that brings about change is learning that includes comprehension *and* acceptance. Acceptance is a product of the affective domain and as such is as important as any other aspect of the entire curriculum and ISD process. Most importantly, it is a vital part of the process that is almost precluded in the practice of curriculum design and implementation because of the need to be able to assess everything that is taught. By teaching what *must* be taught and assessing what *can* be assessed, this problem can be eliminated. Atkin so aptly pointed this out by saying, "worthwhile goals come first, not our progress toward assessing progress on those goals" (1971, p. 374).

In closing this section, it is probably useful to note that this need to assess every objective, which has led to non-assessable objectives being omitted, most likely arose from an understandable but misguided attempt to bring the rules of physical science to bear on a science that is, in fact, physical *and* social *and* psychological. While the merit of scientific principles is, to many, undeniable, it does not necessarily follow that those principles can be applied to all aspects of human life with equal effect. All of the variables that need to be controlled to make curriculum and ISD, and teaching and learning, a completely scientific endeavor, simply cannot be controlled in the non-laboratory setting in which practice always is situated. Curriculum models must move away from the highly reductionist frameworks upon which they are built.

Since suggestions such as those made here are rejected often on the grounds that they herald a shift away from scientific education (a valid concern), it is perhaps a suitable conclusion to this section to include a quote from a more scientific perspective. "All that is counted does not count, and all that counts cannot be counted" (Einstein, 1879-1955, quoted in Tokuhama-Espinosa, 2011, p. 75; also cited in Patton, 2008, p. 420).

CONCLUSION

In order for effective learning to occur, teachers must facilitate learner engagement, and in order to do so, learning resistance has to be conceptually understood, acknowledged, identified, and addressed as a part of the curriculum for any given class, course, or program. To do this effectively, one must take a critical look at the theory-practice gap that exists in curriculum design practices.

The three factors discussed in the latter part of this chapter all come together to form a complex of dynamics, the confluence of which results in a lack of learner engagement in the classroom. First, motivation must be seen as an integrated and inextricable part of human learning, and the resulting confluence creates a dynamic in which all learning is both a matter of understanding content and accepting content. The acceptance part of this process is where the intersection of learning resistance, facilitation, and curriculum and ISD design exists. Effective practice demands that curriculum experts be experts of human learning, course design, and teaching and facilitation whether or not these experts will be engaging in all of these activities themselves. Learning philosophy and the physical, social, and psychological sciences of human learning are the absolute foundation, whether explicit or not, of all other curricular aspects and processes, and as such, must be studied, conceptually understood, and explicitly enumerated by all those who purport to be experts in curricular development.

Second, practitioners must acknowledge certain weaknesses inherent in the mass production of curriculum. Despite the necessity to approach curriculum design in this manner under certain conditions, the process must be seen as an integrated whole, learning must be seen as something more than the reception of static information, and the entire ISD process must be carried out with learner engagement as a primary concern.

Lastly, the difficulty in assessing affective aspects of human learning should not result in their omission, intended or unintended, in any aspects of the curriculum design process, especially in the teaching process. To make this so, there must be a willingness on the part of designers to include and even to emphasize affective objectives that may not appear in the assessment items. The messiness required here reflects the messiness of real life as opposed to the neatly ordered machinations of scientific study. This may be the most difficult to embrace, of all the changes suggested here, but is, nonetheless, the most important if curriculum practices are to be used to facilitate prolonged and meaningful human learning in organizations and institutions. Teach what must be taught, measure what can be measured. As measurement methods are improved over the years, the gap may slowly close, but in the meantime, assessment cannot and must not determine what is actually taught.

REFERENCES

Alatis, J. (1974). *The urge to communicate vs. resistance to learning English as a second language*. Paper presented at the Seventh Annual Conference of the International Association of Teachers of English as a Foreign Language (IATEFL). New York, NY.

Althusser, L. (1969). *For Marx*. New York, NY: Vintage Books.

Antonelli, M., Kembe, J., & Sidberry, G. (2000). & now for something completely different... theatrical techniques for library instruction. *Research Strategies*, *17*, 177-185. doi:10.1016/S0734-3310(00)00045-8

Atherton, J. (1999). Resistance to learning: A discussion based on participants in in-service professional training programmes. *Journal of Vocational Education and Training*, *51*(1), 77–90. doi:10.1080/13636829900200070

Atkin, M. J. (1971). Behavioral objectives in curriculum design: A cautionary note. In M. Kapfer (Ed.), *Behavioral objectives in curriculum development: Selected readings and bibliography* (pp. 368–374). Englewood Cliffs, NJ: Educational Technology Publications.

Bandura, A. (1986). *Social foundations of thought and action: A social cognitive theory*. Englewood Cliffs, NJ: Prentice-Hall.

Bandura, A. (1977). *Social learning theory*. Englewood Cliffs, NJ: Prentice-Hall.

Bell, S., Morrow, M., & Tastsogloul, E. (1999). Teaching in environments of resistance: Toward a critical, feminist, and anti-racist pedagogy. In Rose & Mayberry (Eds.), Meeting the challenge: Innovative feminist pedagogies in action (pp. 23-48). New York, NY: Routledge.

Bernstein, B. (1977). *Class, codes, and control: Towards a theory of educational transmission* (2nd ed., Vol. 3). London, UK: Routledge & Kegan Paul.

Boldt, G. (2006). Resistance, loss, and love in learning to read: A psychoanalytic inquiry. *Research in the Teaching of English*, *40*(3), 272–309.

Bourdieu, P. (1977). *Outline of a theory of practice*. Cambridge, MA: Cambridge University Press. doi:10.1017/CBO9780511812507

Brookfield, S. D. (2005). *The power of critical theory: Liberating adult learning and teaching*. San Francisco, CA: Jossey-Bass.

Brookfield, S. D. (2006). *The skillful teacher: On technique, trust, and responsiveness in the classroom* (2nd ed.). San Francisco, CA: Jossey-Bass.

Brookfield, S. D. (2012). *Developing critical thinkers*. San Francisco, CA: Jossey-Bass.

Bowles, S., & Gintis, H. (1976). *Schooling in capitalist America*. New York, NY: Basic Books.

Burroughs, N. F. (2007). A reinvestigation of the relationship of teacher nonverbal immediacy and student compliance-resistance with learning. *Communication Education*, *56*(4), 453–475. doi:10.1080/03634520701530896

Burroughs, N. F., Kearney, P., & Plax, T. G. (1989). Compliance-resistance in the college classroom. *Communication Education*, *38*, 214–229. doi:10.1080/03634528909378758

Canagarajah, A. S. (1993). Critical ethnography of a Sri Lankan classroom: Ambiguities in opposition to reproduction through ESOL. *TESOL Quarterly*, *22*(2), 601–626. doi:10.2307/3587398

Caplin, M. D. (1969). Resistance to learning. *Peabody Journal of Education*, *47*(1), 36–39. doi:10.1080/01619566909537673

Carr, M., & Claxton, G. (2002). Tracking the development of learning dispositions. *Assessment in Education*, *9*, 9–37. doi:10.1080/09695940220119148

Cennamo, K., & Kalk, D. (2005). *Real world instructional design*. Belmont, CA: Thomson Wadsworth.

Corno, L. (1977). Teacher autonomy and instructional systems. In L. Rubin (Ed.), *Curriculum handbook: Administration and theory* (pp. 234–247). Boston: Allyn and Bacon, Inc.

Cowles, S. L. (2001). *Educating for identity & resistance: Situated learning among the older mennonites*. Paper presented at the 45th Annual Meeting of the Comparative and International Education Society. Washington, DC.

Csikszentmihalyi, M. (1990). *Flow: The psychology of optimal experience*. Grand Rapids, MI: Harper & Row, Publishers.

Dembo, M. H., & Seli, H. P. (2004). Student's resistance to change in learning strategies courses. *Journal of Developmental Education*, *27*(3), 2–11.

Dick, W., Carey, L., & Carey, J. (2009). *The systematic design of instruction* (7th ed.). Upper Saddle River, NJ: Merrill.

Field, J. C., & Olafson, L. J. (1999). Understanding resistance in students at risk. *Canadian Journal of Education*, *24*(1), 70–75. doi:10.2307/1585772

Foucault, M. (2001) Michel Foucault: Fearless speech. Los Angeles, CA: Semiotext (e).

Fredricks, J. A., Blumenfeld, P. C., & Paris, A. H. (2004). School engagement: Potential of the concept, state of the evidence. *Review of Educational Research*, *74*(1), 59–109. doi:10.3102/00346543074001059

Freire, P. (1996). *Pedagogy of the oppressed* (2nd ed.). New York, NY: Penguin.

Gagne, R. M. (1965). *The conditions of learning*. New York, NY: Holt, Rinehart & Winston.

Gagne, R. M. (1968). Contributions of learning to human development. *Psychological Review*, *75*(3), 177–191. doi:10.1037/h0025664 PMID:4874111

Giddens, A. (1984). *The constitution of society: Introduction of the theory of structuration*. Berkeley, CA: University of California Press.

Giroux, H. A. (1983). *Theory and resistance in education: A pedagogy for the opposition*. South Hadley, MA: Bergin & Garvey Publishers, Inc.

Giroux, H. A. (2001). *Theory and resistance in education*. Westport, CT: Bergin & Garvey.

Goodboy, A. K., & Bolkan, S. (2009). College teacher misbehaviors: Direct and indirect effects on student communication behavior and traditional learning outcomes. *Western Journal of Communication*, *73*(2), 204–219. doi:10.1080/10570310902856089

Habermas, J. (2003). *The future of human nature*. Cambridge, MA: Polity.

Hatcher, T., & Bowles, T. (2006). Bridging the gap between human resource development and adult education: Part one, assumptions, definitions, and critiques. *New Horizons in Adult Education and Human Resource Development*, *20*(2), 5–23. doi:10.1002/nha3.10248

Henson, J., & Gilles, C. (2003). Al's story: Overcoming beliefs that inhibit learning. *Language Arts*, *80*(4), 259–267.

Hiemstra, R., & Brockett, R. G. (1994). Resistance to self-direction in learning can be overcome. In R. Hiemstra & R. Brockett (Eds.), *Overcoming resistance to self-direction in adult learning* (pp. 89–92). San Francisco, CA: Jossey-Bass. doi:10.1002/ace.36719946413

Horton, M., Kohl, J., & Kohl, H. (1998). *The long haul: An autobiography*. New York, NY: Teachers College Press.

Illeris, K. (2002). *The three dimensions of learning: Contemporary learning theory in the tension field between the cognitive, emotional and the social*. Malabar, FL: Krieger Publishing Company.

Illeris, K. (2003). Workplace learning and learning theory. *Journal of Workplace Learning*, *15*(4), 167–178. doi:10.1108/13665620310474615

Illeris, K. (2007). *How we learn: Learning and non-learning in school and beyond*. London, UK: Routledge.

Illeris, K. (2011). *The fundamentals of workplace learning: Understanding how people learn in working life*. London, UK: Routledge.

Janas, M., & Boudreaux, M. (1997). Beyond resistance: A functional approach to building a shared agenda. *Reading & Writing Quarterly*, *13*(2), 193–198. doi:10.1080/1057356970130207

Jarvis, P. (1992). *Paradoxes of learning: On becoming an individual in society*. San Francisco, CA: Jossey-Bass.

Jensen, A. R. (1969). Understanding readiness: An occasional paper. [ERIC Clearinghouse on Early Childhood Education.]. *Urbana (Caracas, Venezuela)*, IL.

Jing, H. (2006). Learning resistance in metacognition training? An exploration of mismatches between learner and teacher agendas. *Language Teaching Research*, *10*(1), 95–117. doi:10.1177/136216880601000107

Kegan, R. (1994). *In over our heads: The mental demands of modern life*. Cambridge, MA: Harvard University Press.

Kemp, J. E., Morrison, G. R., & Ross, S. M. (1994). *Designing effective instruction*. New York, NY: Merrill.

Lave, J., & Wenger, E. (1991). *Situated learning: Legitimate peripheral participation*. Cambridge, MA: University of Cambridge Press. doi:10.1017/CBO9780511815355

Lecky, P. (1945). *Self-consistency, a theory of personality*. New York, NY: Island Press.

Little, G.D., & Sanders, S.L. (1990). *Resistance to learning? Student reaction to communicative language teaching*. ERIC, ED319232.

Long, H. B. (1994). Resources related to overcoming resistance to self-direction in learning. In R. Hiemstra & R. Brockett (Eds.), *Overcoming resistance to self-direction in adult learning: New directions for adult and continuing education* (pp. 13–21). San Francisco, CA: Jossey-Bass. doi:10.1002/ace.36719946404

Maier, S. F., & Seligman, M. E. (1976). Learned helplessness: Theory and evidence. *Journal of Experimental Psychology. General*, *105*(1), 3–46. doi:10.1037/0096-3445.105.1.3

Marks, H. M. (2000). Student engagement in instructional activity: Patterns in the elementary, middle and high school years. *American Educational Research Journal*, *37*(1), 153–184. doi:10.3102/00028312037001153

McFarlane, T. A. (2003). *Defining and measuring the love of learning*. (Unpublished doctoral dissertation). University of Colorado at Denver, Denver, CO.

McFarland, D. (2001). Student resistance: How the formal and informal organization of classrooms facilitate everyday forms of student defiance. *American Journal of Sociology*, *107*(3), 612–678. doi:10.1086/338779

McLaughlin, M. L., Cody, M. J., & Robey, C. S. (1980). Situational influences on the selection of strategies to resist compliance-gaining attempts. *Human Communication Research*, *7*(1), 14–36. doi:10.1111/j.1468-2958.1980.tb00548.x

McNamee, K., Atwood, K., Noddings, N., & Taylor, P. C. (2002). Power. In J. Wallace & W. Louden (Eds.), *Dilemmas of science teaching* (pp. 98–111). New York, NY: RoutledgeFalmer.

Mezirow, J. et al. (2000). *Learning as transformation: Critical perspectives on a theory in progress*. San Francisco, CA: Jossey Bass.

Moore, H. A. (2007). Student resistance in sociology classrooms: Tools for learning and teaching. *Sociological Viewpoints*, *23*, 29–44.

Moscovici, H. (2003). The way I see it: Resisting teacher control or canceling the effect of science immersion. *Journal of Research in Science Teaching*, *40*(1), 98–100. doi:10.1002/tea.10062

Ogbu, J. (1991). Cultural diversity and school experience. In C. E. Walsh (Ed.), *Literacy as praxis: Culture, language, and pedagogy* (pp. 25–50). Norwood, NJ: Ablex.

Ornstein, A., & Behar, L. (Eds.). (1995). *Contemporary issues in curriculum*. Boston, MA: Allyn and Bacon.

Patton, M. Q. (2008). *Utilization-focused evaluation*. Thousand Oaks, CA: Sage.

Paulus, T., Evans, K., Halic, O., Lester, J., & Taylor, J. (2009). Knowledge and learning claims in blog conversations: A discourse analysis in social psychology (DASP) perspective. In C. O'Malley, D. Suthers, P. Reimann, & A. Dimitracopoulou (Eds.), *Computer-supported collaborative learning practices: CSCL 2009 conference proceedings* (pp. 93-97). International Society of Learning. Retrieved from http://www.isls.org/cscl2009/CSCL2009ConferenceProceedings.htm

Piaget, J. (1951). *Play, dreams and imitation in childhood*. New York, NY: Norton.

Plax, T. G., Kearney, P., & Richmond, V. P. (1986). Power in the classroom VI: Verbal control strategies, nonverbal immediacy and affective learning. *Communication Education*, *35*, 43–55. doi:10.1080/03634528609388318

Posner, G., & Rudnitsky, A. (2006). *Course design: A guide to curriculum development for teachers* (7th ed.). Boston, MA: Pearson.

Quigley, B. A. (1997). *Rethinking literacy education: The critical need for practice-based change*. San Francisco, CA: Jossey-Bass.

Quintilianus, M. (1972). Extracts from Quintilian's insitutio oratoria. In H. Black, K. Lottich, & D. Seckinger (Eds.), *The great educators: Readings for leaders in education* (pp. 195–228). (W. Smail, Trans.). Chicago, IL: Nelson-Hall.

Quirk, M., Thornbery, E., Power, M., & Samuel, E. (2012). Resilience in learning: A report on action research in a West Midlands primary school. *The Psychology of Education Review*, *36*(2), 46–53.

Raney, D. (2003). Whose authority? Learning and active resistance. *College Teaching*, *51*(3), 86–91. doi:10.1080/87567550309596418

Rank, O. (1945). *Will therapy and truth in reality*. New York, NY: Knopf.

Salaman, G., & Butler, J. (1990). Why managers won't learn. *Management Education and Development*, *21*, 183–191.

Schraw, G., & Lehman, S. (2001). Situational interest: A review of the literature and directions for future research. *Educational Psychology Review*, *13*, 23–52. doi:10.1023/A:1009004801455

Schraw, G., Flowerday, T., & Lehman, S. (2001). Increasing situational interest in the classroom. *Educational Psychology Review*, *13*, 211–224. doi:10.1023/A:1016619705184

Schunk, D. (1995). Self-efficacy and education and instruction. In J. E. Maddux (Ed.), *Self-efficacy, adaptation, and adjustment: Theory, research, and applications* (pp. 281–303). New York, NY: Plenum. doi:10.1007/978-1-4419-6868-5_10

Schunk, D. E., & Zimmerman, B. J. (2007). Competence and control beliefs: Distinguishing the means and ends. In P. A. Alexander & P. H. Winne (Eds.), *Handbook of educational psychology* (2nd ed., pp. 349–367). London, UK: Lawrence Erlbaum Associates.

Seels, B., & Glasgow, Z. (1998). *Making instructional design decisions* (2nd ed.). Columbus, OH: Prentice-Hall.

Seiler, G., Tobin, K., & Sokolic, J. (2001). Design, technology, and science: Sites for learning, resistance, and social reproduction in urban schools. *Journal of Research in Science Teaching*, *38*(7), 746–767. doi:10.1002/tea.1030

Seiler, G., Tobin, K., & Sokolic, J. (2003). Reply: Reconstituting resistance in urban science education. *Journal of Research in Science Teaching*, *40*(1), 101–103. doi:10.1002/tea.10063

Seligman, M. E. (1998). Building human strength: Psychology's forgotten mission. *APA Monitor*, *29*(1), 2.

Shaw, S. M., Caldwell, L. L., & Kleiber, D. A. (1996). Boredom, stress and social control in the daily activities of adolescents. *Journal of Leisure Research*, *28*, 274–292.

Smith, P. L., & Ragan, T. J. (1993). *Instructional design*. New York, NY: Macmillan.

Sun, A. (1995). Development and factor analyses of the student resistance to schooling inventory. *Educational and Psychological Measurement*, *55*(5), 841–849. doi:10.1177/0013164495055005019

Taylor, J. E. (2010). *Resistance to learning in mandatory training contexts: A psychometric approach to measuring resistance and related factors*. (Unpublished doctoral dissertation). University of Tennessee, Knoxville, TN.

Tokuhama-Espinosa, T. (2011). *Mind, brain, and education science: A comprehensive brain-based teaching*. New York, NY: W. W. Norton Company.

Torrance, P. (1949). The phenomenon of resistance in learning. *Journal of Abnormal and Social Psychology*, *45*(4), 592–597. doi:10.1037/h0060966 PMID:14803168

Trowler, V. (2010). *Student engagement literature review*. Heslington, UK: Lancaster University.

Tyler, R. W. (1949). *Basic principles of curriculum and instruction*. Chicago, IL: University of Chicago Press.

Verduin, J. R. (1980). *Curriculum building for adult learning*. Carbondale, IL: Southern Illinois University Press.

Vygotsky, L. S. (1978). *Mind in society: The development of higher psychological processes*. Cambridge, MA: Harvard University Press.

Walberg, H. (1995). Productive teachers: Assessing the knowledge base. In A. C. Ornstein & L. S. Behar (Eds.), *Contemporary issues in curriculum* (pp. 55–69). Boston, MA: Allyn and Bacon.

Wexler, L. M. (2006). Learning resistance: Inupiat and the US bureau of education, 1885-1906—Deconstructing assimilation strategies and implications for today. *Journal of American Indian Education*, *45*(1), 17–34.

Willis, J. (1995). A recursive, reflective instructional design model based on constructivist-interpretivist theory. *Educational Technology*, *35*(6), 6.

Wittich, W., & Schuller, C. (1973). *Instructional technology: Its nature and use* (5th ed.). New York, NY: Harper & Row Publishers, Inc.

Zhang, Q. (2007). Teacher misbehaviors as learning demotivators in college classrooms: A cross-cultural investigation in China, Germany, Japan, and the United States. *Communication Education*, *56*(2), 209–227. doi:10.1080/03634520601110104

Zuna, N., & McDougall, D. (2004). Using positive behavioral support to manage avoidance of academic tasks. *Teaching Exceptional Children*, *37*(1), 18–24.

KEY TERMS AND DEFINITIONS

Learning Engagement: A willingness to mobilize the necessary energies (i.e., physical, emotional, and psychological), for learning in a given learning context.

Learning Resistance: A state in which a learner is not open to learning in a specific learning situation as demonstrated through either active rejection or passive disengagement. This includes both *behaviors* and *cognitions*.

Environmental Resistance: Resistance that is brought about because of factors in the environment of the learner during or near the specific learning event (localized). Examples of this are poor room arrangements, loud learning environments, poor instructional methods, and inter-personal issues in the immediate context.

Cognitive-Psychological Resistance: Resistance is characterized by largely internal factors such as low (or high) self-efficacy, learned helplessness, anxiety, and defense mechanisms.

Sociocultural Resistance: Resistance that has as its source, social or cultural dynamics such as issues concerning marginalization due to race, ethnicity, gender, and sexual preference.

Epistemological Resistance: Resistance caused by a disconnect or mismatch between the learner's and teacher's conception or understanding of (a) what learning is and/or (b) what criteria should be used to evaluate truth claims.

Unidirectional Learning Objectives: Needs-based learning objectives that are determined for a course and are not affected by the organization's and/or institution's capacity to accurately assess them. The underlying philosophy for unidirectional learning objectives is to "teach what must be taught, and assess what can be assessed." While attempts to measure these objectives are expedient, any shortcomings of assessment will not result in the objectives being removed from the curriculum.

This work was previously published in Andragogical and Pedagogical Methods for Curriculum and Program Development edited by Victor C. X. Wang and Valerie C. Bryan, pages 55-80, copyright year 2014 by Information Science Reference (an imprint of IGI Global).

Chapter 69
Quality Assurance in Transnational Education Management:
The Developmental "Global Studies" Curriculum

Gilbert Ahamer
Austrian Academy of Sciences, Austria

ABSTRACT

This chapter deals with quality assessment for interdisciplinary university curricula. As a case study, it analyses the recently established "Global Studies" (GS) developmental curriculum at Graz University, Austria. After reviewing literature on concepts of quality for curricula, key concepts for multi-disciplinarity, inter-disciplinarity, and trans-disciplinarity, approaches for their monitoring, and necessary ingredients for multi-paradigmatic inputs, processes, and outputs, this chapter applies these criteria to the ethically and globalization-oriented curriculum Global Studies at Graz University, Austria. A practical set of criteria assessing quality in curricula and in courses is identified, a list of assessment exercises that have been performed so far is provided, and assessment of academic performance and suggestions for future improvements are given. Recommendations focus on the implementation of inter-paradigmatic mutual understanding and include setting up a regular, peer-oriented discourse among all stakeholders and founders of the curriculum and the inclusion of expertise into the curricula commission. All such concrete measures shall underpin the key capability of inter-paradigmatic studies, namely to see complex phenomena as perceived by other stakeholders, friend or foe.

INTRODUCTION

The worldwide integration of higher education, curricula and their quality criteria, as well as practice in international projects and experiences in academic education didactics, suggest the necessity for transnational collaboration among universities such as clarification of success criteria and subsequently possibly even joint degrees. Higher education management involves gover-

DOI: 10.4018/978-1-4666-8246-7.ch069

nance, self-responsibility and courageous steps in quality assessment that may also be inspired by cutting-edge cases of already implemented developmental curricula that target ethical questions of globalization.

This paper has a double target:

1. Explain and analyze the necessity for Quality Assessment (QA) of curricula, especially in so-called trans-disciplinary, inter-professional and multi-paradigmatic cases such as developmental and Global Studies (GS); followed by assessment strategies proposed in literature.
2. Undertake to measure practice of GS against (1) GS curriculum, (2) international practice, (3) feedback received to date.

As a basis for writing and contextualizing, this paper dwells on both

1. A theoretical literature analysis that scanned ~1000 peer reviewed articles (making use of the Scopus literature reference system) of which ~100 were taken into consideration and ~10 considered as very suitable (among which are Aboelela et al. 2007, Brennan & Shah 2000, Lantis 2004, Fischer et al. 2011, Lattuca et al. 2004, McFadden et al. 2011, Peterson & Wittstrom 2011, Ried 2011, Spelt et al. 2009, Wagner et al. 2011)[1].
2. The concrete involvement and practical experience of the author, in co-founding and implementing the GS curriculum at Graz University and lecturing in practically all courses established specifically for GS, as well as in other inter-paradigmatic curricula.

WHY QA FOR CURRICULA?

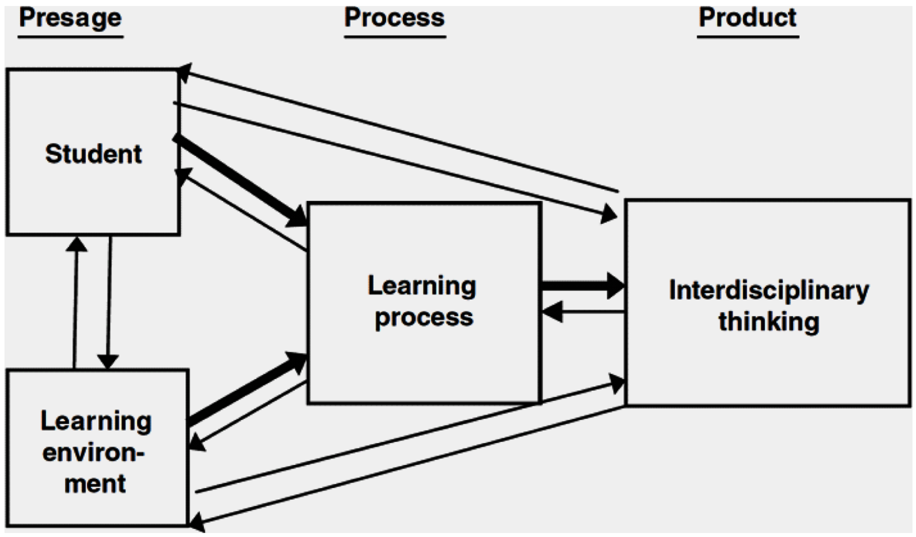
The importance of Quality Assessment (QA) during curricula development and subsequent regular quality improvement is widely debated and confirmed in literature for all modes of education (Bernhard 2011a, 2011b; 2012a, 2012b), on both national and supranational levels. On OECD level, various initiatives attempt to strengthen cross-country compatibility of education management and QA—e.g., IHME (2012), AHELO (2012), IHERD (2012)—often promoted via large international conferences.

Reeves et al. (2012) and Vilgats and Heidmets (2011) provide an overview of key developments in the past three decades. In particular, medical and health care studies already have a long tradition in QA, for which Simmons and Wagner (2009) find that "although inter-professional education and continuing inter-professional education are becoming established activities…, assessment of learners continues to be limited." The present paper, however, includes such initiatives of learner-centered assessment, e.g. undertaken by Bader and Zotter (2012).

The necessary broad scope of assessment for inter-professional education and scholarship is highlighted by Reeves (2009) who names seven key trends leading to higher quality: "conceptual clarity, quality, safety, technology, assessment of learning, faculty development, and theory". Evidently, QA is more than merely counting the impact points of lecturers or the political honors of administrators. Grossman et al. (2001) propose a collaborative model of teacher community in the workplace based on mutual respect and professional criteria-orientation: such is ultimately demanded here also, both as a general recommendation and for the case study of GS after literature and bibliometric analyses.

The mentioned extensive literature analysis of hundreds of peer-reviewed papers brought the review framework for interdisciplinary and trans - disciplinary curricula taken from Biggs (1993, 2003), and cited in Spelt et al., 2009 (Figure 1) that embraces input, process and output (from left to right) as suggested by practically all the in-depth papers analyzed. For quality learning at university, Biggs (2003) "analyzes the nature

Figure 1. Conceptual review framework for interdisciplinary curricula, also applicable to trans-disciplinary and multi-paradigmatic curricula. Source: Spelt et al. (2009, p. 368), adapted from Biggs (2003), compatible with Brennan and Shah (2000, p. 335), and closely resembling the working model suggested by Wagner et al. (2011, p. 17).



of good teaching and provides a framework for reflective practice". He" proposes the 'constructive alignment' model whereby the curriculum, teaching method assessment procedures and general institutional environment should all be in alignment with the societally desired output to promote deep learning.

Inspiringly, Figure 1 simultaneously combines the perspectives and perceptions from three different roles of co-citizens: studying, teaching/training, and working in practice (from left to right). Their collective views on higher education provide the full picture.

What is Quality in Curricula and in Higher Education?

Necessity and Effect of QA in Higher Education

A study by Brennan and Shah (2000) on QA and institutional change based on experiences from 14 countries "presents a conceptual model of institutional change in higher education implied by quality management.…" The programme for Institutional Management in Higher Education (IMHE) of the Organization for Economic Co-Operation and Development (OECD) has sponsored a project entitled 'Quality Management, Quality Assessment, and the Decision-Making Process' that considers the impact of quality assessment in terms of

- Rewards/Incentives
- Policies/Structures
- Cultures of institutions

Evidently, any successful quality management approach in higher education should not neglect to follow *all three* paths; especially the latter two institutional and corporate culture ones. A refreshingly sober and realistic outlook should provide a promising start:

Drawing on the work of the sociologist Max Weber, Finch (1997: 152-153) has drawn a distinction *between 'naked power' and 'legitimate authority' with regard to decision-making in higher education. (…) What was necessary was the conversion of naked power into legitimate authority. (…) Legitimacy in higher education is commonly thought to be achieved through adherence to values and standards which are a part of the cultures of academic disciplines (Finch 1997), i.e. a reasonably clear collective understanding between academics in a given discipline that a particular piece of work counts as good and something else as less good. (…) Thus, for Finch, the role of peer review is central to the achievement of legitimacy for quality assessment processes and the decisions reached on the basis of them. (Brennan & Shah 2000: 347).*

Brennan et al. (1994) refers:

To the 'moral' authority of peers in contrast to the 'bureaucratic' authority of quality [i.e. administrative] bodies. This is why virtually all quality bodies make peer review a central part of their assessment processes. (…) We conclude, therefore, that the introduction of external quality assessment systems in most European countries, as well as in many other parts of the world, over the past decade has been associated with a shift in the distribution of power within higher education.

The author of the present paper is very keen to emphasize the importance of peer review and a spirit of partnership, whilst at the same time being oriented on previously jointly agreed and common criteria for academic quality as well as didactics and pedagogy. This aspect of power relation analysis (Fischer & Hödl 2007) will be addressed during bibliographic analysis (see section Applying bibliographic criteria to GS).

In the same vein, Rowlands (2012) diagnoses the shifting roles and self-conceptions of university senates more towards peer review and audit-driven accountability mechanisms. On the other hand, Harvey and Williams (2010) critically analyze fifteen years of (traditional) QA in higher education: internal quality assurance with assessments of the impact of quality assurance brought improvements in learning and teaching to a varying degree:

Quality assurance has become an international concern and procedures have become increasingly standardized across national boundaries. Significantly, the consumerist approach to higher education quality that is driven by governments and senior management, has not met with enthusiasm (…) and there appears to be a strong commitment to autonomy and academic freedom. However, (…) academia is prone to inertia and compliant indifference. Ultimately, (…) it is still not clear that, even after 15 years, quality assurance systems have really enhanced higher education.

As one possible approach in this dilemma, Stensaker (2003) highlights the *structural importance of organizational change*, entitled "Trance, Transparency, and Transformation: The impact of external quality monitoring on higher education". He discusses

The impact of External Quality Monitoring (EQM) on higher education, and identifies areas in higher education where changes have taken place as a result of such external initiatives. Of special interest is the question whether quality improvement actually is the result of the many EQM systems implemented. By interpreting available data an ambiguous answer is provided, highlighting some of the typical side-effects of current EQM systems at the institutional level. The paper argues that lack of effects directly related to quality improvement should not be conceived as an EQM design error alone but as a misconception of how organizational change actually takes place. In the conclusion, it is claimed that a more dynamic view on how organizations change, highlighting the responsibility of the institutional leadership *as 'translators of meaning', may contribute to a more useful process.*

Carr et al. (2005) investigate the influence of external quality audits (EQA) on university performance and find that "evaluations have a stronger foundation when the combined effects of university governance, management initiatives and government initiatives are examined together with EQA."

QA for Global Developmental Studies: Discourse as Procedural Strategy for Quality

Curricula on global and developmental studies (Schuurman 1993; Bernstein 1973, Fischer2009) necessitate especially high levels of both disciplinary and interdisciplinary academic quality (Ahamer 2011, 2012; Ahamer et al. 2011). Given their complex fact base and epistemological landscape, such curricula require a wider range of quality criteria than do curricula of a purely disciplinary nature, given the inapplicability of any concept of "absolute truth" in multi-stakeholder and multi-perspectivistic issues in the framework of global change. Hence, global developmental studies constitute the cutting edge of academia in this respect.

A very elucidating paper on ethics and foreign policy was written by an American educator who had students discuss contemporary issues of conflict resolution (e.g. Kosovo, Iraq) while using structured debate with preparative essay writing (Lantis 2004). Gorton and Havercroft (2012) successfully use historical simulations and Socratic debates to teach political theories. Haller and Ressler (2006) studied the meanings and interrelationships of national and European identity as well as cultural identities in the face of globalization (Haller & Ressler, 2007). Osborne (2005) argues that the use of debate in a core world history course can foster both authentic learning in the discipline and progress toward intellectual and ethical maturity. In fact, academic culture in general is a culture of argumentation, and democracies are societies in which debate is central. Yet such a criteria-based culture of argumentation and peer review might be initially alien to most students and even lecturers who have grown up in a culture of personal loyalties.

Thus, any QA has to take the dialogic element of debate and discourse into account. Web based discourse in GS is described by (Ahamer 2012).

As a consequence, the concept of quality in higher education is shifted from "suitable content" (i.e. truths that can be learned) towards "suitable processes" and constructed consensus (Ahamer 2005, 2006) in multi-stakeholder issues such as global development. A didactic approach using dialogic, debate-oriented, and collaborative learning and inquiry (Becher & Trowler, 2001) shows more promise than in a purely disciplinary science.

Debate as an instrument (Doody & Condon 2012) and the power of in-class debates leads stakeholders to change their roles (Kennedy 2009). Omelicheva & Avdeyeva (2008) tested the effectiveness of traditional versus active learning methods of debate for teaching graduate students (Moody-Corbett 1996).Koklanaris et al. (2008) propose debate preparation and participation as an active, effective learning tool; Gokhale (1995) finds that collaborative learning enhances critical thinking – even in technological education. Crone (1997) used panel debates to increase student involvement in an introductory sociology class. Healey (2012), convinced by the power of debate, reflects on the potential of debates for engaging students in critical thinking about controversial geographical topics. Rocca (2010) provides an extended literature review on student participation in the college classroom.

Personal cooperation is an essential strategy: Wuchty et al. (2007) and Grossmann et al. (2001) highlight the increasing dominance of teams in the production of knowledge. Vanasupa et al. (2012) reflect on cases of faculty members' failure to collaborate as the main challenges in trans-disciplinary projects. Baba et al. (2004) studies the efficacy of globally distributed teams as vehicles for knowledge sharing. Cant and Kulik (2009) emphasized the necessary targets and ethics in university teaching when developing and implementing an ethical decision-making framework for an integrated business curriculum. For peace education and international economics, Kumpfmüller (2007, 2009) utilizes decades of professional experience in team building, continuing inter-professional education and andragogy and, after consistently excellent student feedback, was nominated by GS students for the university's lecturer prize recently (GS site 2010).

Structural Strategies for Quality in Interdisciplinary Curricula

Interdisciplinary and intercultural education needs structural and organizational transformation strategies because traditionally discipline-oriented hierarchies are not always appropriate to cope with the issues of globalization. Braun & Schubert (2007) surveyed the growth of research on inter- and multi-disciplinarity within scientific and social science papers. Spelt et al. (2009), in an intriguing paper, systematically reviewed teaching and learning in interdisciplinary higher education.

Lattuca et al. (2012) identified "eight dimensions of interdisciplinary competence that emerged from [their] extensive literature review:

1. Awareness of disciplinarity
2. Appreciation of disciplinary perspectives
3. Appreciation of non-disciplinary perspectives
4. Recognition of disciplinary limitations
5. Interdisciplinary evaluation
6. Ability to find common ground
7. Reflexivity
8. Integrative skill."

Lattuca et al. (2004: 35) ask if inter-disciplinarity promotes learning in higher education. "Constructing meaning in the classroom," they argued, "means developing multiple perspectives and demonstrated young adults' increasing capacity to contend with and choose among multiple perspectives." A very practical example, comparable with the author's edited reports on practicals in environmental systems science (USW 2012; Ahamer 2005), is that of Lattuca et al. (2004: 36), with their report on an interdisciplinary lecturer:

He presents a broad set of ideas across various disciplines and fields. During the first week of the course, he provided an overview of ecosystems and introduced questions about human nature and culture. In the next week, the discussion turned to classical economic concepts, like markets, and how these impact on the environment. Once that background was laid, the class considered problems like energy use and alternative energy, pollution of water and air, agriculture, and food supplies. The focus was on quantitative analysis and technical issues, which the instructor juxtaposed against the philosophical foundations laid in the first week of the course. In the next section of the course, students scrutinized developed and developing nations and discussed issues like sustainable development, industrialization, alternatives to industrialization, and demography. Finally, the course moved to an examination of politics, geopolitics, and policy.

The questions proposed (Lattuca et al. 2004: 36)"focus on how interdisciplinary courses and the instruction practiced by instructors in these courses might (a) forge connections to students' prior knowledge and experience; (b) assist students in developing complex understandings in particular subject areas; (c) promote the development of sophisticated views of knowledge and learning; (d) influence thinking skills; (e) build students' capacity to recognize, evaluate, and use differing (multiple) perspectives; (f) engage student interest and increase motivation; and (g) enact constructivist and active learning strategies."

Interdisciplinary strategies act as transformative change in higher education (Holley 2009). For successful reorganization, she poses "two research questions: 1) For this subset of inter-paradigmatic curricula, what change strategies are utilized by administrators to support interdisciplinary work on campus? 2) To what extent does the effort to facilitate interdisciplinary change extend across the institution?" and provides a table with answers for the following strategies (p. 337): Senior administrative support, collaborative leadership, flexible vision, faculty/staff development, and visible action.

Earlier examples of administrative reorganization at Graz University include the concept of the "interfaculty basic module" (Ressler 2007) and the successful generation of an interfaculty curriculum "Environmental Systems Sciences" (USW 2012) a decade ago; also the developmental curriculum "International Development (IE 2012; Fischer & Hödl 2007) at Vienna University. Organizational strengthening was also provided by a joint position paper on GS (2012).

Qualities in Inter-Disciplinarity

Even if it may not be necessary to consider interdisciplinarity as a target in itself, the fundamental argument is that reality as such is not limited to any of the disciplinary lenses institutionalized at universities and hence needs the critical evaluation of expert opinions (i.e. of such opinions that consider themselves to have sufficient expertise). Real-life problems are ill-structured problems without single clear answers (Lattuca et al., 2004, p. 33) but demand multiple and balancing paradigms for understanding. The more the learning paradigm advances from behaviorist to cognitive and constructivist (Ahamer, 2010), the more self-responsible learning strategies become appropriate (Lattuca et al., 2004: 35):

Reflecting on 25 years of research on college students' epistemological beliefs, Michael Paulsen and Charles Wells (1998: 367) noted that studies have consistently found that 'as students advance in their coursework and experience other aspects of the academic environment over the years of college (and graduate school), they develop more sophisticated epistemological beliefs'. Most studies of epistemological development owe a debt to William Perry (1968) who theorized that in late adolescence individuals move through several different views of knowledge; they progress from simplistic views (things are right or wrong, good or bad, true or false; knowledge comes from authorities) to multifaceted ones (there are multiple opinions and perspectives in the world).

Definitions for Varying Degrees of Inter-Disciplinarity

All too often a curriculum is called interdisciplinary when it is actually multi-disciplinary: Multiple perspectives are presented without any support for the integration of disciplinary knowledge throughout the curriculum.… In addition, curricula that aim to develop interdisciplinary thinking on a broad scale are likely to experience more difficulties than curricula that aim to develop interdisciplinary thinking on a narrow scale" (Spelt et al. 2009: 366).

Motivated by the above introduction that clearly highlights the confusion of concepts, and given the strategic importance of inter-disciplinarity that has long since gained credibility in science, we adopt suitable definitions, concepts and implementations of inter-disciplinarity in literature and practice. What is inter-disciplinarity? First is presented a clear definition of the three key concepts in growing degree of integration (Table 1).

According to Klein (2008) and Wagner et al. (2011: 15), this "most widely used schema for defining interdisciplinary research (IDR) (i.e. the three definitions in Table 1: multidisciplinary, interdisciplinary, trans-disciplinary) derives from a typology presented at the first international con-

Table 1. Definitions of key terms used in most literature: multi-, inter-, trans-disciplinarity. Sources: Wagner et al. (2011, p. 16) and Stokols et al. (2003), adapted.

Multi-	disciplinary approaches juxtapose disciplinary/professional perspectives, adding breadth and available knowledge, information, and methods. They speak as separate voices, in encyclopedic alignment, an ad hoc mix, or a mélange. Disciplinary elements retain their original identity. In short, the multidisciplinary research product is no more and no less than the simple sum of its parts
Inter-	disciplinary approaches integrate separate disciplinary data, methods, tools, concepts, and theories in order to create a holistic view or common understanding of a complex issue, question, or problem. The critical indicators of interdisciplinarity in research include evidence that the integrative synthesis is different from, and greater than, the sum of its parts.
Trans-	disciplinary approaches are comprehensive frameworks that transcend the narrow scope of disciplinary worldviews through an overarching synthesis. More recently, the term has also connoted a new mode of knowledge production that draws on expertise from a wider range of organizations, and collaborative partnerships for (social, economic, environmental)sustainability that integrate research from different disciplines with the knowledge of stakeholders in society. Here too, the transdisciplinary product is greater than the sum of its parts, though the scope of the overall effort is more comprehensive and the parts may be more diverse.

ference on interdisciplinary research and teaching in 1970." These definitions encompass a new way of knowing that grows out of shifts in:

- Epistemics
- Institutional structure
- Culture

For Klein (1996), inter-disciplinarity is *"notable for conflicting meaning"*. The author looks back on decades of tedious university experiences that indeed corroborate such theorizing.

Table 2 splits up single characteristics for the above three degrees of integration. It includes in the 3rd column the importance of the "paradigm" (i.e. thinking model) being utilized; the 4th column hints towards a spectrum of the social behavior of scientists that might range from using the same coffee machine to actually working together, and the relevance of the 5th column will become apparent when interpreting bibliometric results in section Applying bibliographic criteria to GS. The importance of true "translation" of meaning (Wolf 2011) is referred to in the last grid cell below right.

In Which Sectors Inter-Disciplinarity Emerges First: An Evolutionist View

When searching for consistent and pioneering analysis of inter-disciplinarity, clinical and health sciences assume a leading role (Larson et al. 2011; Gebbie et al. 2008; Peterson and Wittstrom 2011; Ried 2011; McFadden et al. 2011; Kurz 2003). A reason for this observation might of course be a high inclination (or rather pressure) to be innovative in this cutting-edge sector (having the highest impact journals when measuring by sheer ISI impact factors).Also, the leading role of the economic sector "medical and other health services" exhibits an ever increasing GDP share in all world regions, as displayed by the author's Global Change Data Base GCDB (Ahamer 2001; UNSTAT 2003). Figure 2 at top shows time series for the growing share of GDP generated by the medical sectors in eleven world regions.

The GCDB analyzes graphically the global techno-socio-economic trends and (to a certain degree) supports the impression that different regions might be on a similar path during economic evolution. From this perspective, evolutionary leaders are the sectors most prone to inter-disciplinarity, succeeding through high paradigmatic and epistemological interconnectedness (in Ancient Greek language: ἐπιστήμη = episteme = understanding).

Similarly, the economic sector of educational and teaching services shows an increasing trend in its contribution to overall GDP in the economies of all regions (Figure 2 at right).

Whereas in Figure 2 the GDP shares have been displayed as time series for the eleven world

Table 2. Characteristics of multidisciplinary, interdisciplinary, and transdisciplinary research. Source: Aboelela et al. (2007, p. 340).

	Participants/ Discipline	Problem Definition	Research Style	Presentation of Findings
Multidisciplinary	Two or more disciplines	Same question but different paradigm *or* different but related questions	"Parallel play" by individuals	*Separate* publications by participants from each discipline
Interdisciplinary	Two or more distinct academic fields	Described/defined in language of at least two fields, using *multiple models* or intersecting models	Drawn from more than one, with *multiple* data sources and varying analysis of same data	*Shared* publications, with language intelligible to all involved fields
Transdisciplinary	Two or more distinct academic fields	Stated in *new* language or *theory* that is *broader than any one discipline*	Fully *synthesized* methods, may result in new field	Shared publications, probably using at least some new language developed for *translation* across traditional lines

regions defined for the IPCC reports and the Global Energy Assessment (GEA 2012; Ahamer 2013),Figure 3 shows such economic sectors as a function of GDP/capita. At left in Figure 3: such a swarm of countries apparently moving in similar direction indicates that all countries in the world are increasing their efforts to provide community-related, social, and personal services, including the subsectors of medical and educational services mentioned above. At right in Figure 3: framing this service sector within all sectors of the economy shows that these community, social, and personal services grow fastest (together with financial and similar sectors in yellow); this impression is corroborated further when displaying not the shares, but the *growth rates* of these shares in Figure 4. The author's underlying concept of "blossoming evolution" is further explained in Ahamer (2008); countries are considered to move from left to right on the horizontal axes during economic evolution.

To sum up, the contribution of the health sector to overall economic output is continuously growing in all world countries and regions – as does that of the educational sector. As shown in Figure 4 at right, the growth rate of these sectors is highest in already advanced economies which can be interpreted as these activities having a high potential for further (not only economic but presumably also epistemological) strengthening of civilizational achievements and being likely to employ cutting-edge paradigms such as transdisciplinary paradigms.

Cases of Interdisciplinary Collaboration from Health Education and Other Branches

Evidently, according to literature interdisciplinary cooperation is highly necessary among various health and medical disciplines. Larson et al. (2011) build interdisciplinary research models: A didactic course prepares interdisciplinary scholars and their faculty for clinical science. Aboelela et al. (2007: 336)"reviewed 14 definitions of inter-disciplinarity, the characteristics of 42 interdisciplinary research publications from multiple fields of study" employing divergent paradigms of interdisciplinary research, positivist vs. constructivist. Pharo and Bridle (2012: 78) ask if "interdisciplinarity exists behind the façade of traditional disciplines" and require that "interdisciplinary teaching takes into account multiple ways of seeing the world" also in natural resource management teaching.

Figure 2. Time series for share of medical, dental, other health, and veterinary services (top) and educational services (bottom), two out of the approximately 40 sectors of the UN statistical data series (UNSTAT, 2003). Data incompleteness for recent years in several countries is responsible for the only seemingly decreasing trend at the right end of the curves. Source: Global Change Data Base GCDB, Ahamer (2001).

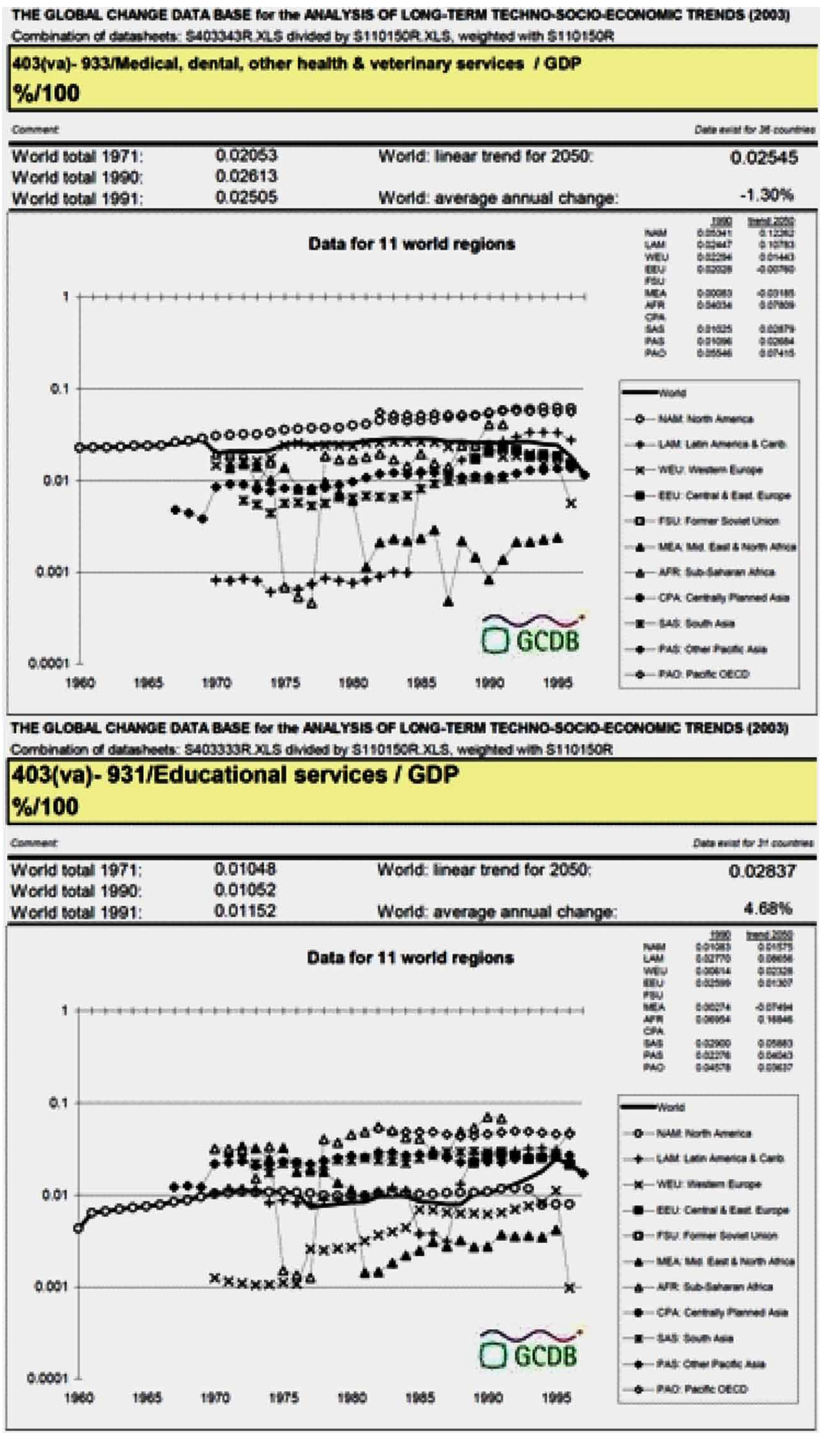


Figure 3. Display of analogous GDP shares for "community, social, and personal services" as a function of the countries' GDP/capita (a proxy for economic development). At left: for all single ~200 countries, at right for eleven world regions in pink, contrasted with the shares for the eight other economic sectors (other colors).GDP/capita values range from 10$/year at far left until 100,000$/year at far right on the horizontal axis.

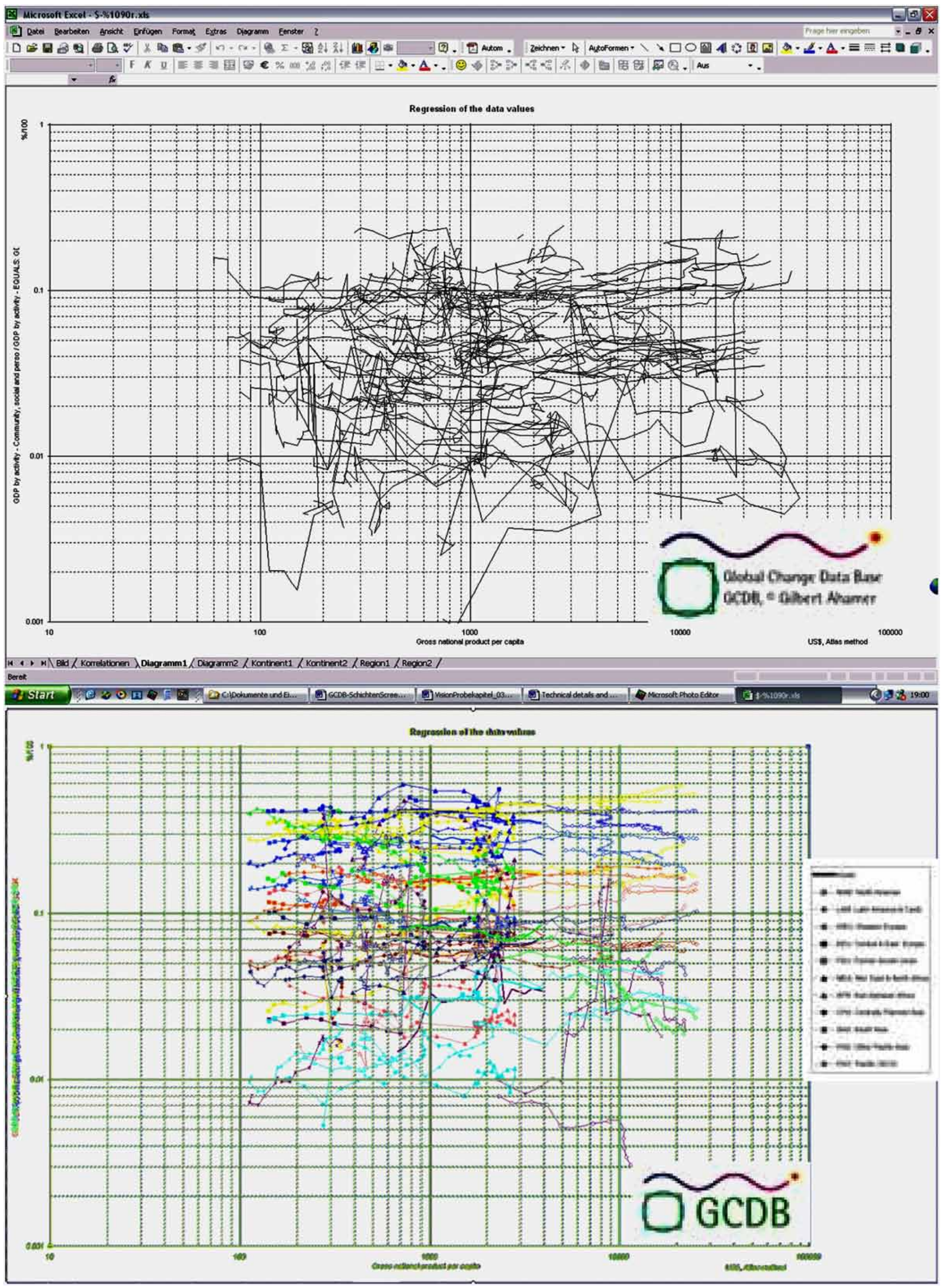
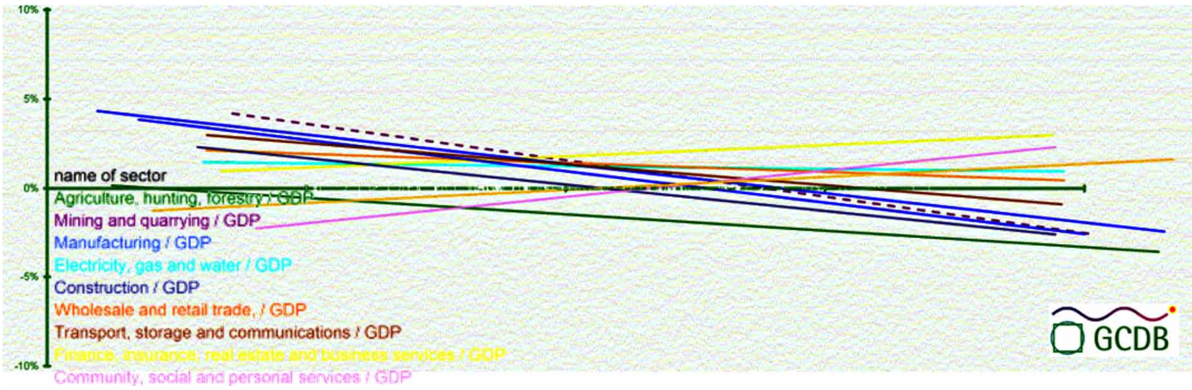


Figure 4. Annual growth rates for share of "community, social, and personal services" as a function of GDP/capita, change rates for the other sectors.



Concepts of inter-disciplinarity for Aram (2004) are *configurations of both knowledge and action*. Nissani (1997) expresses "ten cheers for interdisciplinarity" and claims that his "article presents the only self-contained, comprehensive defense of interdisciplinary knowledge and research." White (1999) uses academic topographies for a network analysis of disciplinarity among communication faculty.

Fischer et al. (2011: 341) review collaboration between the natural and social sciences:

Across disciplines, it became clear that such a community should deal with (1) difference between paradigms in the current sciences; (2) creation of skills and competences of the involved scientists; (3) scarcity of institutions sympathetic to collaborative research; and (4) the internal organization of collaborative projects.

He ranks *mutual esteem* among disciplines highly and analyzes on page 350: "*Lack of respect* may stem from scientists considering their science as the *central* way to discover the truth, and therefore *dominant* in any collaboration".

Interdisciplinary, Intercultural, and Inter-Paradigmatic Modes of Science

The following paragraphs define three "scientific modes" that add to the above, quite common, definitions. In addition to common-sense inter-disciplinarity that uses different (let us call their number "n") disciplinary lenses to look onto and to understand one specific real-world problem (at right in Figure 5, first line in Table 3, and above right in Table 4), the present paper proposes the notion of "interculturality" which shall mean here to take a standpoint of perception (i.e., not a lens) depending on one's own real-world position and involvement in the given real-world problem. An example would be to look on the Nagorno-Karabakh conflict in the Caucasus from an Armenian or Azerbaijani standpoint.

In this sense, "interculturality" means in this text an individual's ability to take several ("m") standpoints (second line in Table 3 and Table 4) that are likely to result in different weighing and assessing of single partial arguments. Other meanings of "culture" in the usual sense (e.g. Wolf 2011) remain of course untouched by the above definition.

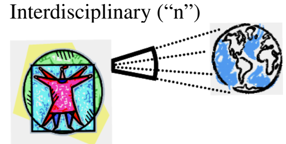
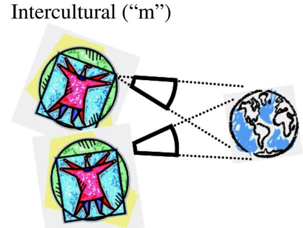
The combination of both inter-disciplinarity ("n") and inter-culturality ("m") in the above-mentioned sense is called "inter-paradigmatic"

Figure 5. The importance of perspectives in developmental and global studies. Perspectives are world-views, symbolized by the person at right, resembling Leonardo da Vinci's human called 'Vitruvian Man.' Looking at realities is graphically symbolized by the looking angle or wedge starting out from the observer and ending at the globe which symbolizes the real-world's global change and globalization. At left: in its academic manifestation, this same entirety is symbolized by the Greek temple with six columns standing for the six modules of the "Global Studies" curriculum at Graz University having six departments; the GS logo is placed on the tympanum.

Table 3. Concise explanation of interdisciplinary, intercultural, and interparadigmatic scientific modes

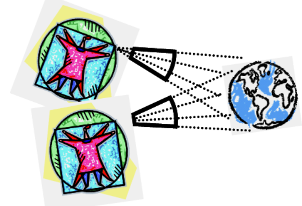
Scientific Mode as Defined Here	Explanation	Likely Substrate of Perception and Cognition
interdisciplinary ("n-fold")	The observer uses n lenses from 1 standpoint to perceive the real world.	**element**
intercultural ("m-fold")	The observer uses 1 lens from m standpoints to perceive the real world.	**interaction**
interparadigmatic ("m×n-fold")	The observer uses n lenses from m standpoints to perceive the real world.	**perspective**

Table 4. Typologies of interdisciplinary research (sources: Aboelela et al., 2007, pp. 337; combined with Pharo & Bridle, 2012, p. 67) compared to science mode definitions of interdisciplinarity, interculturality, and interparadigmatic approach (Ahamer et al., 2011, pp. 17-18)

Degree of Synthesis	Typology	Compares to Science Modes
Least: Disciplinarity	A community of scholars with their own theories, content, methods, history and culture into which members are trained and socialized such that they are able to carry out distinctive intellectual tasks and skills (Becher 1981)	Disciplinary ("1")
Informed disciplinarity	Disciplinary questions may be informed by concepts or theories from another discipline (Lattuca 2001) where they focus primarily on a single discipline but call upon other disciplines to illuminate content (Lattuca et al. 2004)	Interdisciplinary ("n")  "n" facets of viewed facts
Cross-disciplinarity	Variably defined depending on the context; often used to mean informed disciplinarity where a single discipline remains dominant (Lattuca 2001, Davies & Devlin 2007)	
Instrumental interdisciplinarity	Bridge building between fields. Problem-solving activity, does not seek synthesis or fusion of different perspectives (Klein 1996)	
Synthetic disciplinarity	Questions that link disciplines (question either belongs to both or neither disciplines) (Lattuca 2001)	
Moderate: Multidisciplinary	Coexistence of more than one discipline side by side in a way that accumulates knowledge without integration. Connection between disciplines may not be apparent. Often confused with interdisciplinarity (Petrie 1976, Spelt et al. 2009). Teams work in parallel or sequentially from their specific disciplinary base to address a common problem (Rosenfield 1992)	
Synthetic interdisciplinarity	Two or more teachers combine theories, concepts and methods from different disciplines but contributing disciplines remain clearly identifiable, revealing relatively bounded content areas and perhaps distinctive methods of inquiry (Lattuca 2001, Lattuca et al. 2004)	
Interdisciplinary	Integration of two or more disciplines that may range from simple communication of ideas to the mutual integration of organizing concepts and practices in a fairly large field (Klein 1990, Lattuca 2001, Spelt et al. 2009). Teams work jointly but still from a discipline-specific base to address a common problem (Rosenfield 1992)	
Conceptual interdisciplinarity	Explores perspectives on learning from different disciplines and involves critique of the disciplinary theories and methods (Lattuca et al. 2004). Questions without a compelling disciplinary basis (Lattuca 2001)	
Epistemological interdisciplinarity	Restructuring an earlier approach to defining a field (Klein 1996)	
Great: Transdisciplinary	The application of theories, concepts, or methods across disciplines with the intent of developing an overarching synthesis (Lattuca 2001). Focuses on dissolving disciplinary boundaries by focusing on questions that see disciplines as irrelevant. While interdisciplinarity explicitly critiques the disciplines, transdisciplinarity de-emphasizes disciplines (Lattuca 2001, Lattuca et al. 2004, Max-Neef 2005, Vilsmaier, 2011). A movement toward a coherence, unity, and simplicity of knowledge field (Klein 1996).	
Greater		Intercultural ("m")  "m" perspectives by viewing actors

continued on the following page

Table 4. Continued

<table>
<tr><th>Degree of Synthesis</th><th>Typology</th><th>Compares to Science Modes</th></tr>
<tr><td>Greatest:
Including, but beyond inter-, multi-, transdisciplinarity</td><td>
</td><td>Interparadigmatic (“n × m”)

“n” facets of viewed facts × “m” perspectives by viewing actors</td></tr>
</table>

in this text and means a “m×n” combination of both n viewing lenses and m viewing standpoints (second line in Table 3 and at the bottom of Table 4), hence the ability to use diverse paradigms and epistemologies for thinking and assessing realities. According to Lattuca et al. (2004: 35) and Perry (1968), the ability to employ various epistemologies and paradigms increases during individual biography.

As can be seen from the architecture of Figure 5 at left, the curriculum “Global Studies” (and the bundle of electives GS) endeavors to build such combined, inter-paradigmatic view of globalization and global development by including the “cultures of thinking” stemming from (“m”) different cultural positions of students and faculty with the (“n”) lenses of the disciplines history, economics, technology, sociology and culture, and international law as constituting perspectives and essential epistemologies. Figure 5 symbolically proposes the wedge of perception as a cognizable entity.

The evolution of “substrates of cognition” along the three modes is depicted in the right-most column of Table 3: elements – interactions – perspectives. Evidently, any strategy in global politics and developmental cooperation needs to deal with diverging perspectives as substrata of assessment – rather than dealing merely with sheer facts; as does, for example, physics (the author’s initial discipline).

The combined Table 4 emphasizes that the above three modes of science clearly go beyond the degrees of multi-, inter- and trans-disciplinarity that are common in literature: all these three degrees of integration across the disciplines gather within the first mode. However, intercultural thinking and inter-paradigmatic thinking include the position of the *reflective agent* within the self-referenced total of perceiving and influencing global change and globalization. The curriculum of “Global Studies” at Graz University clearly defines an *inter-paradigmatic approach* (GS 2010: 2).

Competencies for Inter-Disciplinarity

After the enlargement of the conceptual framework in the above subchapter, competencies and other requirements identified for inter-disciplinarity in literature are understood to be also applicable to an inter-paradigmatic approach.

The initial definition of inter-disciplinarity includes “the capacity to integrate knowledge and modes of thinking in two or more disciplines to produce cognitive advancement” (Spelt, et al., 2009: 366) and “builds on a performance view of understanding, meaning that individuals understand a concept when they are ready to apply it

Table 5. Core competencies for interdisciplinary research identified in a Delphi survey. Source: Larson et al. (2011, p. 39) and Gebbie et al. (2008).

Major Area	Competencies
Conducting research	• Use theories and methods from multiple disciplines in developing integrated theoretical and research frameworks. • Integrate concepts and methods from multiple disciplines in designing interdisciplinary research protocols. • Investigate hypotheses through interdisciplinary research. • Draft strategies and research proposals in partnership with scholars from other disciplines. • Author publications with scholars from other disciplines.
Communication	• Advocate interdisciplinary research in developing initiatives within a substantive area of study. • Express *respect* for the perspectives of other disciplines. • Read journals outside of his or her discipline. • *Communicate* regularly with scholars from multiple disciplines. • Share research from his or her discipline in language *meaningful* to an interdisciplinary team. • Modify his or her own work or research agenda as a result of interactions with colleagues from fields other than his or her own.
Interacting with others	• Engage colleagues from other disciplines to gain their *perspectives* on research problems. • Interact in training exercises and university lectures with scholars from other disciplines. • Attend scholarly presentations by members of other disciplines. • Collaborate *respectfully* and *equitably* with scholars from other disciplines to develop interdisciplinary research frameworks.

accurately and flexibly in novel situations" (Boix Mansilla, et al., 2000).

As a consequence of the above-mentioned requirements for the increasing levels of interdisciplinarity, Spelt et al. (2009: 366) consider "the ability to *synthesize or integrate* as a beneficial learning outcome of interdisciplinary higher education". As an example, a didactic procedure for such integration was provided by the negotiation game "Surfing Global Change" (Ahamer, 2005, 2006).

Highlighting the importance of perspectives (Table 3 right) as substrata of reasoning and cognizing, Wagner et al. (2011: 16) and Miller and Mansilla (2004) assume a "social process along four phases of increasing integration:

- **Mutual Ignorance:** Of other disciplinary perspectives.
- **Stereotyping:** That may have significant misconceptions about the other's approach
- **Perspective-Taking:** Where individuals can play the role of, sympathize with, and anticipate the other's way of thinking.
- **Merging of Perspectives:** Has been mutually revised to create a new hybrid way of thinking."

Core competencies for interdisciplinary research are listed in Table 5; it notably includes categories such as esteem and respect for other disciplines, and equitable dealing with peer scientists without considering oneself superior to others and their perspectives.

In the framework of the European Neighborhood Partnership Initiative ENPI, the author was instrumental in designing, planning and setting up several 1.2M€ projects, one of them to develop a curriculum for vocational education for agriculture in a difficult multicultural environment (Rosenzweig & Ahamer, 2009). It was particularly interesting to practically observe how respectful partnership and the principle of mutual esteem were essential for the acceptance of any future step during all phases of collaboration.

Table 6. Listing of barriers and opportunities in interdisciplinary science collaboration. Source: Fischer et al. (2001, p. 349), adapted.

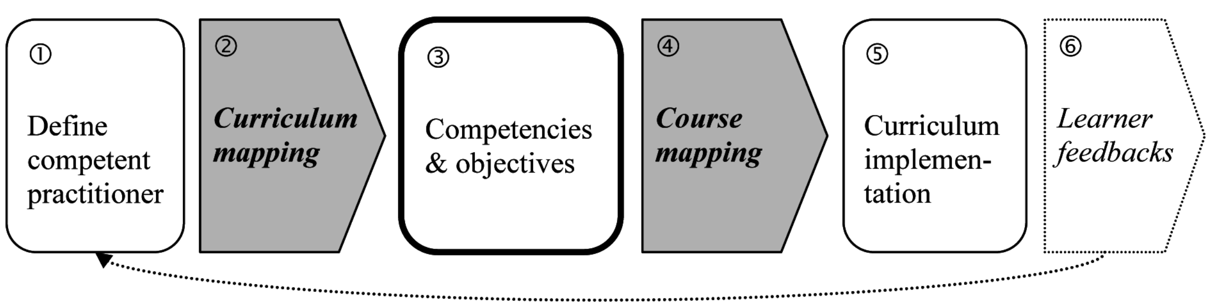
Barriers	Opportunities
Culture and Paradigms in the Sciences	
Fundamental differences between cultures of understanding in branches of science limits the relevance of approaches to be exchanged.	Complementary approaches may provide answers to problems previously outside of the scope of the field.
Make the scientific paradigms the most important aspect of research.	Make the real world goal the most important aspect of research.
Skills and Competences of Scientists	
Mutual misunderstanding of subject-specific jargon.	Select scientists with good interpersonal skills.
Lack of respect.	Select scientists willing to collaborate.
Context of the Research	
Academia is organized along disciplinary lines, making the establishment of collaboration between sciences more difficult than within disciplines.	Creation of interdisciplinary journals with high impact provides collaborative research a podium that is valued in the current evaluation criteria.
Academic institutions reward disciplinary work, and publication in high impact disciplinary journals.	
Tenure track criteria are largely organized along disciplinary lines.	
Evaluation of academic institutions and grant proposals largely follows disciplinary lines.	

Organizational Structures for Inter-Disciplinarity

According to Holley (2009: 337), universities need positive examples of transformational change linked to interdisciplinary initiatives; these can be facilitated by senior administrative support, collaborative leadership, flexible vision, staff development and visible action. Table 6 lists barriers and opportunities for such transformational change.

As a result of the above barriers and opportunities, a regular schedule of meetings among the stakeholders of an initiative such as GS is appropriate, as was implemented by the respectful open meetings of the steering committee GS in earlier years (SC GS 2010).

Figure 6. The continuous quality improvement model proposed by Ried (2011, p. 2), simplified representation along his main path of curriculum mapping and course mapping, including reassessment



How to Measure Quality in Curricula?

Given the above theoretical deliberations on criteria for inter-paradigmatic collaboration in higher education, this chapter proposes concrete methodologies. According to Bath et al. (2004), "it is suitable and indispensable to measure a practical curriculum against its original intentions". In the case of GS, these original and inalienable intentions were cooperatively defined in a peer-oriented process by Kumpfmüller (2007, 2009) and are reiterated in the general introduction of the curriculum (GS 2010: 1-2) and documented as a history of GS in Ahamer et al. (2011: 21-23).

Literature on "quality" as a concept is extremely extensive; one of the early paradigmatic narrative considerations of quality as such was the cult novel by Robert Pirsig (1974) *Zen and the Art of Motorcycle Maintenance: An Inquiry into Values*. Harvey and Green (1993) similarly provide very general criteria: "Quality can be viewed as exception, as perfection, as fitness for purpose, as value for money and as transformative". For quality assurance of (joint) Master programmes, Euro League (2010: 14) suggests to understand quality as follows:

- Quality as compliance with standards.
- Quality as fitness of purpose.
- Quality as fitness for purpose.
- Quality as customer satisfaction.
- Quality as continuous enhancement.

Such includes evaluation of curricula against needs of global real-world complexity and evaluation of the inherited course structure against the curriculum; called curriculum mapping and course mapping, respectively, in literature (Ried 2011, compare Figure 6). Uchiyama and Radin (2009) perceive curriculum mapping in higher education as a vehicle for collaboration. In an older article, English (1978) states that "the efforts of each teacher must be 'mapped', which means the real curriculum being taught in each classroom must be examined and recorded. This mapping can be done by having teachers map their own classroom curricula.... It can also be done by having observers use tools like an observer form for curricular mapping to record what is being taught in the classroom. The results of this mapping must be the beginning point for making the real curriculum fit the desired curriculum."

Cheng and Tam (1997: 24ff) present seven models of quality in education:

1. Goal and specification model
2. Resource-input model
3. Process model
4. Satisfaction model
5. Legitimacy model
6. Absence of problems model
7. Organizational learning model

Cheng (1995) emphasizes the *multidimensional concept of education quality*, which is not easily assessed by only one indicator (in similarity with management literature), as:

Education quality is the character of the set of elements in the input, process, and output of the education system that provides services that completely satisfy both internal and external strategic constituencies by meeting their explicit and implicit expectations.

Cheng and Tam (1997: 23) continue: "the difference in the *choice* of and the emphasis on indicators may *reflect the diverse interests* and expectations among the concerned constituencies and also the different management strategies". Consequently, consensus must be reached on the set of indicators, especially in such a complex case as GS. Regarding QA of Interdisciplinary Scientific Research (ISR), Wagner et al. (2011: 15) are undertaking a very comprehensive study commanded by the US National Science Foundation NSF, a review of the literature in order to consistently understand and measure interdisciplinary scientific research (IDR) and propose while "expanding the inquiry beyond quantitative measures to be inclusive along the following lines:

1. "Measurement of interdisciplinary research should recognize and incorporate *input* (consumption) and *process* value (creation) components as well as *output* (production) [compare the architecture of Figure 1 taking this into account].
2. Interdisciplinary research involves both *social and cognitive* phenomena, and both these phenomena should be reflected in any measure or assessment of interdisciplinarity [hence no limitation to cognitive measures].
3. Assessment of research outputs should be broadened *beyond* those based in *bibliometrics*, [i.e., ISI, Scopus, PoP, see later section of this chapter] while also factoring in differences in granularity and dimensions of measurement and assessment [hence include lecturing, didactics and pedagogy]."

A practical application of such measurement endeavors will be performed in the section "Applying Bibliographic Criteria to GS."

Taking a learner-centered standpoint, Gosling and D'Andrea (2001) suggest that "the quality of students' experience of higher education can more effectively be improved by combining educational development with quality assurance to create a more holistic approach."To reach better learning, van den Akker (2006, 4f) sees design research as important regarding (curriculum and course) design. He suggests interventionist, iterative, process oriented, utility oriented and theory oriented design research.

Methods for QA as a Process

Peterson et al. (2011) propose a course assessment process for curricular quality improvement and Piascik & Bird (2008) strive to create and sustain a culture of assessment. Ried (2011) suggests a model for curricular quality assessment and improvement (Figure 6); all three authors for the case of pharmaceutical education. Prager and Plewe (2009: S47) assess and evaluate GI Science curricula using the Geographic Information Science (GIS) body of knowledge while mentioning the pros and cons of being a completely regulated scientific field. They favor an outcome-based assessment of curricula founded on clear objectives: "in this approach, quality is not judged by conformance but by results". For them, the assessment of outcome sand curricular alignment can be thought of as an ongoing process that addresses four important steps (Suskie, 2004, p. 3):

1. What does the programme expect students to learn? (Desired Student Outcomes)
2. Does the programme give students sufficient opportunities to meet these expectations? (Curriculum Alignment)
3. What have students learned? (Actual Student Outcomes)
4. How can learning be improved through changes in the programme? (Programme Revision)

Such procedural architecture is still sufficiently in line with the process suggested in Figure 1. Ried (2011) discusses each component of his continuous quality improvement model, "including (1) the definition of a competent practitioner, (2) development of the core curricular competencies and course objectives, (3) students' baseline characteristics and educational attainment, (4) implementation of the curriculum, (5) data collection about the students' actual curricular performance, and (6) reassessment of the model and curricular outcomes" (simplified as flow chart in Figure 6).

Prager and Plewe (2009: S50) suggest a model with seven steps for integrated assessment and curriculum evaluation: specify mission and objectives, specify curriculum elements, review objectives and curriculum, assess student learn-

Table 7. Overview of potential sub-skills and conditions for interdisciplinary curricula. Source: Spelt et al. (2009), adapted from Biggs (2003).

Interdisciplinary thinking	Having knowledge	Knowledge of disciplines
		Knowledge of disciplinary paradigms
		Knowledge of interdisciplinarity
	Having skills	Higher-order cognitive skills
		Communication skills
Student	Personal characteristics	Curiosity
		Respect
		Openness
		Patience
		Diligence
		Self-regulation
	Prior experiences	Social
		Educational
Learning environment	Curriculum	Balance between disciplinarity and interdisciplinarity
		Disciplinary knowledge in-/outside courses on interdisciplinarity
	Teacher	Intellectual community focused on interdisciplinarity
		Expertise of teachers on interdisciplinarity
		Consensus on interdisciplinarity
		Team development
		Team teaching
	Pedagogy	Aimed at achieving interdisciplinarity
		Aimed at achieving active learning
		Aimed at achieving collaboration
	Assessment	Of students' intellectual maturation
		Of interdisciplinarity
Learning process	Pattern	Phased with gradual advancement
		Linear
		Iterative
		Milestones with encountering questions
	Learning activities	Aimed at achieving interdisciplinarity
		Aimed at achieving reflection

ing outcomes, verify alignment of objectives and curriculum, verify alignment of student outcomes with objectives and curriculum, and identify revision needs. These seven steps fit roughly into Ried's concept in Figure 6.

For the sub-process "course mapping" in Figure 6, Peterson et al. (2011: 4) propose a tentatively standardized course evaluation form for each lecturer with ten open-ended questions including a variety of perspectives:

1. **Course Policies and Procedures:** Completeness of course syllabi, use of standardized syllabi format, and compliance with policies and procedures.
2. **Course Content and Relationship to Learning Outcomes:** Content and competencies match, learning objectives are addressed.
3. **Integration within the Curriculum:** Appropriate placement within vertical integration, appropriate sequencing and horizontal integration with concurrent courses when appropriate.
4. **Skills:** Identifies that knowledge and skills are developed, practiced, and assessed.
5. **Student Assessment:** Types and number of assessments linked to learning objectives, student performance, and advancement.
6. **Course Coordinator Performance Review:** Course management skills.
7. **Summary of Individual Faculty Teaching Reviews:** Summarized from teaching evaluation forms and student instructor evaluations.
8. **Recommendations:** Specific recommendations and suggested changes for course improvement.
9. **Active Learning:** Describe active-learning techniques observed.
10. **Key Assessments and Key Artifacts:** Specific examinations or learning activities that serve as a demonstration of competency.

The implementation of the above-mentioned processes of QA (and of any sustainable QA) that is to be accepted by those involved requires a "spirit of cooperation, mutual understanding, esteem, and respectful professionalism" (Towell 2012: 107) among the greater team of assessors and assessees.

Assessable Quality Criteria

In this subchapter, the set of quality criteria assessed as most appropriate by the present paper is displayed in Table 7; its leftmost column is identical to Table 1 that has been equally recommended in this paper. These structured quality criteria are general enough to be used henceforth and practically. As an example, "communication skills" indicate the necessity of learning the language of discourse of different disciplines in order to be able to negotiate meaning, resolve epistemological differences, develop shared understanding, and communicate cognitive advancements to a broad audience (Manathunga et al. 2006; Woods 2007; Spelt et al. 2009).

As a suggestion, Table 7 can be complemented by a fourth column into which performance for the respective quality criterion is then entered.

Practical examples for curriculum development around the world:

Over the last decade, almost all European countries have established national systems for the assessment of quality in higher education. Similar developments can be found in many other parts of the world (Brennan & Shah, 2000).

Regarding developmental curricula such as GS, curriculum development in the South (earlier called 3rd world) seems no less common than in the North (earlier called 1st world).Among others, the following studies and notes pertain to Kenya, South Africa, China, Indonesia, Iran, and Latin America: SAQA (2000), Busoga (2012), Mayer et al. (2011), HigherKOS (2012), Mwinyipembe (2012), Western Cape Government (2012), Fu Jen (2012), Sumaedi et al. (2012), Monarca (2012), Havas et al. (2011), and Masembe and Nakabugo (2004). Themes pertain to students' perceived service quality, the influence of national systems of evaluation on curriculum development, the quality of curriculum evaluation in postgraduate studies, or they pertain to QA in curriculum development.

Curriculum development in the North especially seems to take place in Anglo-Saxon countries (Scottish Government 2011; Teagasc

2012; Lime 2012; UNEVOC 1993) that appear to have more of a review and discourse-oriented tradition than Central European countries might have. Wolverhampton (2012) takes advantage of inter-disciplinarity for new curricula and courses, Jordens and Zepke (2009) propose a network method for QA of curricula, Schmidt and Shaw (2008) assess quality regarding e-learning, Towell et al. (2012) create an interdisciplinary business program, Saunders-Smits and de Graaff (2012) include alumni research, Huntoon and Baltensperger (2012) educate earth science teachers.

For further quality assurance in transnational education management, clear declaration of assessment criteria, assessment procedures and a revealing of the hidden agendas of those involved (such as attempts to strengthen own institutes) will prove most useful.

QA FOR THE GS CURRICULUM

The key motto of QA in a developmental curriculum such as GS is responsibility and "accountability for educational outcomes" (Ried 2011: 8). Any assessment procedure should use "a variety of valid and reliable measures" serving as metric for quality criteria agreed in consensus. The university or "school must use the analysis of assessment measures to improve student learning and the achievement of the professional competencies", best as continuous quality improvement (p. 1).

Why GS and What is GS?

The target of the inter-paradigmatic, intercultural and interdisciplinary developmental curriculum GS was coined and formulated by the Austrian doyen in peace research, Karl Kumpfmüller (2007, 2009) and has been developed by him (Kumpfmüller & Ahamer, 2013) in cooperation with a peer-oriented "Steering Committee GS" (SC GS 2010) since 2004. The target and history of GS is extensively explained in Ahamer (2011) and Ahamer et al. (2011). The aim of GS is a professional preparation for critical and peaceful global developmental cooperation and humane management of globalization issues, for example with a strong orientation towards human rights (Benedek 1994). Since its inception, the SC GS has always comprised representatives from all schools of Graz University (in German: faculties, hence GC is an interfaculty curriculum). The author was dispatched to the SC GS to represent the interdisciplinary curriculum Environmental Systems Science and has done so since the first year of GS; this unique curriculum in the meantime belongs to a nearly founded university faculty comprising pedagogics, environmental, systems analysis and interdisciplinary studies (URBI 2012).

According to the above scheme Figure 6 of (a) curriculum mapping and (b) course mapping, the activities listed below have already been performed for GS Graz; another assessment exercise is likely to be launched by the university senate soon. The present chapter should also provide a framework for such a forthcoming assessment.

Measuring Quality in the GS Curriculum

For future QA of an inter-paradigmatic GS curriculum, the methods described by Figure 1 and Table 7 are proposed.

Until now, from the author's view the following feedback activities from the student side have been retrieved. These serve as the first examples of Quality Assurance (QA) measures already implemented to date for the Master's curriculum GS Graz:

- A reviewed paper by the student representative Bader and Zotter (2012) including their survey among all GS students after the second year of GS in 2012; and other surveys by student representatives.
- Regular evaluation of all GS courses by the university-wide online course tool UGO.

- All courses held with the cooperative online learning WebCT included evaluations.
- Students have nominated the lecturer of "economics in developing countries" for the university's prize for the best lecturer. (Lehre: Ausgezeichnet 2010)
- In the framework of GS, interdisciplinary practicals of environmental systems science were eligible and have yielded WebCT evaluations and final reports of ~200 pages.
- The didactic methodology of the Web-supported negotiation game "Surfing Global Change" utilized in these courses was published a dozen times in reviewed journals and entered into the didactic retrieval systems of the Academy of New Media and Knowledge Transfer.
- The genesis of GS Graz and its national context has been published two times. (Ahamer et al. 2011; Ahamer 2011)
- On January 15, 2012 the nationwide workshop on developmental policy was held in Graz, co-organized by the author.
- As a result of the course "Analysis of practice in GS" the participants published a collaborative article in the "Multicultural Education Technologies Journal" on two contested hydro-energy projects in Brazil and Turkey. (Duraković et al. 2012)
- The publication outlet for the 5^{th} national conference on global development three special issues of a peer reviewed journal entitled "Global Studies".
- The national university project Sustainicum (2012) on university didactics includes a description of the didactic procedures used in the "basic lecture GS" by the author, as well as other pedagogic strategies for eligible GS courses such as the interdisciplinary practical "energy revolution" ("SGC", "3x7 = 21", "jet principle").
- In coherence with the university mission statement, the foundation of a new peer reviewed online journal "Global Studies Survey" was planned and submitted (GLOSS 2007). Another SSCI journal was founded by a SC GS member: Sturge and Wolf (2008).
- As an input to the new strategic agreement among ministry and university, the author has submitted a structural proposal upon invitation to the rectorate to strategically foster GS. The proposal was supported by the curricula commission and the official students' representation (GS 2011) and has been very positively received by the rectorate; however, the text of the agreement has yet to be amended.
- Student representatives have expressed their opinion in favor of lectures on developmental economics and social and cultural geography in 2012.
- As an elective exercise, students in the basic lecture GS compared the GS curriculum against other, similar developmental curricula and submitted suggestions for the improvement of the GS curriculum.
- Amonographis planned to include student papers authored during the basic lecture GS. This could serve as a textbook for the basic GS lecture.
- Cross-national cooperation with GS curricula in Salzburg, also Vienna, Linz and with umbrella institutions such as the Mattersburg Circle for Developmental Policies (MK 2012), including a lecture for the GS curriculum in Salzburg.

The abovementioned student feedback suggests among other things (a complete list is available as an addendum to the chapter titled "Education and literature for development in responsibility – Partnership hedges globalization"):

- Increase the role of foreign languages in GS.

- Include lectures on non-neoclassical economics in GS.
- Include the introductory lecture by the founder of GS in the economics module in the regular GS curriculum.
- Arrive at true inter-disciplinarity among all lecturers, who should regularly communicate among themselves.
- Usage of learning platforms was seen positively.

Also the curricula commission (CuKo 2012) took account of some aspects of QA, based on feedback from students:

- More cohesion among the modules of the basic lecture.
- Clear definition of the perspectives adopted by lecturers.
- Clear definition of a main thread throughout the basic lecture.
- Localization of each lecturer's contribution within the greater context.
- Presentation of a meta level of GS by the GS founder.
- The unique selling proposition of GS is its multi-perspectivistic and integral analysis of the phenomena of globalization (see the inter-paradigmatic model of columns in Figure 5).

These items will be completed by achievements seen from other points of view.

Applying Bibliographic Criteria to GS

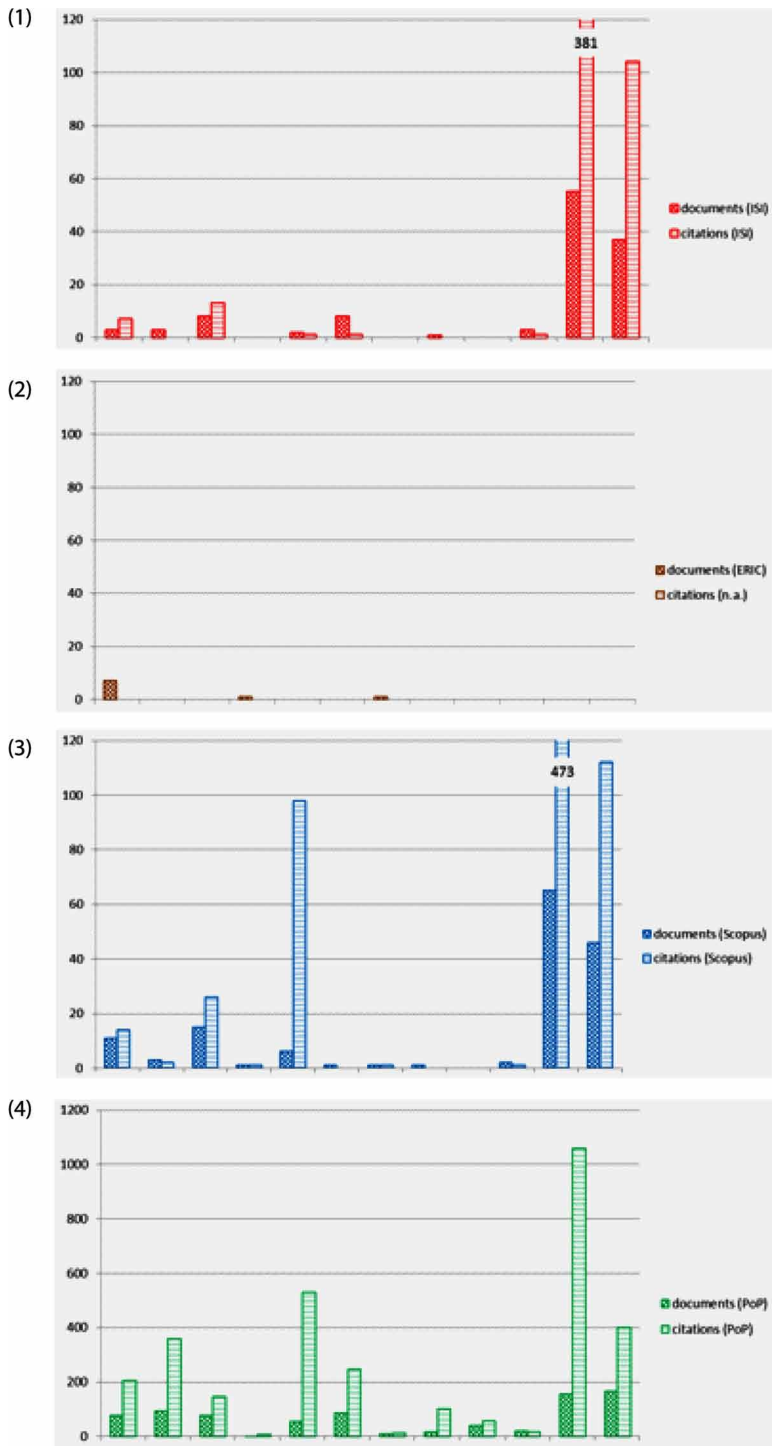
Price (1978) and Wagner et al. (2011) argue that "publication provides the function within science of correction, evaluation, and acceptance by a community. Published works are collected in journals, and a select set of journals is included in various databases such as the Web of Science (built and maintained by ISI Thomson Scientific) or Scopus (built and maintained by Elsevier)" as well as Google Scholar (analyzed by the small but powerful program tool "Publish or Perish" by Anne Harzing (2007) which makes this vast database easily usable.

These databases provide the raw material used in current bibliometric efforts to measure IDR, such as ISI Thomson "introduced by Derek de Solla Price and Eugene Garfield and adopted among others by the National Science Foundation NSFA or the OECD.… Scopus has now achieved high recognition and offers promise in that it currently indexes many thousands more source titles than the ISI databases" (Wagner et al. 2011: 18) and especially by having introduced skillfully normalized metrics such as SNIP and SJR that attempt to level out inconsistencies among citation rates among disciplines. Still, "citation measures privilege publication as the major outcome of IDR. This is one of the sharpest limitations of this approach" (Wagner et al. 2011:19) and therefore requires the use of an additional structural approach by including courses, outreach activities, press and public lectures, as is already implemented in the university's internal citation system in some criteria for professorship.

For the following analyses, some of the criteria suggested by Wagner et al. (2011) were practically applied to the twelve lectures having been active in courses planned specifically for GS in the (last available) academic year 2011-12 (including the number of weekly course hours, according to the retrieval system University Graz OnlineUGO 2012):

- Basic lecture GS (winter semester, 324.519, Basisvorlesung GS, 6)

Figure 7. Bibliometric results for twelve GS lecturers active in 2011-12 regarding retrieved documents (dark, at left) and retrieved citations (light, at right) from four different databases: ISI Thomson (first), ERIC (second), Scopus (third), and publish or perish based on Google Scholar (fourth). Vertical axes (0-120 for the first three and 1-1200 for the fourth) underline the larger sample of the latter.



- Ring lecture GS (winter semester, 324.529, Ringvorlesung GS, 2)
- Introductory lecture GS (winter semester, 324.539, Einführungs-LV GS, 2)
- Analysis of practice GS (winter semester, 324.509, Praxis-Analyse, 1)
- Analysis of practice GS (summer semester, 324.500, Praxis-Analyse, 1)
- Master seminar GS (summer semester, 324.540,Masterseminar GS, 2)

Within this list, the "basic lecture GS" at the start of the first semester in the Master's curriculum provides most of the disciplinary models on development such as history, economic history, economics, environment, society and culture, and international law (Figure 5); these should be integrated by a truly interdisciplinary lecture: such is the intention.

Figure 7 displays the results for the mentioned databases. ISI and ERIC are located in the US (reddish, above row), Scopus in the European Union (blue, below left), PoP is global and shows a tenfold load of documents (green, below right). All documents were manually counterchecked for identities and ambiguities in authorship regarding authors with similar names, if necessary single documents were read.

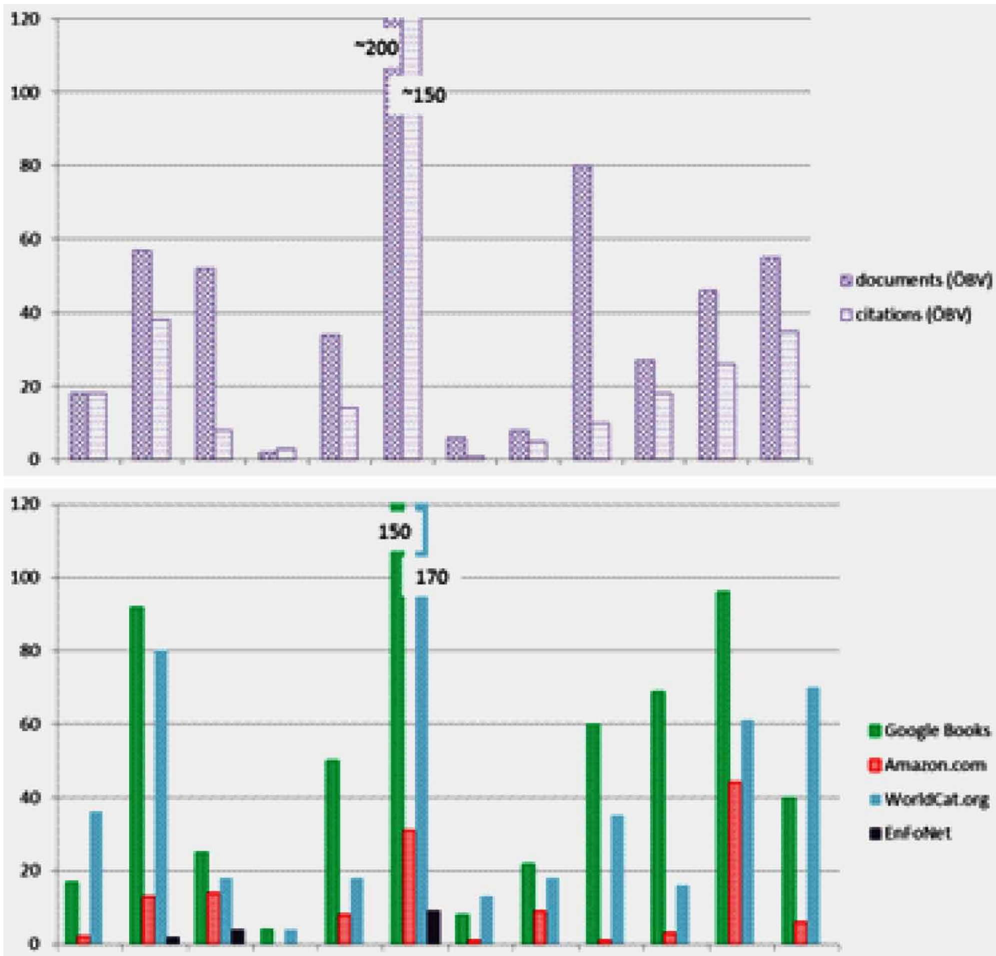
Documents Retrieved in Literature Repositories

The first two of all pictured databases (ISI rather for sciences, ERIC for educational literature) were selected identically to the categories of the monitoring system AkademIS used by the Austrian Academy of Sciences (ISI (S)SCI, ERIC; while for A&HCI on humanities no specific access seemed to be implemented).

The second row of Figure 7 provides the other databases identified by most authors and commentators in the field, such as Wagner et al. (2011), Harzing (2010), Barbour (2012), Virtual Canuck (2011). It appears that the access to ISI and Scopus is restricted to subscribed universities but the use of the other databases is free. The list of Scopus-referenced journals (~20,000) is almost twice as long as with ISI Thomson. Scopus has amended one of the most striking shortcomings of the classical ISI impact factor (equal to roughly the number of citations per number of papers) by the introduction of SNIP and SJR (Scopus 2011) for which time series can easily be compared by a very user-friendly tool, "journal analysis." In this sense, Wagner et al. (2011: 24) ask "what types of normalization (necessary to account for the different relative sizes and dynamics of science across research fields) are required to match the different units of analysis and granularity and what types of measures are best for computing the inputs, processes, and outputs of interdisciplinary research (e.g. simple counts, network measures, dynamic models, or a combination)?" According to Science Watch (2010), the disciplines "with the lowest citation thresholds observed are Social Sciences, Computer Science, and Multidisciplinary Sciences" – which does not at all favor the case of interdisciplinary or inter-paradigmatic thinking – when relying on mere bibliometrics.

Regarding the differences between single databases, Scopus shows more equilibrated scores among representatives of natural sciences, social sciences, and humanities than ISI. The program PoP based on the Google Scholar Database shows the least differences in documents between the main branches of science, notably between technology and others. These data include publications without having undergone a peer review process, as do most journals as the main means for QA. On the other hand, informal articles such as public lecture talks, conferences, and outreach activities are included here. Barrier-free or open access documents especially facilitate citation by students or low-budget countries – as can be shown by download statistics provided by some of these publishers (e.g. INTEC 2011). Also un-reviewed books from regional publishers and eulogies may increase the number of documents in PoP.

Figure 8. Documents retrieved from additional sources: Top: OBV (2012): Catalogue of Austrian libraries (draft numbers). Bottom: Google books, Amazon.com, worldcat.org, EnFoNet (all draft numbers, after manual checks for errors, without checks for double counts).



In the frequency distribution charts of Figure 7, two lecturers from another, technologically oriented university have been taken out of the regular order and placed rightmost for easier interpretation. Technical and natural sciences have higher scores in almost any citation index, non-quantitative disciplines such as history or humanities tend to have fewer citations, social and economic sciences might range in the middle. When interpreting it becomes apparent that real performance of individuals is not sufficiently well illustrated by such data. Neither is interdisciplinary competence measured suitably by sheer citation data, which favor single-disciplinary careers.

High scores in purely disciplinary metrics (such as those being referenced by ISI Thomson) do not protect against feedback from students: sustained high levels of student criticism were targeted at "unequilibriated presentation of only one out of several appropriate paradigms" (student feedback) because of its sharply limited notion of how the complex syndrome of globalization was considered. On the other hand, such lecturers often found other colleagues as insufficiently qualified. This shows that self-perception and perception by others may differ considerably – actually this is the core motivation to set up an *inter-paradigmatic world view* in any case, especially applicable for multi-paradigmatic necessity to understand globalization while slipping out of one's own conceptual and epistemological limitations.

Figure 7 above right (ERIC) shows that publications on didactics and pedagogics occur very seldom, even if teaching and training accounts for a large share of the profile of university staff. Generally, didactic skills are underappreciated in the assessment of university careers, according to the author's view.

Members of the curricula commission (CuKo) have low scores in several databases, nevertheless decisions are often made without consulting other team players who have for many years been active for GS. Compared against a subset of 11 non-retired lecturers, the 5 CuKo members had among the lowest scores of ISI documents (except one) as well as among the lowest scores of ISI citations; the same applies when using the ERIC, Scopus or PoP databases. A negative correlation becomes apparent between performance according to above bibliometrics and self-alleged importance at organizational and political levels regarding university administration and curriculum management. From the perspective of Figure 7, publishing little and being cited rarely in peer reviewed literature correlates with high locally visible honors.

However, it is also possible to draw on a more local database: The combined retrieval system of all Austrian libraries (OBV 2012) yields approximately the number of documents and citations shown in Figure 8, top. The relative distribution is markedly different when dismissing the quality criterion of "international peer review" but adding works being produced by local publishers, seemingly without peer review, historic and social sciences wins the highest scores. Because the self-perception of authors most likely uses the lenses of one's own discipline and its weighing of what is preferable (e.g., book versus journal article), it might be possible that each individual ranks high in their own assessment but colleagues from other disciplines rank much lower. Such (apparently very perspective-bound) perception may extend to disciplines, their paradigms and methods but even to individual personalities and their degree of justification in academia. As an example of bibliometrically induced personal reactions, Virtual Canuck (2011) warns that "a nice glass of scotch is sometimes necessary – either for savoring self-induced feelings of smugness or for drowning one's sorrows over the incapacity of others to recognize true genius". Readers are therefore kindly requested to consult their bar when reading this article. If ever in a casual community of loosely interacting stakeholders (e.g., team of lecturers meeting just once a year discussing timing and schedules) individuals do not engage in a deeper dialogue on the weighing factors of their implicit quality assessments (e.g., what types of result are important), a situation can arise where all individuals enter a room feeling better than their colleagues and 2 hours later they leave the room with the same self-conception. Such perceptional patterns may potentially carry on for decades.

Figure 9. From a systems analysis viewpoint, assessment exercises can be understood as a self-referential system: the assessment a(m), i.e. "how good is each author 'a' in the perception of the assessment method 'm'" is complemented by a conjugate assessment m(a), i.e. "how good is each assessment method 'm' in the perception of the author 'a.'" Such autopoietics create social dynamics that are typical for any closed systems.

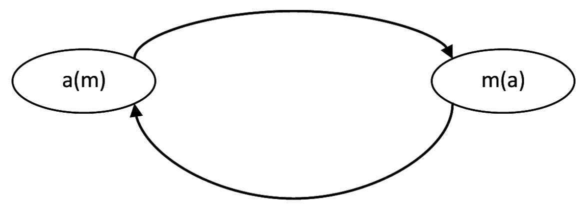
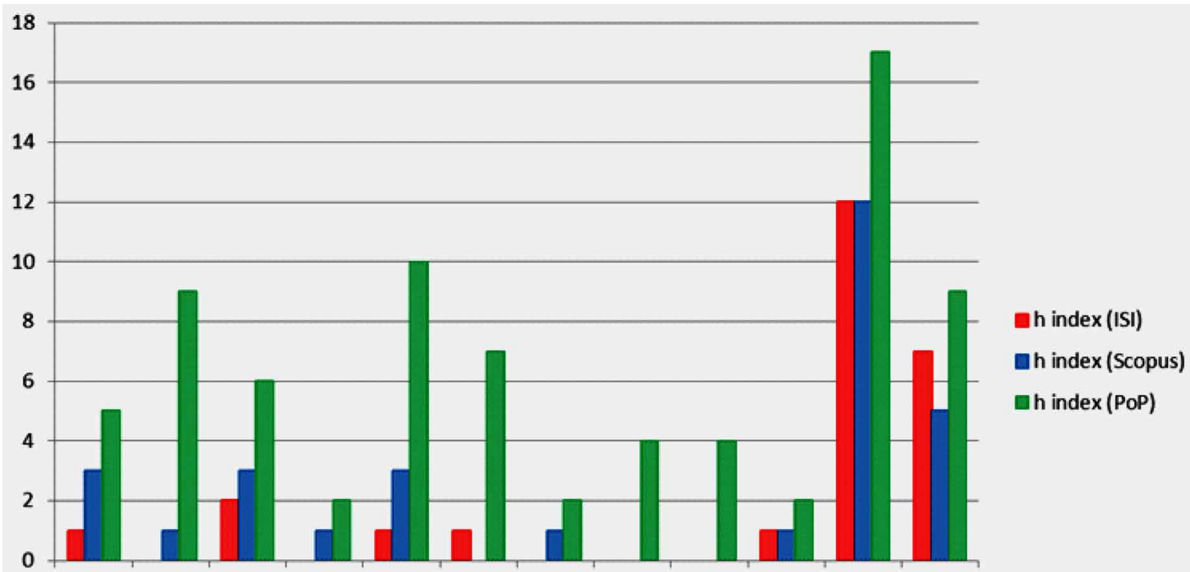


Figure 10. Hirsch's h index based on three different data bases: ISI Thomson, Scopus, and publish or perish based on Google Scholar. The h index can be computed only for such databases that provide both document numbers and citation numbers.

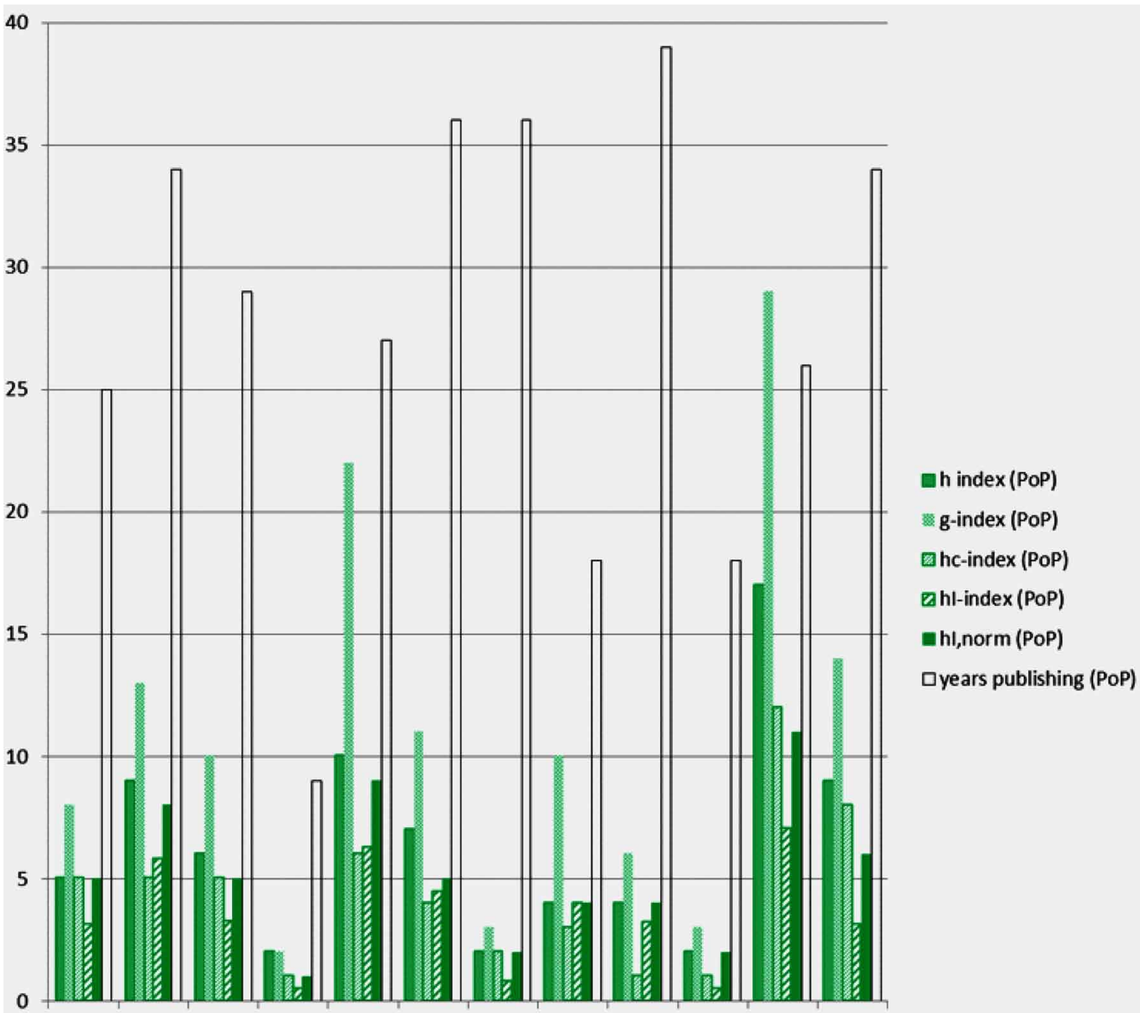


Other descriptors (Figure 8, bottom) such as retrieved documents in Google books, Amazon.com, or the recently established very comprehensive worldcat.org yield other distribution patters and correspond to other preferences in underlying conscious or unconscious assessment. The recent Austrian study on developmental research networks EnFoNet (Witjes et al. 2012 in Figure 8) has decided to use connectivity with other authors as a main criterion after a potentially subjective selection procedure of developmentally relevant pieces of work using the OBV (2012) data set.

Bluntly speaking, for each author (a) an assessment method (m) can be found where author 'a' ranks as best or second best out of the given sample of twelve. This "finding" translates the assessment exercise (or optimization exercise) "how good is each author 'a' in the perception of assessment method m" in a conjugate assessment (or optimization) exercise, namely "how good is each assessment method 'm' in the perception of the author a" (Figure 9). Such a self-referenced social procedure (in the language of social systems analysis) might produce non-linearities in optics, favor sub-optimal perception and the persistence of local sub-optima. Clearly, power relations are an important ingredient on both a local and global scale, including the power of defining success criteria. In the author's view, escape from such a closed loop pictured in Figure 9 is feasible by proactive esteem and acknowledgement of other, foreign quality definitions and quality concepts. Escape is impossible when continuously residing within one's own frame of reference for quality.

Mathematically speaking, a and m are conjugate functions producing two conjugate spaces: the a-space and the m-space. Assessors and assessees might decide to wish to live (only) in either of them – but they might also remember that in other walks of life they change their roles – this is exactly the approach of the negotiation game "Surfing Global Change" (Ahamer 2005, 2006). For design science (Dorst & Cross 2001), such conjugate spaces are known as problem space and solution space. For systems analysis (Ossimitz 2000), such structure is autopoietic and

Figure 11. Modified h indices from the tool Publish or Perish (PoP, greenish), including the number of years an author has passed since their first publication (white)

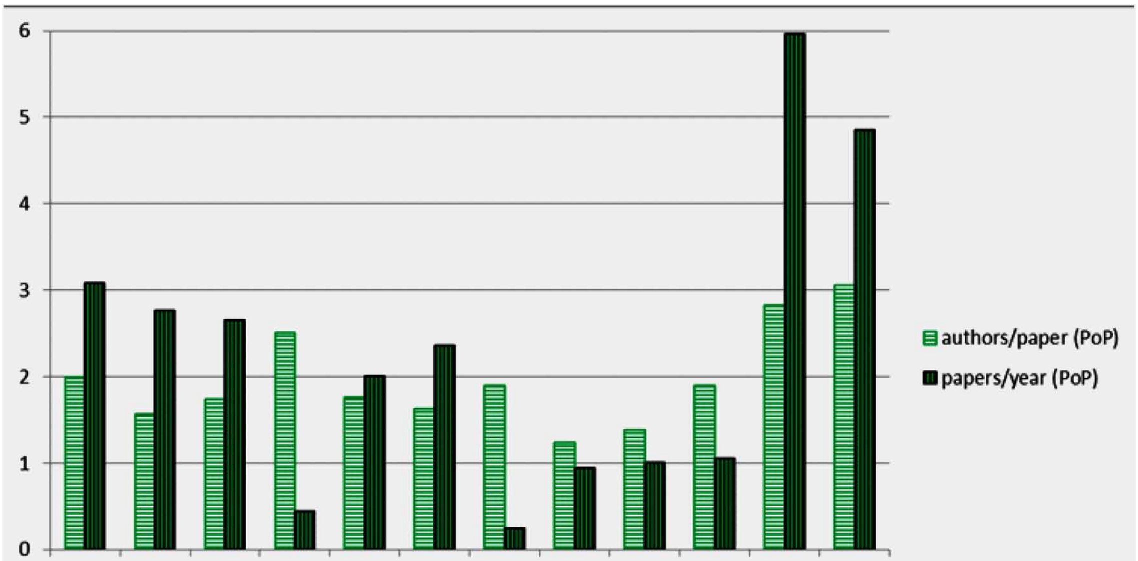


constructs itself – this might be a nice reference to pedagogic constructivism (Watzlawick, 1988). In such systems, the "construction of meaning" (e.g. of "quality") may depend on the smallest stochastic changes in initial preconditions; according to the teaching of chaos theory.

Assessment by Hirsch's h Index

As a consequence of the above-mentioned characteristics of the growing volume of databases, almost all metrics increase along the chain ISI – Scopus – PoP (Figure 7). Also, given the vast multitude of assessment methods and databases for each assessment and in order to combine authors' production with their reception, a need has arisen for a combined and dimensionless measure that takes into account both the number of documents and the number of their citations. The so-called Hirsch index or "*h index*" combines both parameters by yielding an index h if h of a scientist's papers have received at least h citations each (Figure 10). The h index aims to measure the cumulative impact of an author's output by

Figure 12. The PoP tool additionally provides the average number of authors per paper and the annual output of papers per year



looking at the amount of citation the author's work has received.

When contemplating Figure 10, naturally this h index grows markedly with the growing substrate of documents, notably along the chain ISI – Scopus – PoP (Figure 10); this is the case especially for non-technologists. Most strikingly, researchers in humanities and law might have an h index of zero or one with ISI but high h values with PoP; social scientists and economists have a middle position regarding this increase of h indices across databases; while natural scientists may even have similar h indices in all three databases, astonishingly enough, due to the thorough inclusion of their (even grey) literature in ISI Thomson. Quite naturally, the global outreach and world-wide auditorium will be very different for different outlets such as books, journal articles, presentations and informal papers. In the author's opinion, a mature scientist's profile should show assets in many such publication strategies – but should not be modest in all of them. Again, when taking an aggregated picture of all three h indices in Figure 10, 4 out of the 5 CuKo members score in the last places, their (vice-)presidents in the very last places. Strategically designing an innovative curriculum might often be considered as bringing lower honors than publishing papers – at least tacit selection criteria in force suggest this.

Several modifications of this quite telling h index have been proposed in literature and are also provided by the PoP tool (Figure 11). In order to better account for recent publications as compared to older ones, the g index was proposed (light green) but is considered as not very telling by the author; similarly the contemporary h index or h_c index (definitions, algorithms, detailed interpretations and caveats see in Harzing 2010). The individual h index or h_I index accounts for shared or multiple authorship (which might be a positive sign of team-orientation, or likewise be a deliberate strategy by authors to push their indices), as does the $h_{I,norm}$ index (preferred by the author, dark green in Figure 11)in a still more fine-grained manner. An in-depth description of all indices and their pros and cons can be found in the help function of the highly recommendable PoP program (Harzing 2007) or on Wikipedia.

Figure 13. Schematic representation of the attributes of diversity based on Stirling's (2007) conceptualization (Wagner, et al., 2011, p. 21): variety, disparity, and balance. A proxy for the variety indicator might be given through Figure 14.

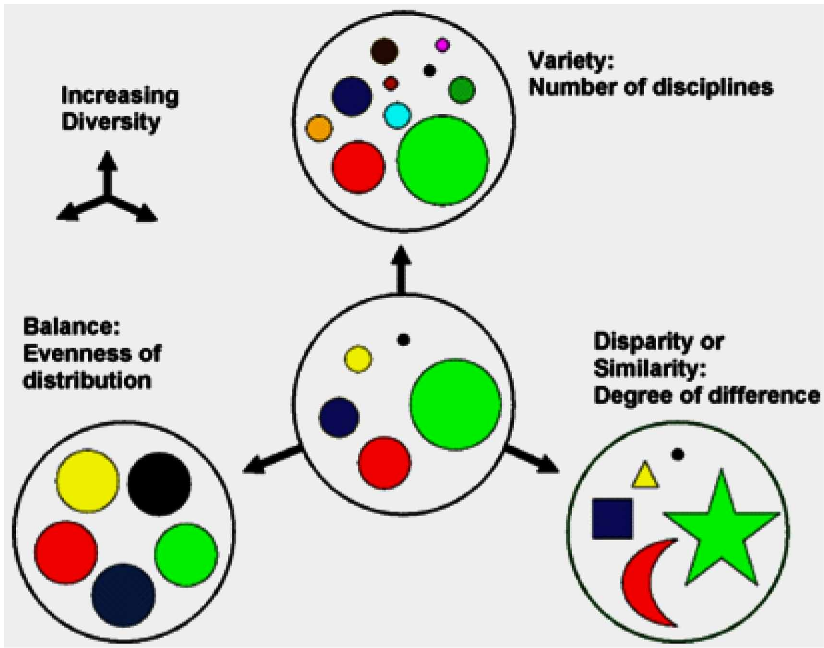
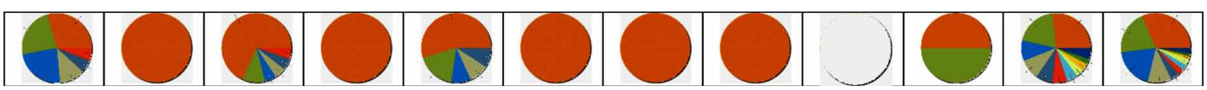


Figure 14. The pie charts from Scopus' "author analysis" tool graphically denoting the distribution of publications between different disciplines for all GS lecturers in 2011-12 ordered as in above figures. Colors are arbitrary regarding disciplines, just meaning consecutive order.



The cascade of these indices shows a strong decline for several authors in Figure 11 which might be co-determined by technical sciences having more multi-author publications than other branches of science, especially humanities. Along the chain of ISI – Scopus – PoP, the author on average scores roughly in fourth, third and fifth place, i.e. rather in the middle of the field, and hence has no personal interest in favoring one metric over another.

Figure 12 adds two variables of general interest (based on PoP data), namely authors per paper (almost 3 in technical sciences, lowest around 1.5 in humanities) and papers published per year (averaged since first publication), maybe closer to personal diligence than other parameters. Again here, 4 out of the 5 lecturing CuKo members range in the last places. At universities, career building in general need not be correlated with high scientific output; such was proven again when a call for professorship recently turned out successful for a candidate who scored far behind the leaders in science-oriented metrics but who already had personal knowledge of the respective institute.

Attempting to Measure Diversity for Inter-Disciplinarity

According to (Wagner et al. 2011: 21)who reports Stirling's (2007) conceptualization of interdisciplinary quality criteria as Figure 13, an additional criterion for inter-disciplinarity is distribution among various disciplines for which a proxy might be the pie charts provided by Scopus listed in Figure 14, again without names in order to secure anonymity. Still other criteria are: roles of (co-)editor in journals, editorial board member, participating in and managing of international projects with a developmental approach, countries worked in for different institutions in diverse roles, own academic formation in several disciplines, affiliation to and cooperation with different, inter-paradigmatically relevant institutions, lecturing in diverse subjects and diverse disciplines at diverse universities, have lived and coined multiple corporate cultures, performing outreach activities, didactic and pedagogic formation and achievement etc. – but quantitative charts are difficult to perform in these cases.

Figure 14 visualizes the multi-disciplinarity of authors by different colors: each color denotes a discipline (according to Scopus categories) in decreasing order of occurrence (orange, green, blue etc.). For the interpretation of such figures, evidently the definition, categorization, and granularity of disciplinary subdivision are highly critical for the appearing graphical impression. Also, these colors do not describe the effective interdisciplinary and inter-paradigmatic quality of the content of any single paper. In Figure 14, the lecturer with the lowest score had the highest administrative position for the GS curriculum in the given year. Sharing of power was experienced by some to be uncommon in this period. An inverse correlation between international bibliographic achievements and actual self-attributed power is apparent in this, and many similar, analyses.

In an attempt to produce impressive graphics quickly, one can always "introduce disciplinary diversity indicators to describe the heterogeneity of a bibliometric set viewed from pre-defined categories" or design "indicators of disciplinary impact by focusing on the intensity of knowledge streams between research fields" or "suggest that betweenness centrality can be used as a measure of interdisciplinarity" (Wagner et al. 2011: 21) or use spatial distances as an assessment tool (Witjes et al. 2012) without preceding in-depth analysis. However, acceptance of such exercises would be limited when assessing the deep quality of inter-paradigmatic understanding as such.

Critical Evaluation of Bibliometric Approaches

"Each approach may tell a useful story" is possibly a suitable final assessment on bibliometric attempts: Wagner et al. (2011: 25) speak up against the limitations to purely quantitative measures and metrics, but call for structural and process-oriented strategies of assessment that take into account complex, self-referential, inter-paradigmatic dynamics of what could be finally considered "academic quality": Γνῶθι σεαυτόν = know yourself – including a critical analysis about your own misconceptions about yourself.

Escape from the self-referential cycle of QA and related power attribution may quite profitably be achieved by proactive application of QA frameworks that are different from one's own; this means to exchange lenses and standpoints in an inter-paradigmatic manner (Figure 5 and Table 4). Mono-disciplinary sclerosis is undesired for such targets.

CONCLUSION AND RECOMMENDATIONS

This paper has been undertaken in order to facilitate transparent and internationally acceptable high-quality assessment to assure the quality of interdisciplinary curricula such as developmental, peace, environmental and global studies.

The literature analysis undertaken in first section of the chapter has yielded sufficient theoretical concepts on quality, inter-disciplinarity and QA methodologies for inter-paradigmatic university curricula to propose a framework for future QA: Figure 1 shows the general overview which has to take into account the input, procedure and output of higher education. Figure 6 proposes to include both curriculum mapping (against initial targets and aims) and course mapping (performance of individual lectures). Table 7 lists criteria, skills, and conditions for especially interdisciplinary curricula.

For transnational higher education it is found to be important to take on an inter-paradigmatic approach which means being able to think along conceptions of diverse stakeholders involved in the complex issues of development, global change and globalization. Such an approach practically means a collaborative and team-oriented performance of academic duties, and no reliance on administrative hierarchies.

The application of above findings for the innovative inter-disciplinary developmental curriculum "Global Studies" in section 2 includes a collection of learner-centered feedbacks and assessment procedures as well as bibliometric analysis. Documents and citations from three different bibliographic databases and derived metrics such as the h index permit quantifiable insight into the performance of lecturers which has to be complemented by social and structural information such as inter-paradigmatic competence, real-world experience from international developmental projects and didactics.

Options and limitations of bibliometrically based QA strategies were extensively discussed and changing frames of reference were recommended that span across disciplines.

The main recommendation for quality assurance in transnational higher education, especially in interdisciplinary curricula on global change and development, is professional clarity on targets that should most efficiently be monitored in a peer-oriented procedure involving assessors, lecturers, practitioners and university administration on an equal basis in a culture and atmosphere of collaboration. Limitation to discipline-oriented bibliometric metrics alone is not appropriate, as is limitations to implicit or explicit attribution of administrative or political power or financial sources in higher education. The present paper suggests that cutting-edge quality can be maintained and enhanced best in a culture of mutual esteem, respect, personal integration and orientation towards clear performance criteria previously agreed in consensus among older and younger contributors, from both the theory and practice sides of all disciplines.

REFERENCES

Ahamer, G. (2001). A structured basket of models for global change. In C. Rautenstrauch & S. Patig (Eds.), *Environmental Information Systems in Industry and Public Administration* (pp. 101–136). Hershey, PA: Idea Group. doi:10.4018/978-1-930708-02-0.ch006

Ahamer, G. (2005). Surfing global change: How didactic visions can be implemented. *Campus-Wide Information Systems*, *22*(5), 298–319. doi:10.1108/10650740510632217

Ahamer, G. (2006). Surfing global change: Negotiating sustainable solutions. *Simulation & Gaming –. International Journal (Toronto, Ont.)*, *37*(3), 380–397.

Ahamer, G. (2008). Im spiegelkabinett unterschiedlicher entwicklungsvorstellungen. *Journal fur Entwicklungspolitik*, *24*(3), 56–76. Retrieved from http://www.mattersburgerkreis.at/jep/20083.php#ahamer

Ahamer, G. (2010). A short history of web based learning including GIS. *International Journal of Computer Science & Emerging Technologies*, *1*(4), 101–111. Retrieved from http://ijcset.excelingtech.co.uk/vol1issue4/17-vol1issue4.pdf

Ahamer, G. (2011). How technologies can localize learners in a multicultural space. *International Journal of Technology and Educational Marketing*, *1*(2), 1–24. doi:10.4018/IJTEM.2011070101

Ahamer, G. (2012). The jet principle: Technologies provide border conditions for global learning. *Multicultural Education & Technology Journal*, *6*(3), 177–210.

Ahamer, G., & Kumpfmüller, K. A. (2014). Education and literature for development in responsibility – Partnership hedges globalization. In Mukerji, S., & Tripathi, P. (Eds.), Handbook of Research on Transnational Higher Education Management (pp. 526-584). Hershey, PA: IGI Global.

Ahamer, G., Kumpfmüller, K. A., & Hohenwarter, M. (2011). Web-based exchange of views enhances global studies. *Campus-Wide Information Systems*, *28*(1), 16–40. Retrieved from http://www.emeraldinsight.com/journals.htm?issn=1065-0741&volume=28&issue=1

AHELO. (2012). *The assessment of higher education learning outcomes*. Retrieved from http://www.oecd.org/edu/highereducationandadultlearning/testingstudentanduniversityperformancegloballyoecdsahelo.htm

Akker, van den, J.J.H., et al. (2006). *Educational design research*. Abingdon, UK: Routledge.

Aram, J. D. (2004). Concepts of interdisciplinarity: Configurations of knowledge and action. *Human Relations*, *57*(4), 379–412. doi:10.1177/0018726704043893

Baba, M. L., Gluesing, J., Ratner, H., & Wagner, K. H. (2004). The contexts of knowing: Natural history of a globally distributed team. *Journal of Organizational Behavior*, *25*(5), 547–587. doi:10.1002/job.259

Bader, L., & Zotter, V. (2012). Interdisciplinarity: Wishful thinking? Experiences at the University of Graz. *Multicultural Education & Technology Journal*, *6*(3), 118–136.

Barbour, M. (2012). Book review - The publish or perish book: Your guide to effective and responsible citation analysis. *International Review of Research in Open and Distance Learning*, *13*(3), 319–321.

Bath, D., Smith, C., Stein, S., & Swann, R. (2004). Beyond mapping and embedding graduate attributes: Bringing together quality assurance and action learning to create a validated and living curriculum. *Higher Education Research & Development*, *23*(3), 313–328. doi:10.1080/0729436042000235427

Becher, T. (1981). Towards a definition of disciplinary cultures. *Studies in Higher Education*, *6*(2), 109–122. doi:10.1080/03075078112331379362

Becher, T., & Trowler, P. R. (2001). *Academic tribes and territories: Intellectual enquiry and the culture of disciplines* (2nd ed.). Buckingham, UK: SRHE/Open University Press.

Benedek, W. (1994). The meaning of human rights in the development cooperation policy of the European Union. *Journal fur Entwicklungspolitik*, *10*(1), 13–31.

Bernhard, A. (2011a). *Quality assurance in an international higher education area: A case-study approach and comparative analysis of six national higher education systems*. Retrieved from http://www.uni-graz.at/bernhard2011_abstract.pdf

Bernhard, A. (2011b). Quality assurance on the road: Finland and Austria in comparison. *European Educational Research Journal*, *10*(4), 583–594. doi:10.2304/eerj.2011.10.4.583

Bernhard, A. (2012a). *Quality assurance in an international higher education area - A case study approach and comparative analysis*. (Dissertation). Klagenfurt University, Klagenfurt, Germany.

Bernhard, A. (2012b). Quality assurance in an international higher education area: A summary of a case-study approach and comparative analysis. *Tertiary Education and Management*, *18*(2), 153–169. doi:10.1080/13583883.2012.654504

Bernstein, H. (Ed.). (1973). *Underdevelopment and development*. New York: Penguin.

Biggs, J. B. (1993). From theory to practice: A cognitive systems approach. *Higher Education Research & Development*, *12*(1), 73–86. doi:10.1080/0729436930120107

Biggs, J. B. (2003). *Teaching for quality learning at university: What the student does* (2nd ed.). Buckingham, UK: Open University Press.

Boix Mansilla, V., Miller, W. C., & Gardner, H. (2000). On disciplinary lenses and interdisciplinary work. In S. Wineburg & P. Grossman (Eds.), *Interdisciplinary Curriculum: Challenges of Implementation*. New York: Teachers College Press.

Braun, T., & Schubert, A. (2007). The growth of research on inter- and multidisciplinarity in science and social science papers 1975–2006. *Scientometrics*, *73*(3), 345–351. doi:10.1007/s11192-007-1933-3

Brennan, J., & Shah, T. (2000). Quality assessment and institutional change: Experiences from 14 countries. *Higher Education*, *40*(3), 331–349. doi:10.1023/A:1004159425182

Busoga. (2012). *Quality assurance*. Retrieved from http://www.busogauniversity.ac.ug/index.php?option=com_content&view=article&id=71&Itemid=96

Cant, G., & Kulik, B. W. (2009). More than lip service: The development and implementation plan of an ethics decision-making framework for an integrated undergraduate business curriculum. *Journal of Academic Ethics*, *7*(4), 231–254. doi:10.1007/s10805-010-9104-1

Carr, S., Hamilton, E., & Meade, P. (2005). Is it possible? Investigating the influence of external quality audit on university performance. *Quality in Higher Education*, *11*(3), 195–211. doi:10.1080/13538320500329665

Cheng, Y. C. (1995). School education quality: Conceptualization, monitoring, and enhancement. In P. K. Siu & T. K. Tam (Eds.), *Quality in Education: Insights from Different Perspectives*. Hong Kong: Hong Kong Education Research Association.

Cheng, Y. C., & Tam, W. M. (1997). Multi-models of quality in education. *Quality Assurance in Education*, *5*(1), 22–31. doi:10.1108/09684889710156558

Cheserek. (2011). Quality management in curriculum development and delivery in African universities: A case study of Moi University, Kenya. In P. Mayer, et al. (Eds.), *Challenges for faculty management at African higher education institutions*. Retrieved from http://www.international-deans-course.de/uploads/media/Quality_Management_in_Curriculum_Development_and_Delivery_in_African_Universities_Cheserek_.pdf

Crone, J. A. (1997). Using panel debates to increase student involvement in the introductory sociology class. *Teaching Sociology*, *25*(3), 214–218. doi:10.2307/1319397

CuKo. (2012). *Protocol of the session of the GS curricula commission of March 1, 2012*. CuKo.

Davies, M., & Devlin, M. (2007). *Interdisciplinarity in higher education: Implications for teaching and learning. centre for the study of higher education*. Melbourne, Australia: The University of Melbourne. Retrieved from http://www.cshe.unimelb.edu.au/resources_teach/curriculum_design/docs/InterdisciplinaryHEd.pdf

Doody, O., & Condon, M. (2012). Increasing student involvement and learning through using debate as an assessment. *Nurse Education in Practice*, *12*(4), 232–237. doi:10.1016/j.nepr.2012.03.002 PMID:22475508

Dorst, K., & Cross, N. (2001). Creativity in the design process: Co-evolution of problem-solution. *Design Studies*, *22*(5), 425–437. doi:10.1016/S0142-694X(01)00009-6

Duraković, E., Feigl, B., Fischer, B., Fleck, C., Galler, L.-M., & Heinrich, J. et al. (2012). Dialogic global studies for multicultural technology assessment. *Multicultural Education & Technology Journal*, *6*(4), 261–286. doi:10.1108/17504971211279527

English, F. W. (1978). *Quality control in curriculum development*. Arlington, VA: American Association of School Administrators.

EuroLeague. (2010). *Guidelines for curriculum development and quality assurance of joint master programmes*. Retrieved from https://www.iseki-food.net/Webfm_send/1185

Finch, J. (1997). Power, legitimacy and academic standards. In J. Brennan, P. de Vries, & R. Williams (Eds.), *Standards and Quality in Higher Education* (pp. 146–156). London: Jessica Kingsley Publishers.

Fischer, A. R. H., Tobi, H., & Ronteltap, A. (2011). When natural met social: A review of collaboration between the natural and social sciences. *Interdisciplinary Science Reviews*, *36*(4), 341–358. doi:10.1179/030801811X13160755918688

Fischer, K. (2009). Globalisierung und transnationale akteursnetzwerke: Big business, neoliberale intellektuelle und zentralbanker. *Journal fur Entwicklungspolitik*, *25*(4), 42–45.

Fischer, K., & Hödl, G. (2007). Perspectives on development studies: A short introduction. *Journal fur Entwicklungspolitik*, *23*(2), 4–11.

Fu Jen. (2012). *Teaching excellence project*. Retrieved from http://140.136.240.107/english_fju/index.php/features/features-curriculum-design

Gebbie, K. M., Meier, B. M., Bakken, S., Carrasquillo, O., Formicola, A., & Aboelela, S. W. et al. (2008). Training for interdisciplinary health research: Defining the required competencies. *Journal of Allied Health*, *37*, 65–70. PMID:18630780

GLOSS. (2007). *GLOSS – A joint e-journal initiative of global studies and the academy for new media at Graz University*. Retrieved from http://www.uni-graz.at/globalstudies/deposit/anmwww_ejournal-globalstudies.pdf

Gokhale, A. A. (1995). Collaborative learning enhances critical thinking. *Journal of Technology Education*, *7*(1). Retrieved from http://scholar.lib.vt.edu/ejournals/JTE/v7n1/gokhale.jte-v7n1.html

Gorton, W., & Havercroft, J. (2012). Using historical simulations to teach political theory. *Journal of Political Science Education*, *8*(1), 50–68. doi:10.1080/15512169.2012.641399

Grossman, P., Wineburg, S., & Woolworth, S. (2001). Toward a theory of teacher community. *Teachers College Record*, *103*(6), 942–1012. doi:10.1111/0161-4681.00140

GS. (2010). Master curriculum global studies. *Karl-Franzens University Graz*. Retrieved from https://online.uni-graz.at/kfu_online/wbMitteilungsblaetter.display?pNr=186789

GS. (2011). Expert opinion on the inclusion of the master curriculum global studies into the strategic agreement document with the ministry of science and research. *Karl-Franzens University Graz*. Retrieved from http://www.uni-graz.at/globalstudies/deposit/Stellungnahme-KFU-Entwicklungsplan-2013-18_GS.pdf

Haller, M., & Ressler, R. (2006). National and European identity - A study of their meanings and interrelationships. *Revue Francaise de Sociologie*, *47*(4), 817–850.

Harvey, L. (2006). Understanding quality. In E. Froment, et al. (Eds.), EUA Bologna handbook: Making Bologna work. Brussels: EUA/Berlin.

Harvey, L., & Green, D. (1993). Defining quality. *Assessment & Evaluation in Higher Education*, *18*(1), 9–34. Retrieved from http://www.tandfonline.com/doi/abs/10.1080/0260293930180102 doi:10.1080/0260293930180102

Harvey, L., & Williams, J. (2010). Fifteen years of quality in higher education (part two). *Quality in Higher Education*, *16*(2), 81–113. doi:10.1080/13538322.2010.485722

Harzing, A. W. (2007). *Publish or perish*. Retrieved from http://www.harzing.com/pop.htm

Harzing, A. W. (2010). *The publish or perish book: Your guide to responsible analysis*. Melbourne, Australia: Tarma Software Research Pty Ltd. Retrieved from http://www.harzing.com/popbook.htm

Healey, R. L. (2012). The power of debate: Reflections on the potential of debates for engaging students in critical thinking about controversial geographical topics. *Journal of Geography in Higher Education*, *36*(2), 239–257. doi:10.1080/03098265.2011.619522

Higher, K. O. S. (2012). *University didactics and curriculum development centres for Kosovo*. Retrieved from http://www.higherkos.info/hk/index.php?option=com_content&view=article&id=70%3Auniversity-didactics-and-curriculum-development-centres-dcdc&catid=39%3Acol2&Itemid=1

Holley, K. A. (2009). Interdisciplinary strategies as transformative change in higher education. *Innovative Higher Education*, *34*(5), 331–344. doi:10.1007/s10755-009-9121-4

Huntoon, J., & Baltensperger, B. (2012). Increasing expertise in earth science education through master's education. *Journal of Geoscience Education*, *60*(2), 147–158. doi:10.5408/11-224.1

IE. (2012). *Internationale entwicklung*. Retrieved from http://ie.univie.ac.at/

IHERD. (2012). *Innovation, higher education and research for development*. Retrieved from http://www.oecd.org/sti/innovationhighereducationandresearchfordevelopmentiherd.htm

IHME. (2012). *Institutional management in higher education*. Retrieved from http://www.oecd.org/edu/imhe/#d.en.192220

INTEC. (2011). *Intec open publishers*. Retrieved from http://www.intechopen.com/

Jordens, J. Z., & Zepke, N. (2009). A network approach to curriculum quality assessment. *Quality in Higher Education*, *15*(3), 279–289. doi:10.1080/13538320903399125

Kennedy, R. R. (2009). The power of in-class debates. *Active Learning in Higher Education*, *10*(3), 225–236. doi:10.1177/1469787409343186

Klein, J. T. (1996). *Crossing boundaries: Knowledge, disciplinarities, and interdisciplinarities*. Charlottesville, VA: University Press of Virginia.

Klein, J. T. (2008). The rhetoric of interdisciplinarity. In A. Lunsford, K. Wilson, & R. Ebeerly (Eds.), *The Sage handbook of rhetorical studies* (pp. 265–284). Thousand Oaks, CA: Sage.

Koklanaris, N., MacKenzie, A. P., Fino, M. E., Arslan, A. A., & Seubert, D. E. (2008). Debate preparation/participation: An active, effective learning tool. *Teaching and Learning in Medicine*, *20*(3), 235–238. doi:10.1080/10401330802199534 PMID:18615298

Kumpfmüller, K.A. (2007). *Which targets for global studies? Fundamental deliberations for the inauguration of the master study's curricula commission at Graz University*. Institute for International Law, Memo to the Senate of Karl-Franzens University Graz.

Kumpfmüller, K. A. (2009). *Draft curriculum global studies*. Graz, Austria: Graz University.

Kurz, A. (2003). *Nitrat / Nitrit im Trinkwasser: Herkunft und Wirkung auf den menschlichen Organismus*. (Master thesis). Graz University, Graz, Austria.

Lantis, J. S. (2004). Ethics and foreign policy: Structured debates for the international studies classroom. *International Studies Perspectives*, *5*(2), 117–133. doi:10.1111/j.1528-3577.2004.00162.x

Larson, E. L., Landers, T. F., & Begg, M. D. (2011). Building interdisciplinary research models: A didactic course to prepare interdisciplinary scholars and faculty. *Clinical and Translational Science*, *4*(1), 38–41. doi:10.1111/j.1752-8062.2010.00258.x PMID:21348954

Lattuca, L. R. (2001). *Creating interdisciplinarity: Interdisciplinary research and teaching among college and university faculty*. Nashville, TN: Vanderbilt University Press.

Lattuca, L. R., Knight, D. B., & Bergom, I. M. (2012). *Developing a measure of interdisciplinary competence for engineers*. Paper presented at the ASEE Annual Conference and Exposition, Conference. New York, NY.

Lattuca, L. R., Voight, L. J., & Fath, K. Q. (2004). Does interdisciplinarity promote learning? Theoretical support and researchable questions. *Review of Higher Education*, *28*(1), 23–48. doi:10.1353/rhe.2004.0028

Lehre: Ausgezeichnet! (2010). *Didactic prize at Karl-Franzens-Universität Graz*. Retrieved from http://www.uni-graz.at/lss/lehrpreis

Lime. (2012). *Suggested process for curriculum development*. Retrieved from http://www.limenetwork.net.au/content/suggested-process-curriculum-development

Manathunga, C., Lant, P., & Mellick, G. (2006). Imagining an interdisciplinary doctoral pedagogy. *Teaching in Higher Education*, *11*(3), 365–379. doi:10.1080/13562510600680954

Masembe, C. S., & Nakabugo, M. G. (2004). *Quality Assurance in curriculum development*. Paper presented at the NPT Programme on Building a Sustainable ICT Training Capacity in Four Public Universities in Uganda Curriculum Development Workshop, Institute of Computer Science, School of Education. Retrieved from http://ahero.uwc.ac.za/index.php?module=cshe&action=downloadfile&fileid=81806115511821580815495

Max-Neef, M. A. (2005). Foundations of transdisciplinarity. *Ecological Economics*, *53*(1), 5–16. doi:10.1016/j.ecolecon.2005.01.014

Mayer, P., et al. (2011). *Challenges for faculty management at African higher education institutions*. Retrieved from http://www.international-deans-course.de/idc-resources.html

MC. (2010). *Mattersburg circle for developmental policy at Austrian universities*. Retrieved from http://www.mattersburgerkreis.at/

Miller, M., & Mansilla, V. B. (2004). *Thinking across perspectives and disciplines*. Boston: Harvard Graduate School of Education.

MK. (2012). *Mattersburg circle for developmental policies at Austrian universities*. Retrieved from http://www.mattersburgerkreis.at/

Monarca, H. A. (2012). The influence of national systems of evaluation in curriculum development. *Perfiles Educativos*, *34*(135), 164–176.

Moody-Corbett, F. (1996). Debate: A tool for teaching graduate students. *The American Journal of Physiology*, *271*(6 PART 3), S45–S47. PMID:8997407

Mwinyipembe, M. (2012). *Quality assurance and standards*. Retrieved from http://www.education.go.ke/ShowPage.aspx?department=5&id=260

Nissani, M. (1997). Ten cheers for interdisciplinarity: The case for interdisciplinary knowledge and research. *The Social Science Journal*, *34*(2), 201–216. doi:10.1016/S0362-3319(97)90051-3

OBV. (2012). *Österreichische bibliothekenverbund und service GmbH (OBVSG)*. Retrieved from http://www.obvsg.at/

Omelicheva, M. Y., & Avdeyeva, O. (2008). Teaching with lecture or debate? Testing the effectiveness of traditional versus active learning methods of instruction. *PS - Political Science and Politics, 41*(3), 603-607.

Osborne, A. (2005). Debate and student development in the history classroom. *New Directions for Teaching and Learning*, (103): 39–50. doi:10.1002/tl.202

Ossimitz, G. (2000). *Entwicklung systemischen denkens – Theoretische konzepte und empirischeuntersuchungen*. Klagenfurter Beiträge zur Didaktik der Mathematik, Profil Verlag.

Paulsen, M. B., & Wells, C. T. (1998). Domain differences in the epistemological beliefs of college students. *Research in Higher Education*, *39*(4), 365–384. doi:10.1023/A:1018785219220

Perry, W. (1968). *Forms of intellectual and ethical development in the college years*. New York: Holt, Rinehart, and Winston.

Peterson, S. L., Wittstrom, K. M., & Smith, M. J. (2011). A course assessment process for curricular quality improvement. *American Journal of Pharmaceutical Education*, *75*(8). doi:10.5688/ajpe758157 PMID:22102747

Piascik, P., & Bird, E. (2008). Creating and sustaining a culture of assessment. *American Journal of Pharmaceutical Education*, *72*(5). doi:10.5688/aj720597 PMID:19214251

Pirsig, R. (1974). *Zen and art of motorcycle maintenance: An inquiry into values*. New York: William Morrow & Company.

Prager, S. D., & Plewe, B. (2009). Assessment and evaluation of GIScience curriculum using the geographic information science and technology body of knowledge. *Journal of Geography in Higher Education*, *33*(SUPPL. 1), S46–S69. doi:10.1080/03098260903034012

Reeves, S. (2009). An overview of continuing interprofessional education. *The Journal of Continuing Education in the Health Professions*, *29*(3), 142–146. doi:10.1002/chp.20026 PMID:19728376

Reeves, S., Tassone, M., Parker, K., Wagner, S. J., & Simmons, B. (2012). Interprofessional education: An overview of key developments in the past three decades. *Work (Reading, Mass.)*, *41*(3), 233–245. PMID:22398491

Ressler, R. (2007). *The concept base module at Karl-Franzens University*. Retrieved from http://www.uni-graz.at/en/evp3www/evp3www_studienservice/evp3www_basismodul.htm?=

Ried, L. D. (2011). A model for curricular quality assessment and improvement. *American Journal of Pharmaceutical Education*, *75*(10), 196. doi:10.5688/ajpe7510196 PMID:22345715

Rocca, K. A. (2010). Student participation in the college classroom: An extended multidisciplinary literature review. *Communication Education*, *59*(2), 185–213. doi:10.1080/03634520903505936

Rosenfield, P. L. (1992). The potential of transdisciplinary research for sustaining and extending linkages between the health and social sciences. *Social Science & Medicine*, *35*(11), 1343–1357. doi:10.1016/0277-9536(92)90038-R PMID:1462174

Rosenzweig, T., & Ahamer, G. (2009). *Strengthening the Azerbaijani initial vocational education in the field of agriculture. Paper AZ10/ENP-PCA/HE13 prepared for the European Commission*. Baku, Azerbaijan: EuropeAid and the European Delegation.

Rowlands, J. (2012). Accountability, quality assurance and performativity: The changing role of the academic board. *Quality in Higher Education*, *18*(1), 97–110. doi:10.1080/13538322.2012.663551

SAQA. (2000). *The national qualifications framework and curriculum development*. Retrieved from http://www.saqa.org.za/structure/nqf/docs/curriculum_dev.pdf

Saunders-Smits, G., & de Graaff, E. (2012). Assessment of curriculum quality through alumni research. *European Journal of Engineering Education*, *37*(2), 133–142. doi:10.1080/03043797.2012.665847

SC GS. (2010). *Steering committee global studies*. Retrieved from http://www.uni-graz.at/vre1www/vre1www-wfs/vre1www-steering-committee.htm

Schmidt, T. M., & Shaw, M. (2008). A new model for online doctoral course development with faculty quality assessment. *International Journal of Information and Communication Technology Education*, *4*(3), 69–80. doi:10.4018/jicte.2008070108

Schuurman, F. J. (1993). *Beyond the impasse: New directions in development theory*. Zed Books.

Science Watch. (2010). *Citation thresholds*. Retrieved on September 26, 2012 from http://www.sciencewatch.com/about/met/thresholds/

Scopus. (2011). *Information on SNIP and SJR*. Retrieved from http://info.scopus.com/journal-metrics/index.html

Scottish Government. (2011). *Building the curriculum 5: Quality assurance and moderation*. Retrieved from http://www.educationscotland.gov.uk/publications/b/publication_tcm4617374.asp

Simmons, B., & Wagner, S. (2009). Assessment of continuing interprofessional education: Lessons learned. *The Journal of Continuing Education in the Health Professions*, *29*(3), 168–171. doi:10.1002/chp.20031 PMID:19728381

Site, G. S. (2010). *Global studies web site (older version)*. Retrieved from http://www-classic.uni-graz.at/vre1www/, new version at http://www.uni-graz.at/globalstudies/

Spelt, E. J. H., Biemans, H. J. A., Tobi, H., Luning, P. A., & Mulder, M. (2009). Teaching and learning in interdisciplinary higher education: A systematic review. *Educational Psychology Review*, *21*(4), 1–14. doi:10.1007/s10648-009-9113-z

Stensaker, B. (2003). Trance, transparency and transformation: The impact of external quality monitoring on higher education. *Quality in Higher Education*, *9*(2), 151–159. doi:10.1080/13538320308158

Stirling, A. (2007). A general framework for analyzing diversity in science, technology and society. *Journal of the Royal Society*, *4*, 707–719.

Stokols, D., Fuqua, J., Gress, J., Harvey, R., Phillips, K., & Baezconde-Garbanati, L. et al. (2003a). Evaluating transdisciplinary science. *Nicotine & Tobacco Research*, *5*, S21–S39. doi:10.1080/14622200310001625555 PMID:14668085

Sturge, K., & Wolf, M. (2008). Editorial. *Translation Studies*, *1*(1), 1. doi:10.1080/14781700701705742

Sumaedi, S., Bakti, G. M. Y., & Metasari, N. (2012). An empirical study of state university students' perceived service quality. *Quality Assurance in Education*, *20*(2), 164–183. doi:10.1108/09684881211219424

Suskie, L. (2004). *Assessing student learning: A common sense guide*. Boston: Anker Publishing.

Sustainicum. (2012). *Sustainability in higher education at Austrian universities*. Retrieved from http://www.boku.ac.at/sustainicum/

Teagasc. (2012). *Curriculum development & standards*. Retrieved from http://www.teagasc.ie/curriculum/index.asp

Towell, E., McFadden, K. L., McCoy, W. C., & Buhrow, A. (2012). Creating an interdisciplinary business ethics program. *Journal of Academic Ethics*, *10*(2), 93–112. doi:10.1007/s10805-012-9160-9

Uchiyama, K. P., & Radin, J. L. (2009). Curriculum mapping in higher education: A vehicle for collaboration. *Innovative Higher Education*, *33*(4), 271–280. doi:10.1007/s10755-008-9078-8

UGO. (2012). *Uni graz online*. Retrieved from http://online.uni-graz.at

UNEVOC. (1993). *International project on technical and vocational education*. Retrieved from http://www.unesco.org/education/pdf/23_85.pdf

UNSTAT. (2003). *SNA: National accounts statistics: Main aggregates and detailed tables*. Retrieved from http://unstats.un.org/unsd/snaama/Introduction.asp

URBI. (2012). *Umwelt- regional- und bildungswissenschaftliche fakultät*. Retrieved from http://urbi.uni-graz.at/en/faculty/

USW. (2012). *USW reports: Reports on interdisciplinary practicals in the curriculum environmental systems sciences at Graz University*. Retrieved from http://www.uni-graz.at/usw1www/usw-1www_magazin/usw1www_berichte.htm

Vanasupa, L., McCormick, K. E., Stefanco, C. J., Herter, R. J., & McDonald, M. (2012). Challenges in transdisciplinary, integrated projects: Reflections on the case of faculty members' failure to collaborate. *Innovative Higher Education*, *37*(3), 171–184. doi:10.1007/s10755-011-9199-3

Vilgats, B., & Heidmets, M. (2011). The impact of external quality assessment on universities: The estonian experience. *Higher Education Policy*, *24*(3), 331–346. doi:10.1057/hep.2011.7

Vilsmaier, U. (2011). Responsivity as a transdisciplinary research principle. In *Proceedings 10th Annual IAS-STS Conference: Critical Issues in Science and Technology Studies*. Graz, Austria: IAS-STS.

Virtual Canuck. (2011). *The publish or perish book*. Retrieved from http://terrya.edublogs.org/2011/05/06/the-publish-or-perish-book/

Wagner, C. S., Roessner, J. D., Bobb, K., Klein, J. T., Boyack, K. W., & Keyton, J. et al. (2011). Approaches to understanding and measuring interdisciplinary scientific research (IDR): A review of the literature. *Journal of Informetrics*, *5*(1), 14–26. doi:10.1016/j.joi.2010.06.004

Watzlawick, P. (1988). *Ultra-solutions, or, how to fail most successfully*. New York: Norton.

Western Cape Government. (2012). *Curriculum development, quality assurance and research*. Retrieved from http://www.westerncape.gov.za/eng/jobs/256797

White, W. J. (1999). Academic topographies a network analysis of disciplinarity among communication faculty. *Human Communication Research*, *25*(4), 604–617. doi:10.1111/j.1468-2958.1999.tb00464.x

Witjes, N. Novy, A. Schlögl, M, & Obrecht A.J. (2012). Wissensallianzen für entwicklung: Entw icklungsForschungsNetzwerk(EnFoNet) – Strukturen, akteure &netzwerke der österreichisch-enentwicklungsforschung, Österreichische Forschungsstiftung fürInternationale Entwicklung (ÖFSE) und der Kommission für Entwicklungsfragen (KEF) bei der OeAD-GmbH, ÖFSE Ed. Nr. 18, Südwind-Verlag, Vienna.

Wolf, M. (2011). Mapping the field: Sociological perspectives on translation. *International Journal of the Sociology of Language*, *207*, 1–28. doi:10.1515/ijsl.2011.001

Wolverhampton. (2012). *Curriculum, learning and teaching, and academic quality assurance*. Retrieved from http://www.wlv.ac.uk/default.aspx?page=11717

Woods, C. (2007). Researching and developing interdisciplinary teaching: Towards a conceptual framework for classroom communication. *Higher Education*, *54*(6), 853–866. doi:10.1007/s10734-006-9027-3

Wuchty, S., Jones, B. F., & Uzzi, B. (2007). The increasing dominance of teams in production of knowledge. *Science*, *316*(5827), 1036–1039. doi:10.1126/science.1136099 PMID:17431139

KEY TERMS AND DEFINITIONS

Curriculum Assessment: Means the quality assessment of university curricula regarding the quality criteria set out in literature and in this articlechapter.

Global Change: Is seen here as the long-term change in global patterns of social, cultural, economic and environmental systemic patterns that in the present epoch may take the form of globalization, but in other epochs exhibit different change patterns.

Global Studies: Are developmental university curricula dealing with globalization, international equity and respectful development.

Globalization: Is understood here as the slow but steady change in systemic patterns of global trade, economics, culture, society and behavior; triggered among other things by easier accessibility mediated through communication technologies.

Graz University: Is Austria's second-oldest (since 1585) and second-largest (over 30,000 students) university in its second largest city of Graz (260,000 inhabitants) offering almost all important curricula in its six faculties. The latest innovation of this public generalist university is the interdisciplinary, intercultural, interparadigmatic and interfaculty Master's curriculum "Global Studies" operating since 2010.

Intercultural: Approaches combine different understandings resulting from the actors' entrenchment in different cultures and their adoption of differing values.

Interdisciplinary: Approaches combine understandings, models and views from different scientific disciplines.

Interparadigmatic: Approaches combine interdisciplinary and intercultural approaches; hence they respect both understandings stemming from different scientific disciplines and understandings from different cultural entrenchments.

ENDNOTES

1. Whereas the interesting literature review performed in the US by Spelt et al. (2009) used mostly literature bases provided by the more traditional US-based ISI Thomson retrieval system (SSCI, extended SCI, A&HCI; additionally ERIC), the present literature review used the literature base provided by more recently established Scopus.com (the European counterpart of ISI Thomson) that provides about twice as many journals, in-depth analytical tools as well as an extremely practical online option to search and directly retrieve full-texts of citing and cited literature.

This work was previously published in a Handbook of Research on Transnational Higher Education edited by Siran Mukerji and Purnendu Tripathi, pages 259-302, copyright year 2014 by Information Science Reference (an imprint of IGI Global).

Chapter 70
High School Teachers' Gender-Oriented Perceptions of Technology Integration

Tina L. Heafner
University of North Carolina at Charlotte, USA

Elizabeth Bellows
Appalachian State University, USA

Eric Groce
Appalachian State University, USA

Heather Coffey
University of North Carolina at Charlotte, USA

Mette Evelyn Bjerre
University of North Carolina at Charlotte, USA

ABSTRACT

Within social studies, researchers note limited attention has been given to examining gender differences associated with technology integration, and have called for increased dialogue regarding gender-related technology issues (Crocco, 2006, 2008; Crocco, Cramer, & Meier, 2008; Friedman & Hicks, 2006; Marri, 2007; Mason, Manfra, & Siko, 2005; Sanders, 2006). In response, this chapter explores the gender divide in secondary teachers' perceptions of effective technology integration. Using a qualitative research design, this chapter provides insight into social studies teachers' perceptions of their pedagogical practices and technology integration. The purpose of this study is to develop an understanding of the differences in male and female teachers' use of technology to teach and support student learning. Consideration of how technology is associated with gender-sensitive pedagogical thinking and practice may address the aforementioned gap in technology usage in social studies. Patterns uncovered in data analysis suggest that gender plays a critical role in social studies technology integration. The results from this study can inform methods in which technology is integrated into future social studies classrooms, particularly in emerging areas such as online courses.

DOI: 10.4018/978-1-4666-8246-7.ch070

INTRODUCTION

Over the past two decades, the Internet has become a useful tool for social studies teachers and students. Free access to a plethora of primary and secondary sources not readily available in the classroom (Cohen & Rosenzweig, 2006; Hicks & Ewing, 2003; VanFossen &. Shiveley, 2000) and an emphasis on historical thinking (Barton, 2005; Barton & Levstik, 2004; VanSledright, 2011; Wineburg, 2001) have been central factors in rationalizing technology integration within the discipline (DeWitt, 2007; Friedman, 2006; Hicks, Doolittle, & Lee, 2004; Marri, 2005; Martin & Wineburg, 2008; Swan, & Locascio, 2008). Moreover, national efforts have encouraged technology integration with expectations for frequent and successful applications with K-12 learners (c.f. CCSS, ISTE, P21, C3, and NCSS). External factors, such as the ubiquitous personal use of technology, afforded *anywhere, anytime* access to information and constant connectivity which furthered the expectation of technology as a primary learning tool (CTIA, 2011; Cellsigns, 2010; Pew Research Center, 2011). Students of the 21st century garner information through media and electronics at a much faster and more efficient pace than previous generations. Technological advances have both created and addressed growing student needs.

As technological advances have steadily entered the field of education, the impact of technology and media have contributed to each core subject area in a unique way (Anderson, & Williams, 2012). While technology tools became pervasive in some classrooms, overall the field of social studies has lagged in this process (Swan & Hofer, 2008). The National Council for the Social Studies identifies the primary purpose of social studies education as contributing to the development of responsible citizens (NCSS, 2014). Designing an environment where students can develop into successful global citizens while honing 21st century skills can be challenging, but not impossible. A "key component is the role educational technology can have in facilitating teaching and learning in social studies" (Green, Ponder, & Donovan, 2014). For example, Internet access and gaming have been documented as increasing civic engagement and participation (Bers, 2008; Lenhart, Kahne, Middaugh, 2008; Montgomery, 2009; Perkins-Gough, 2009; VanFossen, 2006). The availability of web-based instruction and access to the Internet, historical documents, diverse perspective, political campaigning, and varying geographic locations enable online social studies educators to pair social studies curriculum with 21st century skills in a 21st century classroom. The process of how research is done in social studies classrooms has radically changed with increased technology access (Bolick, 2006). Within elementary and secondary social studies classrooms across United States the integration of technology has enabled social studies educators to seamlessly interweave the various academic disciplines examined in social studies through online interactive lessons, video, maps, photos, digital archives, and access to historical and political documents (Berson & Berson, 2013; Brush & Saye, 2009; Friedman & Heafner, 2007, 2008; Harris, Mishra, & Koehler, 2009; Heafner & Friedman, 2008; Tally & Goldenberg, 2005; Whitworth & Berson, 2003). However, access does not always imply effective integration, quality instruction, or successful student use for discipline specific learning. At a fundamental level, access does not ensure that technology integration in social studies is ubiquitous.

In order to address the diverse needs of 21st century learners, several states and school districts have developed distance education learning platforms as supplemental academic support (Barbour, 2009; Barbour & Reeves, 2009). These state-initiated platforms eventually evolved from supplemental academic supports to full public, private, and charter virtual schools. Online learning is generally classified according to the following structures: supplemental, districted based, consortium, or cyber charter school (Cavanaugh, Barbour, & Clark, 2009). Twenty-five percent of all public education students participating in distance education courses are enrolled in social studies courses (Setzer & Lewis, 2005). Despite the increasing number of students engaging in online learning in social studies, there is limited research on web-based social studies courses. Whitworth and Berson (2002) reviewed 325 academic articles on social studies education over a five-year period and found that only one percent of the articles reviewed alluded to web-based social studies classrooms and students. Current research on web-based social studies courses offers a narrow understanding on the effectiveness of online course instruction and student achievement.

Examining the concept of meaningful learning in online contexts, Kerr (2007) found that web-based social studies courses utilize a wide variety of tools and instructional approaches to guide the students' learning experiences. Studies on online learning in social studies reveal no uniform structure of methods used consistently throughout web-based courses—such as synchronous or asynchronous communication, website development organization, or course-related activities (Doering, Hughes, & Scharber, 2007; Kerr, 2007). These studies also suggest limited peer-to-peer interaction occurs in web-based classes. The varying platforms for web-based social studies education, limited collaboration, and inconclusive research, coupled with insufficient academic gains, demonstrate a need for further research into best practice concerning web-based social studies courses. The inconsistencies in learning appear to be connected to teacher factors associated with innovative praxis (Journell, 2013).

Examining two decades of U.S. educational technology policy, Culp, Honey, and Mandinach (2003) described the incongruence between visions of technology and the practice that comes to fruition. Rationales for this gap between possibilities of transformative teaching and learning as well as implementation have been sought through examination of: a) discipline differences (Koehler & Mishra, 2008; Mishra & Koehler, 2006), b) teachers' pedagogical practices (Brush & Saye, 2009; Ertmer, 2005; Manfra & Hammond, 2008-2009; Wilson & Wright, 2010; Zhao, 2004-2005), and c) teachers' efficacy and perceptions of technology (Anderson & Williams, 2012; Huang, Hood, & Yoo, 2013; Sanders, 2006; Zhao, 2007). Others contend that gender maintains a prominent role in shaping technology use (AAUW, 2010; Huang, Hood, & Yoo, 2013; Lau, & Yuen, 2010; Saglam, 2011; Shashaani, 1993); yet, this phenomenon remains outside of the realm of social studies. Within social studies, researchers note limited attention has been given to examining gender differences as associated with technology integration (Crocco, 2004, 2006, 2008; Crocco, Cramer and Meier, 2008; Marri, 2007; Mason, McGlinn, & Siko, 2005). They call for increasing the dialogue regarding gender-related technology issues (Crocco, 2006, 2008; Crocco, Cramer and Meier, 2008; Friedman & Hicks, 2006; Sanders, 2006). In response, this study explores the role of gender in secondary teachers' perceptions of effective technology integration.

Implementing a qualitative research design, this study provides insight into secondary social studies teachers' perceptions of their pedagogical practices and technology integration. Specifically, this study describes male and female high school teachers' perceptions technology use in teaching and supporting student learning of social studies. Teacher interviews with twelve tech-savvy practitioners provide descriptions of content-specific technology usage as associated with teacher attributes and characteristics. Classroom observations triangulate teacher reports and were used to affirm the teachers' sense of comfort with technology. Consideration of how technology is associated with gender-sensitive pedagogical thinking and practice may help address the aforementioned inconsistencies in technology usage in social studies. As online learning experiences increase, especially in secondary schools, the ways in which male and female teachers conceptualize technology applications can provide guidance in advancing web-based pedagogy and course design. Patterns uncovered in data analysis suggest that gender plays a critical role in social studies technology integration. Recommendations for supporting gender-oriented technology usage and furthering the role of technology in secondary social studies are provided.

BACKGROUND

Do Technology Expenditures Precipitate Change?

In 1998, technology expenditures in K-12 public schools surpassed $5.2 billion (Petersons, 1998). By fall of 2000, 95 percent of America's public schools had access to the Internet (QED, 2000). In 2009, 97 percent of teachers had one or more computers in their classrooms creating a ratio of 5.3 students for every computer (Gray, Thomas, Lewis, & Tice, 2010). Billions of dollars were poured into technology with the hope that innovative use of technology would improve our schools. In 2011, approximately $2.9 billion dollars were spent on eLearning in K-12 education (Council of Economic Advisors, 2012). The capitalistic interest in education has also led to an increase in private financial investment in online education, an initiative that has the propensity to transform learning contexts.

Investments in online education have made significant impacts. Florida led the way in the development of K-12 online education programs (Rice, 2009). Florida Virtual High School and the Virtual High School of Massachusetts were of the first schools to emerge as full virtual schools. Twenty-five states currently have virtual high schools in operation (Watson, Murin, Vashaw, Gemin, & Rapp, 2013). Twenty-nine states and Washington D.C. have statewide fulltime online schools in operation (Watson et al., 2013). In 2012, Florida began to offer full and part time online learning options to K-12 students (Molnar et al., 2013). Arizona, Florida, Kansas, Minnesota, Utah, Washington, and Wisconsin also offer a variety of fulltime and supplemental options (Molnar et al., 2013). In 2006, Michigan became the first state to require an online learning experience for graduation from the traditional education setting. Other states followed suit by recommending online learning as a necessary experience for graduation. Arizona, Florida, Georgia, Louisiana, Michigan, and Minnesota allow students who participate in online learning to select courses from various providers (Molnar et al., 2013). A total of forty-four states have reported engaging some form of online learning activities in education (Picciano & Seamen, 2007).

Notwithstanding, investments are expected to produce returns, and in education that implies an expectation of daily, fully integrative technology usage. Policy makers believe that creating abundant access to new technologies in schools will directly increase teacher use in classrooms, which ultimately leads to better teaching and learning. Yet, the presence of technology alone has not always impacted classroom learning; nor has it changed pedagogical methods (Crocco & Costigan, 2007; Levstik, 2008; VanSledright, 2011). Simply adding new technological tools to the classroom often created new platforms for traditional methods and has yet to produce the revolutionary learning environment desired by policy-makers and business leaders for ensuring success of all students (Berson & Baylta, 2004; NCES, 2010; Zhao, 2007). However, online education encapsulates a profitable return on educational expenditures and has transformed learning opportunities.

In the 2009-2010 academic year, there were approximately 1.3 million high school enrollments in distance education courses across the nation (Queen & Lewis, 2011). As of 2014, it is approximated that 250,000 students were enrolled in fulltime online schools in the United States (Molnar et al., 2014; Watson et al., 2013).

Student enrollment in virtual schools increases with grade level. Secondary students utilize online learning platforms at a higher rate than elementary students. High school students enrolled in online learning programs are engaging the following types of courses: regular education high school courses, remedial courses, advanced placement courses, and credit recovery courses (Clark, 2001). Technology industry investments have driven policy-makers to position technology as an essential learning tool (AACTE Committee on Innovation &Technology, 2008, p. 21).

How has Technology Integration Impacted Social Studies?

Technology-driven changes depend upon teachers' dispositions and skills in embracing its potential. For over a decade, research has called for educators to "take stock of what realistically needs to be done to maximize the potential of the Internet and its associated instructional technologies in our schools" (Simpson, 2001, p. 133). Given that the integration of technology varies greatly across disciplines, schools, and teachers (Anderson & Williams, 2012), exploring content-specific applications becomes important.

In 2001, White contended that successfully integrating technology in social studies classrooms was a vital issue facing social studies educators, especially with the inconsistencies that exist in technology use. As researchers have noted, reluctant and slow integration among social studies educators has been an ongoing trend (Berson, 1996; Berson & Balyta, 2004; DeWitt, 2007; Friedman, 2006; Hicks, Doolittle, & Lee; 2004; Manfra & Hammond, 2008-2009; Marri, 2005; Swan & Hicks, 2007; Swan & Hofer, 2008; VanFossen, 2001; Zhao, 2007). In many social studies classrooms, technology has not been fully integrated as a fundamental component of the curriculum, teaching, and learning (DeWitt, 2004; Friedman, 2006; Mason, 2000-2001). While social studies teachers have developed their technological skills, technology integration has yet to reach its fullest potential to improve and redefine student learning. Evidence of learning outcomes associated with technology use is scarce.

Links between pedagogical practices and technology integration are well documented in social studies literature (Friedman, 2006; Hicks, Doolittle, & Lee; 2004; Manfra & Hammond, 2008-2009; Marri, 2005; Swan & Hicks, 2007; Wilson & Wright, 2010; Zhao, 2004-2005, 2007). Only limited evidence has been documented in technology-mediated, innovative, and transformative practices (Brush & Saye, 2009; Harris, Mishra, & Koehler, 2009). Research on secondary social studies teachers' practices has indicated that those teachers who use technology, specifically the Internet, use it primarily for low-order information gathering and access to primary sources (Friedman, 2006; Hicks, Doolittle, & Lee; 2004; Marri, 2005; Vanfossen, 2001). Rarely do teachers have students engage in activities that employ technology in significant ways that harness the potential benefits of the medium to transform learning beyond traditional processes (Cuban, Kirkpatrick, & Peck, 2001; Salinas, Bellows, & Liaw, 2011; Saglam, 2011; Swan & Hofer, 2008; Whitworth & Berson, 2003; Wilson & Wright, 2010). The inconsistencies in web-based pedagogy presents further questions regarding the effectiveness of technology (Doering, Hughes, & Scharber, 2007; Kerr, 2007; Whitworth & Berson, 2003).

Cuban, Kirkpatrick, and Peck (2001), sought to understand why technology integration remained static in secondary schools, specifically social studies classrooms, as technology became pervasive in personal and social realms. The authors offered two explanations: 1) a "slow revolution", and 2) the constricting nature and structure of secondary schools. First, the "slow revolution" suggested that incremental changes over time would accumulate into a slow moving transformation. Ultimately, technology would impact schools when enough time had lapsed to integrate *societal changes mediated by the infiltration of technology in all aspects of human life. This trickle effect led researchers to contend that evidence of technology-supported, transformative learning in social studies would eventually materialize. The increased use of web-based primary sources, interactive Web 2.0 tools, and 1:1 technology initiatives could be viewed as emerging pedagogies from the "slow revolution". However, these authors anticipated fundamental limitations to this idea and contended that the rigid structure of secondary schools would inhibit or at least slow this process. The fact that social studies has lagged behind in technology integration in comparison to science or mathematics supports this thinking. As the second explanation, Cuban, Kirkpatrick and Peck suggested that high school organization prohibits teachers from collaborating with peers and having the time needed to harness skills and tools that technology affords. They recommended creative thinking about how secondary schools could be restructured to open possibilities of technology-mediated learning beyond the confines of traditional school schedules. The growth of virtual schools and the increased private investment in schools can be viewed as supporting the authors' suggestions for structural changes. While online learning and virtual schools provide different educational contexts, the majority of students are taught in traditional school settings. The structural limitations of high schools still pose challenges.*

Beyond the organization of schools, students' interests have changed. Their palpable needs to be constantly connected and socially engaged have been strong forces pushing for innovations in teaching and learning. As an educator asserted, "Whether we like it [social media] or not that is how students communicate with each other these days. They actually thrive on connecting with their peers in numerous ways" (DeWitt, 2011, para 9). TPACK initiatives have sought to inform shifting pedagogies to more effectively address students' needs (Koehler & Mishra, 2008; Harris, Mishra, & Koehler, 2009; Mishra & Koehler, 2006). Social studies researchers contend that technology is the tool by which student-centered pedagogy can be facilitated (Brush & Saye, 2009; Heafner, 2002; 2004; 2013; Manfra & Hammond, 2008-2009; Mason, Berson, Diem, Hicks, Lee, & Dralle, 2000; van Hover, Berson, Bolick, & Swan, 2006; VanFossen & Shiveley, 2000; Zhao, 2007).

What is the Relevance of Gender in Determining Technology Applications?

While student technology use appears to be equitable among male and female students in elementary grades (AAUW, 2010), a gender gap develops beginning in middle school (Mitts, 2008; Sherman, Sanders, Kwon, & Pembridge, 2009) and is exacerbated in secondary schools (Anderson & Williams, 2012; Bannert & Arbinger, 1996; Mitts, 2008; Shashaani, 1993). Technologies in schools, especially the type of applications available, are geared more towards boys than girls, and boys utilize technology more often than girls (Borg, 1999; Washburn and Miller, 2005). By the time students reach the end of high school and are deciding on higher education or a career path, girls typically have less experience with computers and technology than boys their age, and feel less confident in their abilities to *do technology*. The lack of gender role models (i.e. female adults using technology in educational settings) advance notions of inferiority and frequently leads girls away from pursuing technology fields (AAUW, 2010; Frieze, Quesenberry, Kemp, & Velazquez, 2012; Lau, & Yuen, 2010). In effect, boys and girls are socialized in school to view computers and technology as *something boys do* (Borg, 1999; Mitts, 2008; Shashanni, 1999; Washburn & Miller, 2005).

When using technology in higher education courses, gender differences are present. Huang, Hood, & Yoo (2013) conclude that males and females perceive Web 2.0 applications differently when considering the use of technologies for completing learning tasks. Females prefer using technology for designing, communicating, and socializing relevant issues, while males tend to prefer technology for utilizing, building, constructing, and programming (Frieze, Quesenberry, Kemp, & Velazquez, 2012; Mitts, 2008; Sherman, Sanders, Kwon, & Pembridge, 2009; Weber & Custer, 2005). Females gravitate toward tasks that are perceived as having some social significance, while males choose activities that require creation of an artifact. Mitts (2008) defines male-oriented outcomes as *an end in itself* (i.e. concrete, discernable product) rather than a feminine-orientation of technology as *a social process for change* (i.e. abstract, theoretical, and moral). The overemphasis on product-driven outcomes commonly present in technology applications favor male interests over the types of task structures that would promote female interest. As a result, females experience greater levels of anxiety and lower comfort levels in using technology than males. Researchers attribute these differences as an outcome of gender stereotyping, which, they note, was further emphasized through formal schooling (Frieze, Quesenberry, Kemp, & Velazquez, 2012; Mitts, 2008; Sherman, Sanders, Kwon, & Pembridge, 2009; Weber & Custer, 2005). These studies suggest that participation between genders remains unequal and is associated with differences in perceptions of skills, task orientations, and task outcomes.

Present within the literature is a belief that gender is associated with technology use (AAUW, 2010; Huang, Hood, & Yoo, 2013; Lau, & Yuen, 2010; Saglam, 2011; Shashaani, 1993). Crocco, Cramer, and Meier (2008) posited that gender is not a gap, but rather an acknowledgement of a cultural difference worthy of further examination. Males and females are drawn to different attributes of technology; thus, they do not share the same interests or ideas for how technology should be utilized. In a review of literature from four leading social studies technology journals, these authors contend that without attention to gender "as part of the effort to integrate technology into education, any gains will have only limited impact" (Crocco, Cramer and Meier, 2008, p. 30). A gap in social studies research that examines the gender divide as associated with technology integration is acknowledged among researchers (Crocco, 2004, 2006, 2008; Crocco, Cramer and Meier, 2008; Marri, 2007; Mason, Manfra, & Siko, 2005). The need for expanding the conversation regarding gender-related technology issues (Crocco, 2006, 2008; Crocco, Cramer and Meier, 2008; Friedman & Hicks, 2006; Sanders, 2006) serves as the impetus for this study.

What Is the Culture of Technology in Secondary Social Studies?

Culture is a synergistic process for change (Frieze, Quesenberry, Kemp, & Velazquez, 2012). Culture shapes its members and is shaped by members who serve as active contributors. In classrooms and online courses, teachers and students contribute to the development of the learning culture. While students are important variables, for the purpose of the chapter, we will examine the role of the teacher in defining the academic culture and the context for learning. Our rationale for this emphasis is that while research identifies many factors affecting student achievement (Zuelke, 2001), the greatest determinant of student success is the influence of teachers (Collias, Pajak, & Rigden, 2000; Lasley, Siedentop, & Yinger, 2006; Sanders & Rivers, 1996). Researchers have found that the majority of the differences in measurable student learning outcomes can be directly attributed to the teacher (Darling-Hammond, 2006; Darling-Hammond & Ball, 1997). Thus, the influence of teachers can either be positive or negative depending on various teacher characteristics.

Social studies teachers control curriculum and the context for student learning (Thornton, 2005). Their cultural attributes define gatekeeping decisions and are often limited by their own perspectives. Sunal, Christensen, and Shwery (2010) contend that teachers must recognize that they may or may not share similar cultural views with students and this is a significant issue when teaching online. Forums for discourse facilitated by technology can become platforms for deliberative discourse when awareness of culture is present; however, when differences are not acknowledged, greater isolation and inequity can result. As the use of online learning continues to expand, the ways in which teachers build a respectful and accepting classroom culture in these environments is dependent upon the collective social presence instructors are able to establish among participants (Rubin, Fernandes, Avgerinou, 2013; Shea, Bidjerano, 2012).

The culture of technology, specifically the culture of technology in secondary social studies, is one in which teachers define the manner in which technology will used by students. As with any technology, the teacher is a central determinant (Green, Ponder, & Donovan, 2014). Characteristics of the teacher (e.g. age, gender, and pedagogical beliefs), reactions to the students whom they serve (e.g. Generation X and Y), and responses to external forces (21st Century Skills, Curriculum, Standards, Technology Expenditures, Teacher Evaluations) have been documented as influences shaping technology decisions in social studies (Heafner, 2013). In a meta-analysis of social studies technology research, Green, Ponder and Donovan (2014) call for more research examining differences in teacher motivations for using (or not using) technology. These authors suggest that "exploring teacher beliefs and attitudes about the purpose and usefulness of technology…can provide insights that could inform the work of teacher educators and those responsible for teacher professional development" (Green, Ponder & Donovan, 2014, p. 580).

In this chapter, we focus on one teacher characteristic that emerged from a broader study examining teachers' reports of technology use. Of these spheres of influence, the most profound factor that emerged from an earlier study was gender. Male and female teachers projected noticeably different perceptions of technology integration and gravitated toward dissimilar uses of technology in teaching and designing student tasks. The variance of learning opportunities with technology raises the importance of examining gender as a cultural influence in defining the role technology will play in secondary social studies. Patterns that emerged from high school teacher interviews are described to shed light on why gender is an important variable that shapes the culture of technology in secondary social studies. As online learning continues to grow and reshape secondary education, those who design and teach web-based courses will impact how learning experiences are conceptualized. Noting gender differences in approaches to technology as well as gender-oriented views of meaningful technology-mediated outcomes will influence the quality and effectiveness of online education.

TEACHERS' PRECEPTIONS OF TECHNOLOGY AND REPORTED INTEGRATION

Method

Using a qualitative research design, this study presents male and female teachers' perceptions of their technology usage in high school social studies. The guiding research questions are:

- How do male and female teachers describe their use of technology to teach social studies?
- Are there differences associated with gender in teacher perceptions of technology and reported uses of technology?

We seek answers to these questions by examining male and female teachers' perspectives of technology and technology integration within high school social studies courses. The study aims to explore depth rather than breadth in order to inform understanding of gender-oriented technology applications in secondary social studies. Teacher interviews provide a deeper understanding beyond the observational level (Rubin & Rubin, 2012) and were used in conjunction with classroom observations. Interviews allowed researchers to uncover gender-specific findings from teacher motivations for using technology that would have otherwise been hidden or unseen (Tracy, 2013). As a qualitative tool, interviews enabled researchers to obtain respondents' opinions and experiences (i.e. the subjective and depth of understanding). By conducting semi-structured interviews, we embraced an inductive approach and aimed at building explanations and answers depending on what emerged from the data. Approaching the research objectives in this manner allowed us to view the data through a naturalist perspective and our findings were therefore analyzed, interpreted, and given meaning contextually (Kvale, 2012; Rubin and Rubin, 2012).

Participants

The interviewees were a purposeful sample of twelve secondary social studies teachers from five high schools in the vicinity of the researchers' location and districts that have shown efforts to effectively integrate technology, and therefore represent a sample of teachers who are assumed to be knowledgeable technology users. Researchers conducted observations in each teacher's classroom to note the manner in which technology was used and to affirm the teachers' sense of comfort with technology usage. Of the twelve teachers interviewed, seven were female, five were male, and their ages ranged from twenty to fifty years old. Participants' teaching experience included a wide scope from one year to twenty-five years with an average of ten years teaching experience for both male and female teachers. The purpose of selecting this diverse group was to explore the potential of generational differences associated with technology experiences. One of the twelve teachers worked in a private school, and the remaining participants taught in public high schools, including two teachers who were working in a magnet school program. All the schools, including the private school, were located in urban areas, (i.e. counties with a population > 50,000). Participants were given a number to preserve anonymity and to avoid gender identification. Detailed descriptions of teachers are provided in the Appendix.

Table 1. Interviewee demographics

	Private High School	Public High School	Magnet High School
Male	1	4	2
Female	0	5	0

Data Analysis

The interviewees where solicited via email with information about the project and invitations to participate. As an incentive and a show of gratitude, participants were given a gift card at the conclusion of the study. Interviews took place in a two-week period, either on the researchers' university campus or at the participant's school, depending on the availability and convenience of the participant. During this span of time, we conducted three classroom observations of each teacher. Before each interview, the researchers gave a brief introduction to the project and provided each participant the opportunity to ask questions. Each participant read and signed an informed consent document before commencing. A responsive interview model was employed to capture the depth and context required for analysis (Rubin & Rubin, 2012), and unlike normal conversation, the model included: main questions, probes, and follow up questions. It was typical for researchers to balance these inquiries throughout the interview (Rubin and Rubin, 2012). The twelve interviews varied in length and lasted between sixty and ninety minutes, due to the responsive interview model employed and the semi-structured interview format, which allowed for ad hoc probing and the freedom of the participants to add context to their answers. All interviews were recorded on a portable voice recorder, saved on a secure hard-drive, later transcribed by a graduate assistant, and coded by the research team.

To analyze the interviews, we used a grounded theory approach (Glaser & Strauss, 1967), which, similar to our interview method, allowed us to focus on patterns that emerged from the data. Our grounded theory approach integrated a multi-step, constant comparative model (Glaser & Strauss, 1967; Rubin & Rubin, 2012) to discover theory by building themes and concepts from the data as the research team read and re-read the transcripts, coded and re-coded data, and redefined codes throughout the process. The constant comparative model allowed for continual comparison between codes and concept generation, consequently leading to continual re-defining and analyzing during the coding process (Glaser & Strauss, 1967). The analysis process consisted of four stages: (1) *Comparisons*. When coding, the researchers compared examples of the same code and thereby developed abstract concepts from the observations - abstractions needed for theory development. (2) *Integration*. In the process of developing codes and comparing them to each other, the researchers developed links between the codes and sought to discover how they were interconnected. (3) *Minimization*. The grounded theory approach produced an overwhelming amount of categories, themes and codes. In order to reduce the quantity of codes and condense the material to a manageable level, researchers met to determine these levels. A meta-theme that was present in all themes emerged during these meetings. This meta-theme of gender was selected as the focus. (4) *Writing*. In the final stage, the researchers developed the theoretical framework and identified the themes as related to gender as abstracts (Glaser & Strauss, 1967). These steps guided the data analysis process in this study.

We implemented four steps in our coding process. First, all transcripts were read and open coded - coding anything seemingly relevant. Researchers did not have any developed codes before starting this process and developed the codebook while coding. The open coding process was a way of sorting and summarizing the data in order to make some preliminary sense of what was emerging (Rubin and Rubin, 2012). Due to the grounded theory approach employed in this project and the constant comparative model that followed, researchers built validity into the coding process (Kvale, 2012). Regardless, to ensure high validity the researchers open coded all twelve transcripts independently and subsequently compared codes and interpretations. If researchers coded similar statements differently, discussion about how researchers arrived at that code enabled refining of concepts and building the codebook with consensus. For the purpose of this study, only codes relating to gender-associated observations were included.

In the second stage of the coding process researchers re-visited all transcripts and continued to adjust and refine codes as relevant to study objectives. In this stage, researchers listened to audio recordings while reading transcripts to capture auditory emphasis by the interviewees. Codes were verified and additional coding occurred. In the third stage of the coding process, the themes and codes were fully developed and sub-codes were recognized. We should note that the codebook was developed to function merely as an aid in the coding process to help conceptualize and organize emerging data. Based on patterns observed, frequency counts were tallied on codes to triangulate gender differences that emerged during data analyses and coding. These frequency counts were not intended to produce a quantitative analysis, but rather to provide evidence of observable differences associated with gender. The gender-associated themes and codes that emerged from the data are discussed in the following section. Codes are presented in the Appendix.

FINDINGS AND DISCUSSION OF RESULTS

Views of Pedagogical Beliefs

A focus of the broader study was to explore teachers' pedagogical beliefs and how these are associated with teachers' descriptions of their technology use. In examining gender-oriented pedagogy, males described themselves as more constructivist teachers than female teachers. In the interview, teachers were asked to rank their pedagogical practices on a continuum of 1 (behaviorist) to 5 (constructivist). All teachers indicated a greater tendency toward constructivism. However, males reported a higher mean ranking (4.10) than female participants (3.14). These differences were examined more closely.

To explore more in-depth teacher ratings, participants were asked to describe their beliefs in detail. Data excerpts that document gender differences were noted in Table 3. Males and females described themselves as student-centered; however, males tended to focus their explanations on increasing student autonomy. In contrast, female teachers emphasized the need for behaviorist approaches to ensure that students learned the essential information and to maintain student attention. Overwhelmingly throughout the interviews, female teachers noted a need for control over the classroom environment. The manner in which they maintained this control was frequently articulated as teacher-directed instructional practices. In contrast, male participants did not express a need for behavior management or restrictive control. They were more likely to indicate greater student freedom and decision-making in how learning was structured. These comments explain mean differences in perceptions of constructivist beliefs and practices.

Table 2. Teacher self rankings of teaching philosophy

	Teaching Philosophy (1=Behaviorist to 5=Constructivist)
Average	3.54
Female Average	3.14
Male Average	4.10
F-M Difference	-0.96

Epistemological orientations were not static. Males and females alike described vacillating along the pedagogical continuum, and linked these shifts to whether or not they were using technology, the course they were teaching (e.g. Advanced Placement, an elective, a STEM/STEAM social studies course), and the composite of students in each class. A comparison of two classes as described by a young female teacher provides an example of this movement between constructivist and behaviorist methods:

#12: *I think it looks different in the classes I teach. I teach Holocaust and genocide. I also teach AP US history. For Holocaust and genocide, I feel I've been able to experiment more with student-centered and student-driven learning because there's no way, especially when we get to the genocides to teach it all. I don't know everything about the Rwandan genocide or Darfur and so I have the students doing that research, creating visual digital essays is what I call them, where they share with their classmates, and ask hard questions. In these visual digital essays, students have to incorporate music and photographs and survivor testimony and such, so I've been able to experiment with them… That class does not like me standing up and lecturing to them. It's very much learning about the*

Table 3. Male and female teacher philosophy descriptions

Male Quotes	Female Quotes
#1: *I believe in teaching students to be historians rather than teaching students to remember history.... It's very hands-on, in terms of students doing things to master historical skills and ascertaining historical content. My classes are very active. I am a facilitator not a lecturer.... It's really a workshop model and kids are working with a purpose.*	***#5:*** *It's a hard question…. student centered? I guess I figure out where I want my students to be and then I try to find activities and ways to get the content to them to meet that goal so it kind of depends on the class. Like for an AP class our goal is of course to make a certain level on the AP exam so there we're focusing on practicing and testing and getting ready for that umm whereas like a class that doesn't have an end of course test it's a little bit more informal and I get to more decide what the goals are for the students* ***#5:*** *kind of dead center in the middle* ***#5:*** *I try to balance both.*
#2: *What I have found myself falling in love with more and more, the more I teach, is the idea of trying to foster a student desire for learning. The realization that I came to about two years ago was that an authoritarian figure in front of the room is not going to in any way instill a desire to learn... by diverting some of the responsibility for learning to them but also giving them a little bit more authority in deciding how it is that they learn and how it is that they go about the classroom process, I've found that ... they enjoy the process more and therefore try harder and get more out of it.... it also becomes an educational process for me.*	***#6:*** *I'd probably go between, uh, probably about to a…closer to a 4. I would say, cause I still, because, you know social studies is such a, a challenging, um, there's just such a wide gamut of information depending on the content you're teaching. There are some things you just have to make sure the kids know, the baseline stuff and then they can do some investigation, particularly with what I teach, you know I, um, one of the several subjects that I teach is civics and economics, and so the kids, you know, I have to give them basic stuff and then I so ok now go create this or go figure out how you do this, so um, that's why I said it's, I still, I can't go to a 5 just yet, because I still have to give them little bit of pieces of the puzzle.*

history of the Holocaust through the survivors, through reflection in those survivor testimonies, looking at documents doing a lot of group and team work, and so on. I've also been able to experiment with teams and student-partners instead of just grouping them where they can choose. But, they're responsible for their own learning. They are accountable to themselves and to their teams or partners. By evaluating themselves, as well as evaluating their teammates, on their contribution to the group in creating or doing they have a vested interest in the team's overall success.

#12: *[Concerning] AP US history, I'm sad to say that this is the part where I'm probably most nervous… [Pause]… to give the students control, because I don't know how else to ensure they learn the information they need to be successful. There is so much information in the AP curriculum that I feel I need to lecture. I don't love to lecture. I try to simplify as much as possible. A lot of the students struggle getting the information from their textbook at home, so then I feel like when they come in I at least have to spend 30 minutes going through the history in a timeline for them while telling a story describing the sequence of events. This structure is teacher lead. It's me up there in front of them and that's the class where I want do better with the kids taking ownership of their learning.*

Teachers' perceptions of students and curricular content guided these pedagogical shifts. Surprisingly, females were more cognizant of this and purposeful in noting the need for pedagogical movement between traditional and student-centered methods, whereas males did not directly comment about the motives driving their pedagogical vacillation. Yet, these shifts were noticeably linked to use and nonuse of technology. For example, teacher #4, described his teaching as student-centered instruction and rated himself as a 5 (constructivist). He stated that within the last year and as a result of moving into the STEM program, "I've become more of a constructivist." He expressed:

#4: *Yeah it's STEM focused and it's all project-based. So every bit of the curriculum we create. We have a design cycle that we use for anything from a rough draft of an English paper to some kind of photography project or portfolio. Students approach every project or presentation with that design cycle thinking. It's all PBL, project based learning; so, we actually create a driving question as a group. We always begin with a question. The question is open ended question; it may not have a definitive answer, but it's got tons of answers. The kids through research, through trial and error, you know through scientific method, come up with the solution. They create something that shows us [the class and peers] that and what they've learned. Our approach is that we just give them a basis, a framework. They go from that framework and discover the rest of the content on their own. So it's learning by doing…*

Later in the interview, when asked to provide an example of when he does not use technology, he commented,

#4: *Yeah but it would be more limited, you know, what I would have access to. I have a regular civics class, civics and American government, I teach. That class is mostly 10th graders with some 11th graders who have taken it before, a repeat course. This course is not STEM so it's not project based. It's more your traditional lecture, note taking, vocabulary comprehension, and unit project type course. Maybe that's not, you know, the overall method but it [lecture] supplements the content. So, I wouldn't pull out the laptops, Mac books or whatever's available. The pc laptops or the iPads that are in the library are difficult to use. I have to rent those, check those out. When I do, students are using PowerPoint, Keynote, you know, they're using simple software like that…*

Even though he reports using technology, it is much more simplistic (i.e. traditional) and is limited in comparison to his STEM courses which embraced advanced technology applications and a more student-centered focus. This not only raises concerns about equitable access for students, but also a clear gender difference in how instructional practice is perceived.

Links between teachers' pedagogical beliefs and how they integrate technology were present. These were not gender specific, but provide evidence of technology driving pedagogical change. Constructivist, student-centered teaching seemed essential for more sophisticated technology uses. A female teacher explained how technology shaped her practice,

#6: *Well I think if we're able to integrate it [technology] successfully, and if the kids are doing what they're supposed to be doing, then they're able to really direct their learning more, because now, now that's taking into account that as a teacher I've put together the plan for them. You're going, I've given them some good instructions, they're going be able to go and find this, and it enables them to say, ok I'm going to discover this on my own, because I'm going go to this website or I'm going to ask this question and find it, … and then we can come back…*

#6: *…technology use enables constructivist learning, because it's kind of putting the learning in their hands. If I give them the set of questions or a WebQuest and they have to go find...that information, and I think it enables, it takes a lot of the big load off of me. Rather than staying there spoon-feeding information, it really puts the responsibility on them, to go and find that information...*

A few comments made during several points in the interview from a fifteen-year veteran, male teacher eloquently expressed this connection be-

Table 4. Male/female technology usage and confidence average ratings

	Immigrant (Learned to Use Technology as an Adult) or Native (Grew Up Using Technology)	Technology Confidence
Average	3.96	4.25
Female Average	3.79	4.21
Male Average	4.20	4.30
F-M Difference	-0.41	-0.09

tween technology and student-focused learning. Here are examples from the transcripts,

#9: *I would say that the current kind of movement towards really making learning more student centered lends itself well to technology because you have, they have access to so many resources and you really can set it up for them to look through content even if it's simple like a WebQuest or something like that. They can build a text book or write a chapter to a book and make it look great....*

#9: *I think technology is driving student centered learning.*

#9: *I think the philosophy is, it's [technology] not reactive but it's adaptive. I think student centered learning can be done very well through technology...*

Moreover, teacher #1 (male) suggested that a "philosophical shift" was needed before effective technology integration could be achieved. He further recommended, "The first little step of that pedagogical shift is getting them [students] comfortable with technology and really working with them on how you choose the tools you choose for each assignment. And then our second part of it, is... pushing toward a workshop model…where we're modeling work and then kids are doing work by replicating processes not just creating a product."

Gender Differences in Perceptions of Technology Usage and Confidence

During the interviews teachers were asked to rank themselves on a scale of 1 to 5 about technology usage and confidence (See Appendix). Table 4 shows the overall average, the female and male averages, and the differences between the female and male averages. Male teachers ranked themselves higher on both questions. The males perceived themselves closer to native technology users than the females, and the male teachers perceived themselves as more confident in technology usage than female teachers.

In each interview, males rated their confidence and abilities at either a four or five. Examples of highly confident and comfortable male responses follow:

#1: *[I would rate myself a] five in that I can figure out what I want do, when I want to do it. I don't have any trouble once I get technology. What I have learned is that I don't know all of the tools, which is why I rate myself a four on comfortableness or knowledge of it. Five on comfortableness because once I find a tool, I watch, then I play, and then I figure out how to use it. That's why I don't, I don't feel uncomfortable taking something I don't know and figuring out how to make it work.*

#4: *"I wouldn't say if five was a digital native I'm old enough that I can remember having to go visit people instead of sending them a text* *message. So I wouldn't say I'm a complete digital native, I have acclimated very well to the technology.*

Female ratings ranged from two to five. Variation in confidence could be associated with age differences of teachers. The presence of a generational gap among females was evident, while not present among males. Younger female teachers with teaching experience between one to six years all ranked their abilities and confidence at a four or five; while, the more experienced teachers ranged from a two to four. Table 5 provides evidence of both female differences in technological confidence as well generational gap differences.

Interestingly, even though males noted potential limitations in their skills, their ratings remained high. For example, teacher #2 who has been teaching over ten years commented,

I would rate myself as a five except for the rare moments when I complete or totally get thrown, I am when it comes time for any sort of trouble shooting, I am absolute garbage, I want it to work, I want to know how to operate it but when it comes to, the color on my smart board has been flickering the last week and I have got no idea what to do with it and if I didn't…since I don't have a competent tech director it's just that color is going to flicker kids I don't know what to do with it, I'm great with software, I am rubbish with hardware…

Similarly, an experienced female teacher of 25 years, teacher #7, rated her skills and comfort as a three, four and explained that she was,

Fairly comfortable, I feel pretty good about it [technology]. Of the reasons I feel comfortable about it, honestly, is because the relationship I have with my students is such that they love to help me. If I'm in a bind and don't know exactly, I mean like they manoeuvre around. They are much more skilled at using technology than I am. So, I'm going to; I've done my research; and I got my stuff together. I know what I'm doing, but I know if I hit a glitz, somebody that's sitting in my room can fix it. The bottom line is that my skills are nowhere near that of my students. They are very comfortable and confident in using technology.

Table 5. Examples of female confidence quotes

Less Confident	Confident:
#6: Rating of two. Some teachers …have been able to do that.... There's some software out there where kids will have a certain amount of time that they go and do a quiz or a test and they have to have it submitted by a certain deadline. Some do that, and you know, that's great if that's what you think works…I'm just not real comfortable doing that yet.	#3: I'd say a 5=five just because after during my undergraduate studies and while we were in our education program, we did a lot with technology. And then... we have the STEM program which I'm going to be working in next year. We do have a lot of technology resources in the school which includes iPads, iPhones, and netbooks. I feel, just with my generation, that I'm very much familiar with technology and I am really creative with technology. I feel very comfortable being able to pick up an iPad and do things in a classroom that some teachers would absolutely positively freak out over…
#5: I'm definitely not a super user. I'd say more of a three, kind of in the middle. Sometimes I'm more comfortable than others. The iPads are still pretty new to me. I don't have my own. So when I get them I have to teach myself how to use them with my PowerPoints and the smart boards and resources I've developed. I feel really comfortable with these now, because I've been using them for a couple of years.	#10: …not that I have necessarily used everything or that I am completely proficient in everything, but I am pretty self-reliant when it comes to learning new technologies. I have actually presented at a state conference about using technology in the classroom. So, I always feel like I'm pretty confident on that scale. Interviewer: Okay, how comfortable are you using technology? #10: probably a five Interviewer: So, you're completely comfortable… #10: Yeah. Interviewer: …with using new software and new technology? #10: Oh yeah.

While both noted weaknesses and limitations in their skills, overall, male teachers expressed a more positive perception of their technical skills and confidence in using technology.

Most notably, female teachers all reported a desire to "...do better with the use of technology in my classroom" [#12]. Every female teacher expressed sentiments that their technology usage was not at the level it should be, and articulated a desire for professional development opportunities to hone their skills for technology integration. They conveyed a need for more content-specific applications rather than generic STEM focus examples present in mandated professional development opportunities. These findings mirror gender-based research technology usage that while technology differences between males and females often do not exist, males tend to have greater efficacy in their technical skills (Anderson & Williams, 2012; Huang, Hood, & Yoo, 2013; Lau, & Yuen, 2010; Saglam, 2011; Shashaani, 1993). Furthermore, results affirm prior findings that women internalize and personally blame themselves for perceived technological inferiority (Frieze, Quesenberry, Kemp, & Velazquez, 2012; Huang, Hood, & Yoo, 2013; Mitts, 2008; Sherman, Sanders, Kwon, & Pembridge, 2009; Weber & Custer, 2005). These findings offer implications for blended or online learning. Differences in efficacy among male and female teachers could impact who is chosen to develop or deliver web-based instruction. If this becomes gender inequitable, it may perpetuate female teachers' sentiments toward technology, as well as reduce female models of advanced technology users, which has broader implications for high school and college bound girls.

Access to Technology

Teachers associated a gap between how they envisioned themselves using technology (fully constructivist and seamless integration) with the lack of access. They frequently noted that lack of access can be a barrier to more constructivist pedagogical methods. Their perceptions of the lack of accessibility were associated with specific types of hardware. Classroom observations revealed that each teacher had a computer in the classroom, and all had Internet access. The challenges described by teachers were limited advanced technology tools, specifically iPads, and the differences in longevity in having classroom technology resources (e.g. SMART Boards). The incongruence in teachers' visions of the possibilities of technology and the access to technology tools, like smartphones, was noted. A pattern that emerged was that differences in access were gender-specific. Females reported greater barriers due to access issues. One veteran female teacher noted, "I found... that it was an issue for me sometimes having access to iPads. For example, when I wanted to use it…I'd come up with a great project and unless you had it [a reservation] way out in advance you wouldn't be able to get those iPads" (#5).

Envisioned Possibilities—or Inequitable Campus Distribution?

In their descriptions of technology integration, teachers shared both their vision of the possibilities of technology as well as the practicality of classroom applications. For example, a male teacher in a general classroom [#9] commented, " I know my challenges on a daily basis to get through the curriculum and to grab the technology that I need to integrate meaningfully, sometimes it's a challenge to get it as much as I would like." (citation) These gaps between visionary goals and practical applications could be attributed to access barriers. Surprisingly, access of our sample was not gender equal. Several male and female teachers taught within the same school, but they were assigned different responsibilities (e.g. STEM, curriculum coach), which were linked to greater technology access. In one particular school, distributions of SMART Boards had occurred over several years. Within this school's social studies department, one male received the department's first Smart Board five years ago, whereas two female teachers had a SMART Board installed in their classrooms within the last two years. Furthermore, the male teacher who taught in the STEM program at this school had access to iPads. This 1:1 iPad program provided all students with individual iPads for in school and at home usage. From observations and school visits, the inequitable pattern that was present in this school also existed among other schools.

Access to Technology Tools

A female teacher who had recently moved to her current school highlighted inequalities in access across schools. She noted some schools have a computer/iPad per student and other schools must share technology resources. In contrast to the 1:1 iPad school, the teachers in this study had access only to shared computer labs or iPad carts. This teacher was a young teacher with four years of teaching experience and wanted greatly to integrate technology, as she had been able to do in her previous technology-rich teaching environment. She commented,

#10: *Anytime that I'm not using it is just, it's just access and that was something that the school I had previously been at we were 1:1, our students all had computers and we were a very technology rich environment. Now that I'm in a traditional school, um, it's {laughter}, it's sort of survival of the fittest whoever can sign up for it first, so it, limited access is the big thing.*

To equalize the playing field, in the year this study was conducted, the school districts in which these teachers work implemented a BYOT policy: *Bring Your Own Technology*. This allowed increased access for some students and teachers. The most common technology tool used under this policy was a smartphone. For teachers though, this seemed limiting since the resources were not standardized, and not all students had access to a smartphone. In addition, the wireless routers on campus, also recently installed, were inconsistently reliable. These results led us to question the rising inequalities in access among schools and within schools. Furthermore, we were concerned about the inequities for female teachers as well as the students they serve. The numbers reported in technology access studies fail to present an accurate picture of inequitable resource distribution on a national scale (NCES, 2010).

When technology was in abundance, as was the case in the 1:1 iPad STEM program, access produced results. The motive for using technology was teacher accountability and teacher evaluations. Seamless integrated technology was expected to justify county expenditures.

Interviewer: *It sounds like technology is heavily embedded in the classroom.*

Teacher #4: *In this program [STEM] it is, in my classroom yes ma'am it is and it's had to be. The county paid a ton of money to get this program here … and they thought you know we're going to give these kids the opportunity with as much technology as possible, readily available, so you know, they wanted to come in our classrooms and see it being used, they didn't want to come in and still see kids you know doing this with a notebook....*

Subject Priority as a Determinate for Technology Access

Another variable affecting teachers' access to technology was that they taught social studies. As teacher #10 observed,

#10: *I think that [access is] the big thing for social studies, and I hate to get on the political soap box here but I think in, within a school, what I said about access, is big and I know that within most schools social studies is not the priority and I think that when it comes*

> *to having access to that technology I think that math and science and English classes are going to be the ones to get the upper hand, because they're, and I hate to say this I don't think every administrator feels this way but I think at a lot of schools those are valued over social studies, and I think that has a lot to do with our access to it.*

She was not alone in this observation. Four other teachers made reference to limited access to technology as a result of the STEM subjects and Common Core courses, which were given preferential access. Regretfully, these findings support marginalization research acknowledging the subordinate role the social studies has been subjugated to in schools, and the potential ramifications at the secondary level (Fitchett & Heafner, 2010; Fitchett, Heafner, & Lambert, 2012; Heafner & Fitchett, 2012). Perhaps the silos of disciplines within the secondary environment create fundamental barriers to technology integration (Cuban, Kirkpatrick, & Peck, 2001). A possible solution to the imbalance of subject area priorities is the potential that blended and online learning afford. Given that one quarter of web-based courses are social studies (Setzer & Lewis, 2005), the opportunity for social studies teachers to utilize innovative platforms for learning that are not limited to the hardware available in schools is apparent. The school with the greatest number of participants in this study is taking strides in this direction with the experimentation of providing online social studies courses and a "power hour" for students to engage their social studies teachers with questions derived from their web-based learning.

Perceptions of Impact of Technology on Teachers' Work and Workload

Male and female teacher differences were quite noticeable in how they responded to the impact of technology on their preparation, teaching, and overall workload. To provide an overview of the wealth of information present in the teacher interviews, we attempted to visually present these differences using frequency counts of teachers' descriptions of subcategory concepts related to work perceptions of increased ease or difficulty of workload.

Perceptions That Technology Makes Work Easier

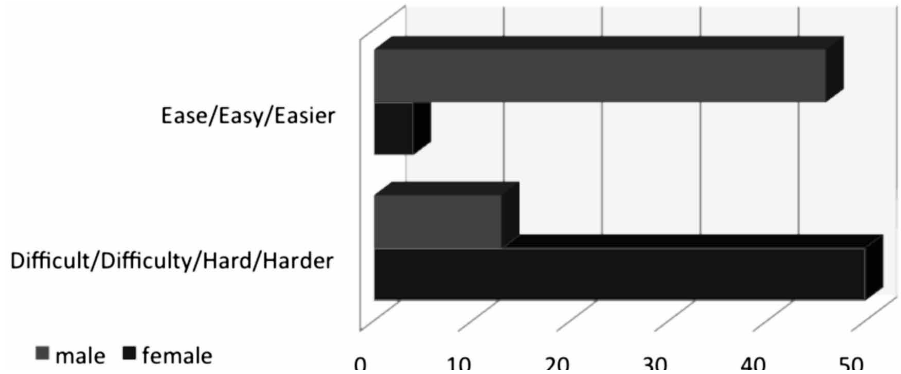
In our coding process, we had noted many occurrences of words that were associated with simplification of work (e.g. ease, easy, and easier) and words describing increased complexity as a result of technology (e.g. difficult, difficulty, hard, harder). We tabulated the frequency of males' and females' use of these words to describe how technology impacted their work. Figure 1 demonstrates the gender differences we observed in teacher interviews. Males talked the benefits of technology in an overwhelmingly positive manner. For example, Teacher #2 defined technology as "a tool or device, usually we're thinking now electronic, that makes an existing process easier or allows some sort of a new task to be accomplished" [Teacher #2]. Other male teachers echoed these sentiments when describing technology, such as:

> ***#9:*** *I would define technology as anything that helps and it doesn't have to be the student but you know in society anything that's going to help what we're trying to accomplish. If it makes something easier, simplifies a process then it's actually classified as technology.*

Male teachers also expressed a belief that the use of technology reduced their preparation time. Teacher #4 commented,

> ***#4:*** *I mean it [technology] makes my job super and simpler…*
> ***Interviewer:*** *it makes it easier?*

Figure 1. Gender differences in perceived impact of technology on teachers' work



#4: *It makes it a lot easier. I don't have to have a huge file cabinet full of worksheets. It's all at the touch of a couple of buttons.*
Interviewer: *so it doesn't intimidate you in any way*
#4: *No it doesn't intimidate me at all umm, technology no it doesn't. I mean it makes my day easier, it makes planning lessons easier.*

Teacher #8 commented,

#8: *I think it [technology], it enhances and makes it easier on me because the students know of and can find more sites, research-based sites than I'm aware of. I think it's helped because I don't have to do as much preparation. I can say, you know, within some parameters this is what I want you to find, go find it and they can do a great job of finding the information and presenting it in ways that I'm not familiar with.*
Interviewer: *OK. So it reduces some of your preparation time?*
#8: *It does because kids can to a lot more on their own.*

Perceptions That Technology Makes Work Harder

While males indicated that technology made their work easier, females conversely reported that work had become harder and more difficult as a result of increased technology usage. Perhaps an explanatory factor was the observed generational gap among females. Yet overall, females of all ages perceived technology as requiring greater preparation time. Another possible explanation was that male teachers have greater exposure to technology and many technology programs are male-oriented (Borg, 1999; Washburn & Miller, 2005). Additionally, female teachers perceived the need for greater teacher attention and monitoring when technology was utilized in the classroom. This level of awareness increased teacher supervision of students in order to reduce technology-mediated distractions and to keep students on task. For example,

#10: *I think it [technology] actually makes things… more difficult. I think a lot of people think it makes it easier. I think in a lot of ways technology can make the classroom much more stressful and more challenging. You know, when the students have access to any information, they're connected to the Internet and that opens a door for inappropriate behavior. That opens the door for students doing something that they're not supposed to do. So, I think from a classroom management perspective technology definitely increases how much you have to monitor students.*

Teacher Control

Another area in which gender differences were found was in the perceptions of teacher control. Female teachers described more concerns regarding a need for classroom control and managing student behavioral changes as a result of technology use. We present frequency counts to share visual differences in the number of times female and male teachers referred to these sub-codes.

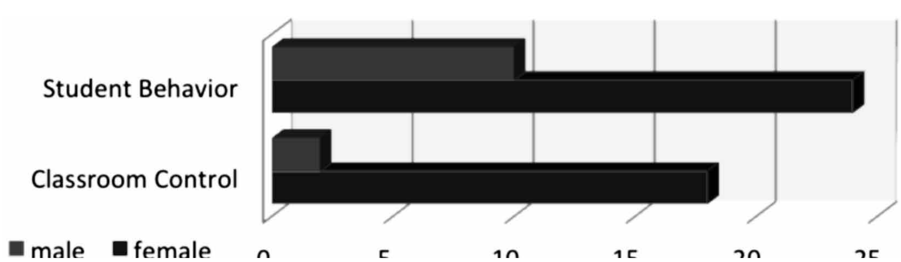
Female teachers reported a need to control the classroom, yet male teachers made little connection to control as a factor associated with technology integration (see Figure 2). Teacher control was a prominent issue that informed female teachers' decisions to teach without technology. For example,

#10: *I can even say that for myself. I have one class that just behaviorally that can't do a lot of student-centered activities because they don't have that self-control component to complete it. And, I will tell you if you look and compare these students to my other classes, they use almost zero technology on their own, because they haven't gotten over that behavior problem yet. I think that absolutely having a student-centered classroom will allow you to use any technology you want. This is unless you're in a classroom that you don't want it to be student-centered or the students can't handle that then I think that absolutely affects how much technology is being used, without a doubt.*

Generational differences among females were not present when examining classroom control. A need for control might explain a female tendency toward behaviorist pedagogies. In addition, it may be an indicator of female internalized pressure for accountability (teacher evaluations are connected to technology use) and gender roles within Western culture (Huang, Hood, & Yoo, 2013). The frequently mentioned concern for behavior issues as a deterrent to technology use was also a female phenomenon. Student behavior was consistently described in conjunction with perceptions of control.

The ability of male teachers to freely shift learning autonomy to students was not shared by female teachers. Results affirm prior findings that women internalize and personally hold themselves accountable as well as experience greater levels of workload stress (Frieze, Quesenberry, Kemp, & Velazquez, 2012; Huang, Hood, & Yoo, 2013; Sherman, Sanders, Kwon, & Pembridge, 2009). Hargreaves (1994) and Apple (2000, 2004) provide further insights into the gender roles in education and the ramifications for female teachers. Apple (2000, 2004) situates intensification in the context of the proletarianization and gender stratification of teaching. He argues that intensification of teachers' work has deskilled and undermined the professionalism of a predominately female work-

Figure 2. Gender frequencies for regarding limitations to technology



force. The findings from this study suggest very different workplace perceptions, in which female teachers experience workplace intensification that is associated with technology usage.

The need of female teachers to maintain control and to monitor student behavior when using technology, in contrast to male teachers, has the propensity to influence the manner in which teachers approach online learning. Male teachers may gravitate toward online tools that encourage more student autonomy and independence, while female teachers may instruct online courses with greater student oversight and monitoring. Given that one of the major uses of online learning currently in high schools is credit recovery (Queen & Lewis, 2011; Setzer & Lewis, 2005). We suggest that female teachers may be better suited to work with struggling students who might not have the skills needed to function independently in online learning environments.

Perceptions of Technology as a Teaching and Learning Tool

Technology and Student Engagement

The propensity for male teachers to open the social studies classroom to greater student freedom and choice is present in the frequency with which males describe the use of group work and collaboration in their technology integration. This shift of learning accountability from teachers to students was a more common description among male teachers than female teachers. As one male teacher commented,

#9: *My approach as far as learning within the classroom and technology use, it's a mixture of methods. I would say I do a lot of group work. It's very discussion oriented. I try to get the kids to think critically not only in answering writing prompts and through guided questions, but also through group discussions, which include mixed groupings like small partner groups, a few students working together, and also in whole class settings.*

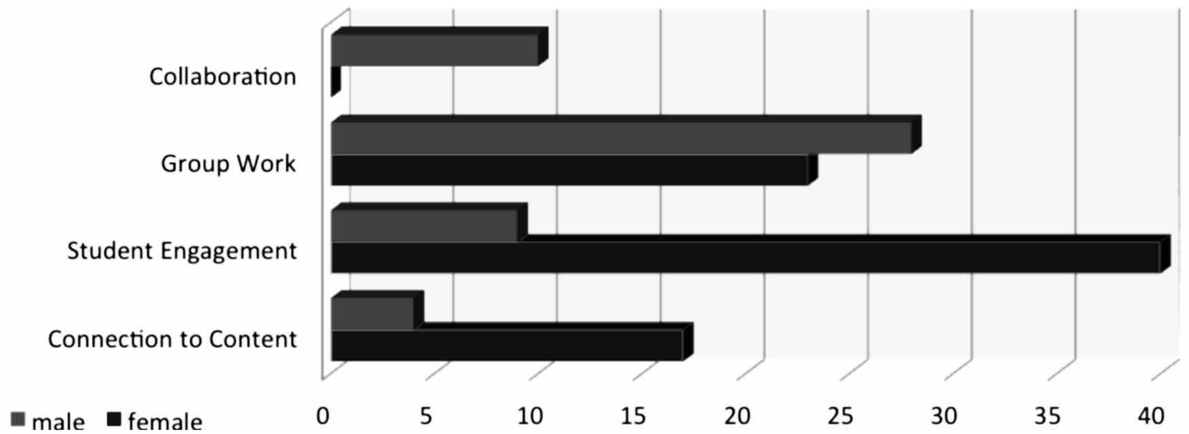
#9: *I actually have reduced the use of my smart board this year significantly....I think as far as interactive games go and so forth I've kind of turned that over to the kids because we have iPads and iPods and other portable technologies like these.*

Males provided examples of student technology uses in which students engaged in blogs, class Dojos, Twitter, digital games, Voice Thread, Toondoo, Edmodo, and other collaborative web-based tools. Technology for males was viewed as a tool for promoting interactive discourse, cooperative learning, and engagement with others as a process to support learning.

When female teachers talked about student engagement or student-centered learning, it was associated with some form of discourse. Discussion and dialogue were always described in the context of a face-to-face class activity, such as a Socratic seminar or debate, and rarely used when talking about technology tasks or classroom applications. The sheer frequency differences in how participants contextualized collaboration and discussion is surprising. While research suggests that females gravitate toward communicative technology tools (Huang, Hood, & Yoo, 2013; Mitts, 2008; Sherman, Sanders, Kwon, & Pembridge, 2009; Weber & Custer, 2005), these female teachers did not perceive technology as a tool for supporting classroom dialogue. For females, interactive exchanges were articulated as feedback loops between the teacher and students.

Research acknowledges female oriented perceptions that support affective educational experiences (AAUW, 2010; Frieze, Quesenberry, Kemp, & Velazquez, 2012). Our findings affirm this gender sensitive impact. Females viewed the role of technology as a tool to engage learners, to capture their attention, and to interact with content. As an example,

Figure 3. Purpose for using technology



#11: *I think social studies can by nature be boring, unless you just have a natural love for it. I think it really can be horribly boring especially for kids that hate it. They don't see its purpose, such as their "when am I ever going to use this" type thinking. I think you can utilize technology in so many different ways to make content seem more relevant and make what we are studying seem more real. Technology engages them in content. If anything, I use it to get their attention to focus on the content.*

Another female teacher stated,

#3: *So I'm not saying that they need to use technology to constantly entertain them, but the more creative you [teachers] are I think with technology in the classroom, the more engaged this generation stays.*

#3: *…When I use technology it's just to engage and interact with the kids…*

Furthermore, female teachers talked about technology as a medium for connecting content and making learning relevant for students. For female teachers, technology applications needed to support students in learning content, or technology tools should not be used. Female teachers articulated content connections and content learning as technology-mediated relevance. The use of visual primary sources was a strategy used to demonstrate a concept or to describe an event. For example, Teacher #6 described

#6: *[The use of technology] absolutely impacts my lesson planning, because I'm now looking more and more at things that I can get kids doing. To make the content more relevant technology becomes an important resource.*

#6: *The big thing is relevance. Relevance in social studies is important. You know, you talk about Congress to kids. Well then, get out there and research what current bills are in legislation, what topics are being deliberated, and which bills are being debated. Or if you're talking about a current genocide, go see what the United Nations is doing about it right now. Go see what some of those members are saying. It's just, content relevance. I think relevance is a big part of being able to use technology effectively.*

This female-oriented view of engagement differed greatly from male colleagues who rarely used the term *engagement* to describe technology integration motives. Male teachers described *content* as the primary driving force to initiate student interest. Male teachers also rarely justified the use of technology to create content connections. Rather, male teachers described technology as a medium for building contextual knowledge and supporting the development of background content knowledge. Many of the applications males described using included web-based visual tools, such as content videos, Geographic Information Systems (GIS), and interactive gaming. One male teacher's comment epitomizes this difference and highlights the contrast in gender perceptions:

Interviewer: *"so when you do use the technology what's the primary reason for using it in your class? Either by yourself or having the kids use it?"*
#9: *Access to information. And I use it as a pallet to demonstrate learning or build upon prior learning.*
Interviewer: *Okay, a lot of teachers have said to me that they feel the use of technology is helping them to catch the students' attention and keep them attentive basically.*
#9: *Yeah engaged*
Interviewer: *engaged, do you find that?*
#9: *Some of the applications I do but not all, I think the material, not the technology, is probably the prime determinant of what makes students interested and engaged.*

Males did not share the same vision as females regarding technology as a tool to create content relevance, nor did they see technology as a way to get students' attention. Instead, male teachers noted that the newness of technology wears off and that it no longer impacts student interest as it once did when it was new and unfamiliar. When males described the purpose of technology, they focused on student familiarity with technology as an asset to promote greater understanding of content.

#8: *…Well with students using so much more technology in their daily life, I think it's becoming more and more necessary to utilize technology from a student's standpoint because that's what they know…*
Interviewer: *So when you do use technology, whether it's the students or yourself, what's the primary reason?*
#8: *For us [students and teacher], it's a lot of research-based and some project-based learning. Creating something either to present to the class or to make something that goes along with the concept students are learning.*

Gender differences were observed in teachers' descriptions of student uses of technology as a medium for engagement and content connections. Male teachers consistently referred to technology as a tool throughout the interviews; whereas female teachers referred to technology as a means to facilitate learning and a resource to increase student motivations to learn. Gender differences in technology descriptions support existing research (Huang, Hood, & Yoo, 2013; Mitts, 2008; Sherman, Sanders, Kwon, & Pembridge, 2009; Weber & Custer, 2005). Affirming Huang, Hood, and Yoo's (2013), findings regarding web-based gender behaviors, males in our study expressed preferences for *visual* tools like videos, while females preferred to use *audio* media, such as digitally recorded speeches. The impact of gender differences in preferences for technology tools on blended learning and online course development are potentially significant. The types of web-based learning experiences offered in an online course environment might vary based on the gender of the person designing the course.

Gender-Oriented Technology-Mediated Tasks

Other gender relevant outcomes—and perhaps the most significant—were the differences in the web-based instructional tasks that teachers assigned their students. Male teachers, more often than females, described their students' technology-mediated assignments as activities that required students to demonstrate their learning by writing, presenting, building, and modeling. Female teachers articulated a need for technology task outcomes to provide students opportunities to express understanding through completing an assigned task and applying a specific technology. These gender differences align with descriptions of gender-specific activities in the literature review (Huang, Hood, & Yoo, 2013; Mitts, 2008; Sherman, Sanders, Kwon, & Pembridge, 2009; Weber & Custer, 2005). The orientation of tasks for males tended to be product-oriented and more concrete. In contrast, female teachers perceived technology assignments to be more abstract and promote social engagement.

Primary Sources and Historical Thinking

We examined teachers' discipline specific technology behaviors and found all teachers recognized the value of technology in increasing access to primary sources. Male teachers referred to information and primary source accessibility 60 times, while female teachers made similar references 65 times. Evidence that teachers are embracing the value of technology to expand content with the use of primary sources was present throughout teachers' descriptions of technology integration. Outcomes support recommendations of social studies researchers and suggest more positive findings than previously observed (Cohen & Rosenzweig, 2006; DeWitt, 2007; Friedman, 2006; Hicks, Doolittle, & Lee, 2004; Hicks & Ewing, 2003; Marri, 2005; Martin & Wineburg, 2008; Swan, & Locascio, 2008). However, the emphasis on historical thinking touted by researchers (Barton, 2005; Barton & Levstik, 2004; VanSledright, 2011; Wineburg, 2001) was not equally present in teacher descriptions of technological pedagogical and learning applications (see Figure 6). Males talked openly and with emphasis about providing learning opportunities that promoted historical thinking. While female teachers also noted primary source document analysis, they used fewer descriptions of discipline-specific learning behaviors (e.g. sourcing, analysis, and to be historians) in conjunction with technology integration. In contrast, females described technology as an important tool for promoting perspective taking and understanding of diverse perspectives (Bers, 2008; Lenhart, Kahne, Middaugh, 2008; Montgomery, 2009; Perkins-Gough, 2009; VanFossen, 2006). Males offered limited references

Figure 4. Gender frequencies in usage and descriptions of technology resources

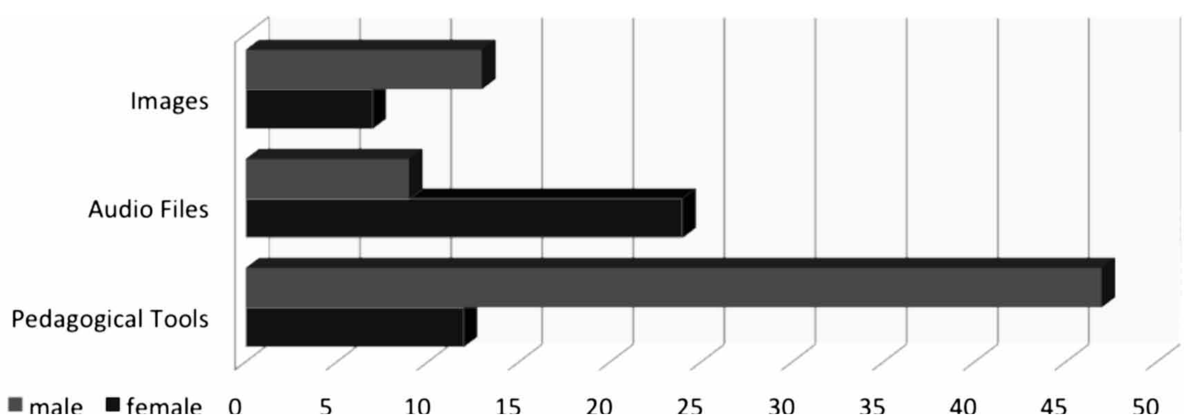
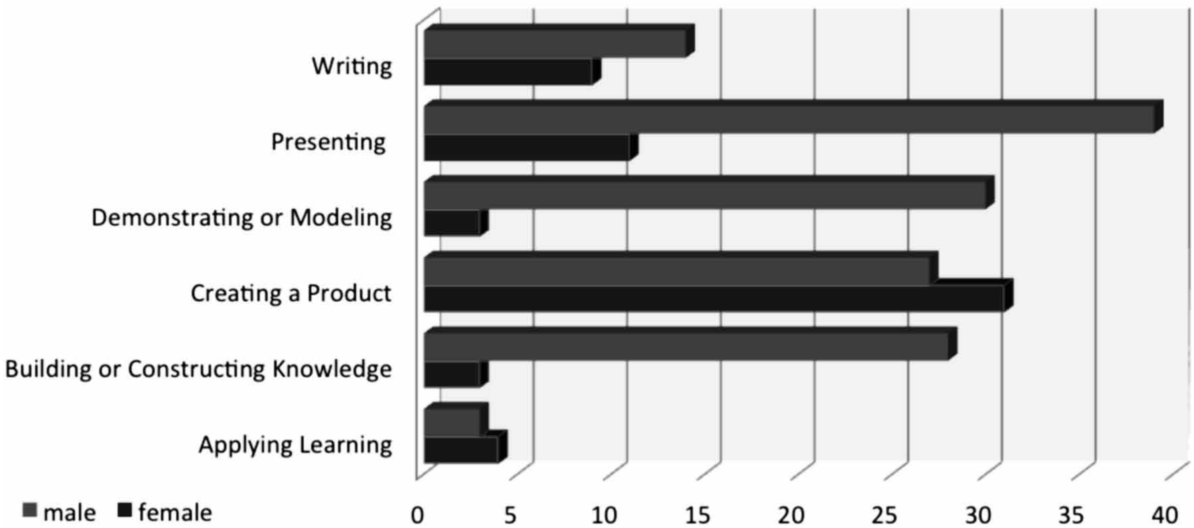
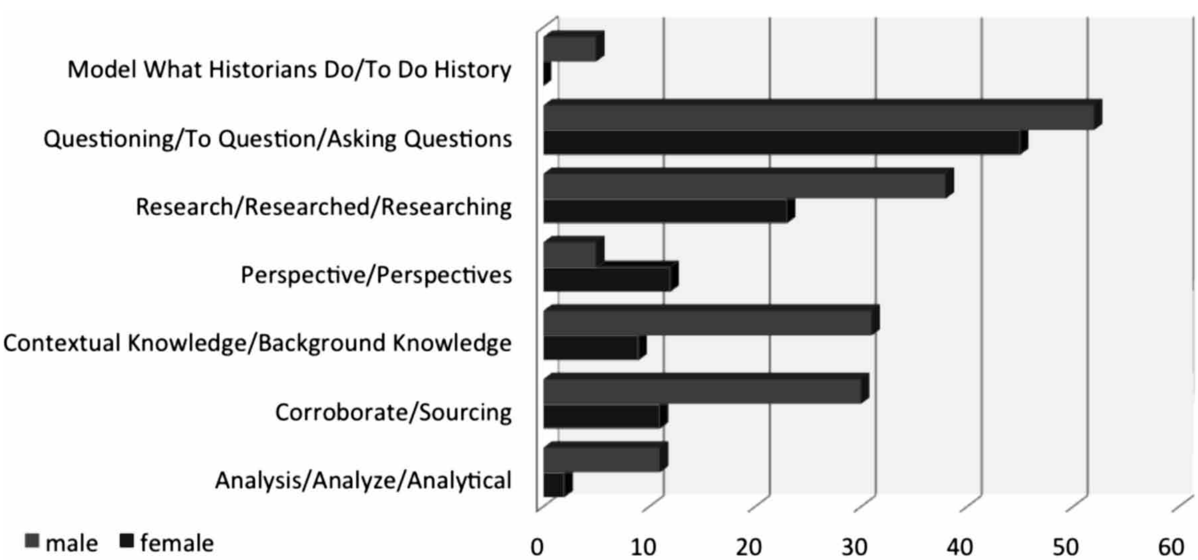


Figure 5. Gender differences in verbs used to describe evidence of student learning outcomes



to perspective-oriented thinking. These gender differences seem to suggest gender-oriented affective and cognitive focused thinking (Bloom, Engelhart, Furst, Hill, & Krathwohl, 1956). Both approaches to technology align with the recommendations social studies researchers offer for the value technology offers in transforming learning, which will impact future developments in blended learning (Green, Ponder, & Donovan, 2014).

Figure 6. Uses to support historical thinking



Technology Tool Outcomes: Products or Processes

Males did not perceive technology as *a means to an end* (Mitts, 2008; Sherman, Sanders, Kwon, & Pembridge, 2009; Weber & Custer, 2005), which, in our study, was a documented *female* point of view. Male teachers described technology as a process for learning. Their descriptions fit more with a transformative view of learning than with a traditional approach. Affirming research, males' perceptions positioned technology as redefining the research process and increasing access to digitized sources (Bolick, 2006; Brush & Saye, 2009; Friedman & Heafner, 2007, 2008; Harris, Mishra, & Koehler, 2009; Heafner & Friedman, 2008; Tally & Goldenberg, 2005; Whitworth & Berson, 2003). In contrast, female teachers viewed the learning process outside of technology and one in which they were an integral part of student knowledge development. Relationships between students and teachers, for female teachers, were central to supporting student learning. Technology for female teachers was a tool to complete a specific task, which resulted in a measurable product. Females, in contrast to males, did not describe technology tasks involving student choice in determining the technology tools utilized. The following quotes exemplify this difference. First, a male teacher responded:

#9: *I would define technology… there's a number… I kind of look at it in two different ways because [technology is] used frequently as a means to an end for kids to research information, it replaces the need for kids to go out of the classroom and into the media center like they traditionally would do to find information and assimilate it. So technology is sort of as a reference guide. It's used frequently, umm, on the other hand, it can also be used by me as a teacher to provide them with pathways to find other information for primary sources. Students have to analyze so it can actually be very, it can be integrated into an instructive lesson times in a way. That's different than using the media center in a traditional way. Ideally also it would be provide them with the tools to create something from the material that hopefully would be evidence of some sort of synthesis of their learning.*

Second, a female teachers stated:

#10: *They [students] use technology, um, I think it's a lot more about how we use it and what product they're making with it. I mean, my peers will tell you, it's just research – just merely look at information, and they can use a textbook for that. If we're using technology, it's for, to create something.*

#10: *There needs to be a product at the end of it.*

Interviewer: *So, okay, let me just re-cap what you've said. So, you said you feel that it's a tool to make a product…*

#10: Yeah.

Interviewer: *…and you use it when it's something when you can create something, not just a source of information.*

#10: *No, not just a source of information. Students need to be able to use technology as a way to express their thinking and model their content understanding.*

This contrasting view of technology as *an end* (tool for historical/critical thinking) *to a means* (to create new pathways of thinking, perspective taking, and content relevance) rather than *a means* (process for assessing new information) *to an end* (to create a product), are distinctly different gender-sensitive points of view. Overall, all teachers view technology as a vehicle for learning, but the mode of transportation they envision looks quite different based on whether the teacher is male or female. These unique gender orientations lead to very different learning opportunities for the students enrolled in their courses. We suggest that the teacher gender differences need to be considered when designing professional development for online course instruction and blended learning. Gender differences in the purpose of technology tasks, as found in this study, can greatly impact what is included in web-based course development, how courses are organized, and what is valued online course delivery. The varying platforms for web-based social studies education, limited peer interaction, and inconclusive research combined with insufficient academic gains, demonstrate a need for further research into best practice concerning web-based social studies courses (Doering, Hughes, & Scharber, 2007; Kerr, 2007). We also argue gender-oriented technology pedagogy should be explored.

IMPLICATIONS AND SCHOLARLY SIGNIFICANCE

Outcomes of our study suggest that gender is an important factor that influences noticeably different visions for how technology should be used to teach social studies and support student learning in secondary schools. The learning opportunities these teachers provide their students vary greatly depending on gender. Furthermore, females express lower efficacy in their technology skills and comfort. They promote greater emphasis on perspective thinking and seek to make learning relevant and meaningful through technology integration. Female teachers nurture creativity, a trait valued highly among technology businesses. Female teachers have embraced the information highway as a resource for primary sources; yet, they have not reached the level of historical thinking applications males employ. Conversely, males project notions of technology as a tool to build and model learning. Descriptions of multi-dimensional media web tools permeate male visions of effective technology integration in social studies; however, the ability males have to accomplish these goals is facilitated by greater access to technology hardware. Males project higher confidence with technology, although it appears that their skills are more equivalent to females than they perceive.

Men and women view their teaching roles, as well as technology, differently; yet, both perspectives are equally important. This study supports findings from existing research (Crocco, 2008; Crocco, Cramer, & Meier, 2008; Francis, 2008). Likewise, we suggest that men and women are drawn to different attributes of technology and do not share the same interests or ideas for how technology should be utilized. Males and females gravitate to different attributes valued in social studies research. These findings counter those of Francis (2008). Crocco, Cramer, and Meier (2008) contend that without attention to gender "as part of the effort to integrate technology into education, any gains will have only limited impact" (p. 30). The implications for transformative learning mediated by technology and virtual learning experiences are significant. The online learning opportunities provided for students should embrace and tap into the gender differences in how male and female teachers perceive and utilize technology for understanding social studies. Given that most social studies teachers have been left to fend for themselves in locating and developing skills in using hardware and software, as well as honing online teaching skills (Journell, 2013), male and female teachers are likely to select very different applications, seek out different primary sources and websites, and develop lessons integrating technology or web-based courses with distinctly different learning outcomes (Doering, Hughes, & Scharber, 2007; Kerr, 2007). What we conclude from these differences is that gender should be a consideration when making technology decisions regarding access, training, professional development, and discipline-specific integration initiatives in K-12 online and blended learning.

RECOMMENDATIONS AND FUTURE RESEARCH

While we acknowledge the limitations of generalizations based on qualitative research design, there are findings from this study that deserve attention on a larger scale. We contend that future research is needed to explore the impact of these points. There are clear patterns that raise concern for researchers and they should be points of discussion in any efforts to expand technological usage in K-12 schooling. Our findings can also inform decision-making efforts to integrate more online learning and blended learning opportunities. Who designs and teaches these future blended and online virtual classes will impact what instructional experiences will look like and which learning attributes will be emphasized. Given that gender has been and continues to be a factor in shaping teaching and learning, gender must also be a consideration in blended online instructional design and virtual course delivery. Our data can be a starting point for recognizing the role of gender in online and blended learning in high school social studies.

On the basis of our study, we offer the following recommendations:

1. A concerted effort for professional development needs to include equal representation of all content areas, including social studies, and must be geared toward online and blended learning (see Journell, 2013). The teachers in this study requested discipline-specific examples of technology applications, which was a specific concern acknowledged by female teachers. However, male and female participants both noted the overemphasis on STEM subjects during technology related professional development.
2. Teachers need to be offered choices in professional development that serve both male and female technology interests, and also challenge gender-oriented perceptions. As teachers transition to new roles of online and blended learning instruction, these professional development options will be necessary to ensure the transformative and revolutionary possibilities of web-based learning are embraced.
3. Male and female teachers need the opportunity to share technology application ideas but these experiences must not be male dominated—they must also provide females with an equal voice. Mutually beneficial collaboration and online professional development learning communities (Petty, Heafner, Farinde, & Plaisance, in press) will be needed for teachers working in virtual schools. Gender dynamics will also come into play in those online environments. Acknowledging the need for gender equity is also an important consideration for online and blended learning.
4. When professional development is provided, emphasis on improving female teachers' efficacy should be included with technology training. This recommendation can greatly impact how online professional development and blended learning initiatives are designed to foster technology confidence and efficacy of female teachers.
5. Teachers should have equal access to technology, including its personal use. Providing teachers technologies such as iPads to be used at home and school is money well spent. Teachers who reported greater personal use were the teachers who rated their skills and comfort higher and perceived themselves as advanced technology users. As more virtual course and blended learning options become available, teachers will need equitable access to technology tools.
6. Time to embrace technology-driven changes, such as increased communication between students and teachers, is not currently present in the workday. Female teachers' sense of intensification was exacerbated by an inability to keep up with technology. One teacher re-

> ported a strong desire to use Twitter to create a streaming consciousness, but felt that she did not have to the time to adequately keep up with student exchanges. The female need to foster strong relationships with students created this personal expectation to respond to every post in blogs, discussion threads, Nings, and other social networking tools. Time to use technology, to learn technology, and to have students utilize technology were shortages most teachers acknowledged. Perhaps the current structure of secondary schools needs to be reconsidered to afford greater time for technology to revolutionize learning as projected decades earlier. The shift to virtual schools and more online courses will be significant in redefining the structure of secondary schools. The flexibility of time can address the challenges described. One point that must not be overlooked is that time, even in virtual teaching spaces, needs to be set aside and protected to allow teachers the opportunities to advance and hone their technology skills and expand their knowledge of digital resources.

In closing, when teachers referred to an "old school" or "very traditional" process, they were specifically describing non-technology instructional practices. Technology is undeniably impacting how social studies is taught. These teachers, both male and female, are shifting their instructional practices in order to accommodate greater technology usage. This has made the transition to constructivism a natural complement to technology integration. The move away from lecture and teacher-centered instruction, documented within the literature, is occurring because of the impact of an urgent investment in technology resources. The "slow revolution" of technology driving pedagogical change is clearly visible (Cuban, Kirkpatrick, & Peck, 2001), and we posit the next step in this evolutionary process of technology-mediated learning is the advancement of virtual and transformative learning spaces (Green, Ponder, Donovan, 2014). Social studies researchers have the opportunity to create new pathways for learning and innovative classroom practice through blended and online learning. In this process of transformation, gender should be a central consideration.

IMPLICATIONS FOR ONLINE LEARNING

Almost two-thirds of institutions of higher education surveyed in 2011 (Allen & Seaman, 2011) indicated the significance of online learning in their current and future planning. Allen and Seaman (2011) found that over six million college students were enrolled in at least one online course in the fall semester of 2010. These numbers have grown exponentially since tracking of online education enrollments began almost a decade ago. Online learning is becoming a ubiquitous experience for higher education. Given the emphasis of online learning in higher education, the natural progression in education is toward the adoption of online learning environments for K-12 settings. The emergence of virtual high schools, the requirement of an online course for high school graduation, and the push for online courses offerings in high schools are clear indicators of the forthcoming promotion of shifting learning environments (Clark, 2001; Molnar et al., 2013; Queen & Lewis, 2011; Rice, 2006; Watson et al., 2013). A total of 44 states report engaging some form of online learning activities in education (Picciano & Seamen, 2007), and 25 states have virtual high schools currently in operation (Watson et al., 2013).

With any change, there are growing pains as K-12 schools embrace online and blended learning as a way to offer large enrollment regular courses, course remediation, advanced placement courses, diverse course options, and traditionally low enrolled courses (Molnar, Huerta, Rice, Shafer, Barbour, Miron, & Horvitz, 2014). As schools seek to address shrinking budgets, online and blending learning can be very appealing options. These new school structures are not without limitations (Barbour, 2009; Barbour & Reeves, 2009; Cavanaugh, Barbour, & Clark, 2009). Learning from current technology uses, such as those presented in this chapter, can help decision makers understand the complexity that lies ahead as educators seek to revolutionize teaching and transform learning with online and blended learning platforms.

REFERENCES

AACTE Committee on Innovation & Technology (Ed.). (2008). *Handbook of technological pedagogical content knowledge for educators*. New York: Routledge.

Allen, I. E., & Seaman, J. (2011). *Going the distance: Online education in the United States*. Babson Survey Research Group.

American Association of University Women (AAUW). (2010). *Improve girls' and women's opportunities in science, technology, engineering, and math.* AAUW Public Policy and Government Relations Department.

Anderson, R., & Williams, R. (2012). Texas agricultural science teachers' attitudes toward information technology. *Journal of Career and Technical Education*, *27*(2), 57–68.

Apple, M. W. (2000). *Official knowledge: Democratic education in a conservative age* (2nd ed.). New York: Routledge.

Apple, M. W. (2004). *Ideology and curriculum* (3rd ed.). New York: Routledge.

Bannert, M., & Arbinger, P. R. (1996). Gender-related differences in exposure to and use of computers: Results of a survey of secondary school students. *European Journal of Psychology of Education*, *11*(3), 269–282. doi:10.1007/BF03172940

Barbour, M. (2009). Today's student and virtual schooling: The reality, the challenges, the promise. *Journal of Open. Flexible and Distance Learning*, *13*(1), 5–25.

Barbour, M. K., & Reeves, T. C. (2009). The reality of virtual schools: A review of the literature. *Computers & Education*, *52*(2), 402–416. doi:10.1016/j.compedu.2008.09.009

Barton, K. (2005). Teaching history: Primary sources in history – Breaking through the myths. *Phi Delta Kappan*, *86*(10).

Barton, K. C., & Levstik, L. S. (2004). *Teaching history for the common good*. Mahwah, NJ: Lawrence Erlbaum Associates, Inc.

Bers, M. U. (2008). Civic identities, online technologies: From designing civic curriculum to supporting civic experiences. In L. W. Bennett (Ed.), *Civic life online: Learning how digital media can engage youth* (pp. 139–160). Cambridge, MA: The MIT Press.

Berson, I., & Berson, M. (2013). Getting to the core: Using digital resources to enhance content-based literacy in the social studies. *Social Education*, *77*(2), 102–106.

Berson, M. (1996). Effectiveness of computer technology in social studies: A review of the literature. *Journal of Research on Computing in Education*, *28*(4), 486–499.

Berson, M., & Baylta, P. (2004). Technological thinking and practice in the social studies: Transcending the tumultuous adolescence of reform. *Journal of Computing in Teacher Education*, *20*(4), 141–150.

Bloom, B. S., Engelhart, M. D., Furst, E. J., Hill, W. H., & Krathwohl, D. R. (1956). *Taxonomy of educational objectives: The classification of educational goals. Handbook 1: Cognitive domain*. New York, NY: David McKay.

Bolick, C. M. (2006). Digital archives: Democratizing the doing of history. *The International Journal of Social Education*, *21*(1), 122–134.

Borg, A. (1999). What draws women to and keeps women in computing? In C. C. Selby (Ed.), *Women in Science and Engineering: Choices for Success* (pp. 102–105). New York, NY: New York Academy of Sciences. doi:10.1111/j.1749-6632.1999.tb08362.x

Brush, T., & Saye, J. (2009). Strategies for preparing preservice social studies teachers to integrate technology effectively: Models and practices. *Contemporary Issues in Technology & Teacher Education*, *9*(1), 46–59. Retrieved from http://www.citejournal.org/vol9/iss1/socialstudies/article1.cfm

Cavanaugh, C. S., Barbour, M. K., & Clark, T. (2009). Research and practice in K-12 online learning: A review of open access literature. *International Review of Research in Open and Distance Learning*, *10*(1).

Cellsigns. (2010). *Text Message Statistics*. Retrieved from http://www.cellsigns.com/industry.shtml

Clark, T. (2001). *Virtual schools: Trends and issues.* A Study of Virtual Schools in the United States.

Cohen, D. J., & Rosenzweig, R. (2006). *Digital history: A guide to gathering, preserving, and presenting the past on the web*. Philadelphia, PA: University of Pennsylvania Press.

Collias, K., Pajak, E., & Rigden, D. (2000). *One cannot teach what one does not know: Training teachers in the United States who know their subjects and know how to teach their subjects*. Retrieved from http://curie.umd.umich.edu/TeacherPrep/120.pdf

Council of Chief State School Officers. (2013). *The college, career, and civic life (C3) framework for social studies state standards: State guidance for enhancing the rigor of K-12 civics, economic, geography, and history*. Washington, DC: Council of Chief State School Officers.

Council of Economic Advisors, Executive Office of the President. (2012). *Unleashing the potential of educational technology*. Retrieved from http://www.whitehouse.gov/sites/default/files/unleashing_the_potential_of_educational_technology.pdf

Crocco, M. S. (2004). Dealing with difference in the social studies: A historical perspective. *The International Journal of Social Education*, *18*(2), 106–126.

Crocco, M. S. (2006). Gender and social education: What's the problem? In E. W. Ross (Ed.), *Social Studies: Purposes, problems and possibilities* (pp. 171–197). Albany, NY: State University of New York Press.

Crocco, M. S. (2008). Gender and sexuality in the social studies. In L. S. Levstik & C. A. Tyson (Eds.), *Handbook of research on social studies teaching and learning* (pp. 172–196). Routledge.

Crocco, M. S., & Costigan, A. T. (2007). The narrowing of curriculum and pedagogy in the age of accountability urban educators speak out. *Urban Education*, *42*(6), 512–535. doi:10.1177/0042085907304964

Crocco, M. S., Cramer, J., & Meier, E. B. (2008). (Never) mind the gap!: Gender equity in social studies research on technology in the twenty-first century. *Multicultural Education & Technology Journal*, *2*(1), 19–36. doi:10.1108/17504970810867133

CTIA. (2011). Reports, Policy position papers & presentations. Retrieved from http://www.ctia.org/advocacy/research/index.cfm/AID/10312

Cuban, L., Kirkpatrick, H., & Peck, C. (2001). High access and low use of technologies in high school classrooms: Explaining an apparent paradox. *American Educational Research Journal*, *38*(4), 813–834. doi:10.3102/00028312038004813

Culp, K. M., Honey, M., & Mandinach, E. (2003). *A retrospective on twenty years of education technology policy*. U.S. Department of Education, Office of Educational Technology. Retrieved from http://www.nationaledtechplan.org/participate/20years.pdf

Darling-Hammond, L. (2006). Constructing 21st century teacher education. *Journal of Teacher Education*, *57*(3), 300–314. doi:10.1177/0022487105285962

Darling-Hammond, L., & Ball, D. L. (1997). *Teaching for high standards: What policymakers need to know and be able to do*. Washington, DC: National Commission on Teaching and America's Future.

DeWitt, P. (2011). *Using social networking to build 21st century skills*. Ed Weekly.

DeWitt, S. W. (2007). Dividing the digital divide: Instructional use of computers in social studies. *Theory and Research in Social Education*, *35*(2), 277–279. doi:10.1080/00933104.2007.10473336

Doering, A., Hughes, J. E., & Scharber, C. (2007). Teaching and learning social studies online: What works in K-12 online learning. International Society for Technology in Education, 91-103.

Ertmer, P. A. (2005). Teacher pedagogical beliefs: The final frontier in our quest for technology integration? Educational Technology Research and Development, *53*(4), 25-39

Fitchett, P. G., & Heafner, T. L. (2010). A national perspective on the effects of high-stakes testing and standardization on elementary social studies marginalization. *Theory and Research in Social Education*, *38*(1), 114–130. doi:10.1080/00933104.2010.10473418

Fitchett, P. G., Heafner, T. L., & Lambert, R. (2012). Examining social studies marginalization: A multilevel analysis. *Educational Policy*, *XX*(X), 1–29.

Francis, B. (2008). Teaching manfully? Exploring gendered subjectivities and power via analaysis of men teachers' gender performance. *Gender and Education*, *20*(2), 109–122. doi:10.1080/09540250701797226

Friedman, A. M. (2006). World history teachers' use of digital primary sources: The effect of training. *Theory and Research in Social Education*, *34*(1), 124–141. doi:10.1080/00933104.2006.10473300

Friedman, A. M., & Heafner, T. L. (2007). You think for me, so I don't have to. [Online serial]. *Contemporary Issues in Technology & Teacher Education*, *7*(3). Available http://www.citejournal.org/vol7/iss3/socialstudies/article1.cfm

Friedman, A. M., & Heafner, T. L. (2008). Finding and contextualizing resources: A digital literacy tool's impact in ninth grade world history. *Clearing House (Menasha, Wis.)*, *82*(2), 82–86. doi:10.3200/TCHS.82.2.82-86

Friedman, A. M., & Hicks, D. (2006). The state of the field: Technology, social studies, and teacher education. *Contemporary Issues in Technology & Teacher Education*, *6*(2). Retrieved from www.citejournal.org

Frieze, C., Quesenberry, J. L., Kemp, E., & Velazquez, A. (2012). Diversity or difference? New research supports the case for a cultural perspective on women in computing. *Journal of Science Education and Technology*, *21*(4), 423–439. doi:10.1007/s10956-011-9335-y

Glaser, B. G., & Straus, A. L. (1967). *The discovery of grounded theory*. Chicago, IL: Aldine.

Gray, L., Thomas, N., Lewis, L., & Tice, P. (2010). Teachers' use of educational technology in U.S. public schools. National Center for Educational Statistics. U.S. Department of Education, NCES 2010-040.

Green, T., Ponder, J., & Donovan, L. (2014). Educational technology in social studies education. In J.M. Spector et al. (Eds.), Hanbook of Research on Educational Communications and Technology (pp. 573-582). New York, NY: Springer Science+Business Media.

Hargreaves, A. (1994). *Changing teachers, changing times: Teachers' work and culture in the postmodern age*. New York, NY: Teachers College Press.

Harris, J., Mishra, P., & Koehler, M. (2009). Teachers' technological pedagogical content knowledge and learning activity types: Curriculum-based technology integration reframed. *Journal of Research on Technology in Education*, *41*(4), 393–416. doi:10.1080/15391523.2009.10782536

Heafner, T. (2002). *Powerful methods: A framework for effective integration of technology in secondary social studies* (PhD dissertation, University of North Carolina at Greensboro). ProQuest Digital Dissertations Document ID No. 764702651.

Heafner, T. L. (2004). Using technology to motivate students to learn social studies. *Contemporary Issues in Technology & Teacher Education*, *4*(1), 42–53.

Heafner, T. L. (2013). Secondary social studies teachers' perceptions of effective technology practice. *International Journal of Computing and Information Technology*, *2*(2), 1–9.

Heafner, T. L., & Fitchett, P. G. (2012). Tipping the scales: National trends of declining social studies instructional time in elementary schools. *Journal of Social Studies Research*, *36*(2), 190–215.

Heafner, T. L., & Friedman, A. M. (2008). Wikis and constructivism in social studies: Fostering a deeper understanding. *Computers in the Schools*, *25*(3-4), 288–302. doi:10.1080/07380560802371003

Hicks, D., Doolittle, P., & Lee, J. K. (2004). Social studies teachers' use of classroom-based and web-based historical primary sources. *Theory and Research in Social Education*, *32*(2), 213–247. doi:10.1080/00933104.2004.10473253

Hicks, D., & Ewing, E. (2003). Bringing the world into the classroom with online global newspapers. *Social Education*, *67*(3), 134–139.

Huang, W. D., Hood, D. W., & Yoo, S. J. (2013). Gender divide and acceptance of collaborative Web 2.0 applications for learning in higher education. *The Internet and Higher Education*, *16*, 57–65. doi:10.1016/j.iheduc.2012.02.001

ISTE. (2007). ISTE standards for students: Advancing learning in the digital age. *International Society for Technology in Education.* Retrieved from http://www.iste.org/standards/standards-for-students

Jonassen, D., Davidson, M., Collins, M., Campbell, J., & Haag, B. B. (1995). Constructivism and computer-mediated communication in distance education. *American Journal of Distance Education*, *9*(2), 7–26. doi:10.1080/08923649509526885

Journell, W. (2013). *Online learning: Strategies for K-12 teachers*. Lanham, MD: Rowman & Littlefield.

Kerr, S. (2007). *High schools online: Exploring teaching and learning in online social studies classrooms.* (Unpublished doctoral thesis). University of Minnesota, Minneapolis, MN.

Koehler, M. J., & Mishra, P. (2008). Introducing TPCK. AACTE Committee on Innovation and Technology (Ed.), The handbook of technological pedagogical content knowledge (TPCK) for educators (pp. 3-29). Mahwah, NJ: Lawrence Erlbaum Associates.

Kvale, S. (2012). *Doing Interviews* (U. Flick, Ed.). London: Sage.

Lasley, T. J., Siedentop, D., & Yinger, R. (2006). A systemic approach to enhancing teacher quality: The Ohio model. *Journal of Teacher Education*, *57*(1), 13–21. doi:10.1177/0022487105284455

Lau, W. W. F., & Yuen, A. H. K. (2010). Gender differences in learning styles: Nurturing a gender and style sensitive computer science classroom. *Australasian Journal of Educational Technology*, *26*(7), 1090–1103.

Lenhart, A., Kahne, J., & Middaugh, E. (2008). *Teens, video games, and civics: Teens' gamining exepriences are divers and include significan social interation and civic engagement*. Washington, DC: Pew Internet & American Life Project.

Levstik, L. S. (2008). What happens in social studies classrooms? Research on K-12 social studies practice. In L. S. Levstik & C. A. Tyson (Eds.), *Handbook of research in social studies education*. New York, NY: Routledge.

Manfra, M., & Hammond, T. (2008). Teachers' instructional choices with student-created digital documentaries: Case studies. *Journal of Research on Technology in Education*, *41*(2), 223–245. doi:10.1080/15391523.2008.10782530

Marri, A. R. (2005). Educational technology as a tool for multicultural democratic education: The case of one US history teacher in an under-resourced high school. *Contemporary Issues in Technology & Teacher Education*, *4*(4), 395–409.

Marri, A. R. (2007). Working with blinders on: A critical race theory content analysis of research on technology and social studies education. *Multicultural Education & Technology Journal*, *1*(3), 144–161. doi:10.1108/17504970710822359

Martin, D., & Wineburg, S. (2008). Seeing Thinking on the Web. *The History Teacher*, *41*(3), 305–319.

Mason, C., Berson, M., Diem, R., Hicks, D., Lee, J., & Dralle, T. (2000). Guidelines for using technology to prepare social studies teachers. [Online serial]. *Contemporary Issues in Technology & Teacher Education*, *1*(1). Retrieved from http://www.citejournal.org/vol1/iss1/currentissues/socialstudies/article1.htm

Mason, C., McGlinn, M. M., & Siko, K. L. (2005). Twenty years of technology: A retrospective view of social education's technology themed issues. *Social Education*, *69*(44), 155–161.

Mason, C. L. (2000-2001, Fall/Winter). Collaborative social studies teacher education across remote locations: Students' experiences and perceptions. *The International Journal of Social Education*, *16*(2), 46–61.

Mishra, P., & Koehler, M. J. (2006). Technological pedagogical content knowledge: A framework for integrating technology in teacher knowledge. *Teachers College Record*, *108*(6), 1017–1054. doi:10.1111/j.1467-9620.2006.00684.x

Mitts, C. R. (2008). Gender preferences in technology student association competitions. *Journal of Technology Education*, *19*(2), 80–93.

Molnar, A., Huerta, L., Rice, J. K., Shafer, S. R., Barbour, M. K., Miron, G., & Horvitz, B. (2014). *Virtual schools in the U.S. 2014: Politics, performance, policy, and research Evidence*. Boulder, CO: National Education Policy Center.

Molnar, A., Miron, G., Huerta, L., Cuban, L., Horvitz, B., & Gulosino, C. et al. (2013). *Virtual schools in the U.S. 2013: Politics, performance, policy, and research evidence*. Boulder, CO: National Education Policy Center.

Montgomery, S. (2009). *iDemocracy: Critical literacy, civic engagement, and podcasting in an elementary classroom* (Doctoral Dissertation, Indiana University). ProQuest LLC.

National Council for the Social Studies. (2013). *The college, career, and civic life (C3) framework for social studies state standards: Guidance for enhancing the rigor of K-12 civics, economics, geography, and history*. Silver Spring, MD: Author.

National Governors Association Center for Best Practices & Council of State School Officers. (2012). *Common core state standards in English language arts and literacy in history/social studies, science, and technical subjects*. Retrieved from www.corestandards.org/about-the-standards

NCSS. (2013). *Technology position statement and guidelines.* National Council for the Social Studies. Retrieved from http://www.socialstudies.org/positions/technology

Partnership for 21st Century Skills. (2011). *Framework for 21st century learning*. Retrieved from http://www.p21.org/

Perkins-Gough, D. (2009). Video games and civic engagement. *Educational Leadership*, *66*(6), 94.

Petersons, The Education & Career Center. (1998). *Technology expenditures in K-12 schools*. Retrieved from http://www.pertersons.com/qedgraphs/tpf3.html

Petty, T. M., Heafner, T. L., Farinde, A., & Plaisance, M. P. (in press). Windows into teaching and learning: Professional growth of classroom teachers in an online environment. *Technology, Pedagogy and Education*.

Pew Research Center. (2011). *Global digital communication: Texting, social networking popular worldwide*. Retrieved from http://www.pewglobal.org/files/2011/12/Pew-Global-Attitudes-Technology-Report-FINAL-December-20-2011.pdf

Picciano, A. G., & Seaman, J. (2007). K-12 online learning: A survey of us school district administrators. *Journal of Asynchronous Learning Networks*, *11*(3).

Quality Education Data (QED). (2000). *95% of American's public schools are wired*. Retrieved from http://qeddata.com/iups_pr.htm

Queen, B., & Lewis, L. (2011). *Distance Education Courses for Public Elementary and Secondary School Students: 2009–10 (NCES 2012-008). U.S. Department of Education, National Center for Education Statistics*. Washington, DC: Government Printing Office.

Rice, K. (2009). Priorities in K-12 distance education: A delphi study examining multiple perspectives on policy, practice, and research. *Journal of Educational Technology & Society*, *12*(3).

Rubin, B., Fernandes, R., & Avgerinou, M. D. (2013). The effects of technology on the community of inquiry and satisfaction with online courses. *The Internet and Higher Education*, *17*, 48–57. doi:10.1016/j.iheduc.2012.09.006

Rubin, H., & Rubin, I. (2012). *Qualitative Interviewing: The Art of Hearing Data* (3rd ed.). Thousand Oaks, CA: Sage.

Saglam, H. I. (2011). An investigation on teaching material used in social studies lesson. *The Turkish Online Journal of Educational Technology*, *10*(1), 36–44.

Salinas, C., Bellows, M. E., & Liaw, H. L. (2011). Preservice social studies teachers' historical thinking and digitized primary sources: What they use and why. *Contemporary Issues in Technology & Teacher Education*, *11*(2), 184–204.

Sanders, J. (2006). *Gender and technology in education: What the research tells us*. Retrieved from http://doi.acm.org/10.1145/1117417.1117423

Sanders, W. L., & Rivers, J. C. (1996). *Cumulative and residual effects of teachers of future student academic achievement*. Retrieved from http://www.mccsc.edu/~curriculum/cumulative%20and%20residual%20effects%20of%20teachers.pdf

Setzer, C., & Lewis, L. (2005). *Distance education courses for public elementary and secondary school students: 2002–03*. U.S. department of education, national center for education statistics. Retrieved from http://nces.ed.gov/programs/quarterly/vol_7/1_2/4_5.asp\

Shashaani, L. (1993). Gender-based differences in attitudes toward computers. *Computers & Education*, *20*(2), 169–181. doi:10.1016/0360-1315(93)90085-W

Shea, P., & Bidjerano, T. (2012). Learning presence as a moderator in the community of inquiry model. *Computers & Education*, *59*(2), 316–326. doi:10.1016/j.compedu.2012.01.011

Sherman, T. M., Sanders, M., Kwon, H., & Pembridge, J. (2009). Middle school children's thinking in technology education: A review of literature. *Journal of Technology Education*, *21*(1), 60–71.

Simpson, M. (2001). Editor's notebook. *Social Education*, *65*(3), 133.

Solomon, G., Allen, N., & Resta, P. (2003). *Toward digital equity: Bridging the divide in education*. Boston: Pearson Education.

Staley, D. J. (2000). The role of technology in social studies education. *The International Journal of Social Education*, *15*(1), 1–127.

Sunal, C. S., Christensen, L. M., Shwery, C., Lovorn, M., & Sunal, D. W. (2010). Teachers from five nations share perspectives on culture and citizenship. *Action in Teacher Education*, *32*(2), 42–55. doi:10.1080/01626620.2010.10463549

Swan, K., & Hicks, D. (2007). Through the democratic lens: The role of purpose in leveraging technology to support historical thinking in the social studies classroom. *The International Journal of Social Studies Education*, *21*(2), 142–168.

Swan, K., & Hofer, M. (2008). Information ecologies: Technology in the social studies. In L. Levstik & C. Tyson (Eds.), *Handbook of research on social studies teaching and learning* (pp. 307–326). New York, NY: Erlbaum Publishing.

Swan, K., & Locascio, D. (2008). Alignment of technology and primary source use within a history classroom. *Contemporary Issues in Technology & Teacher Education*, *8*(2).

Tally, B., & Goldenberg, L. B. (2005). Fostering historical thinking with digitized primary sources. *Journal of Research on Technology in Education*, *38*(1), 1–21. doi:10.1080/15391523.2005.10782447

Thornton, S. J. (2005). *Teaching social studies that matters*. New York: Teachers College Press.

Tracy, S. J. (2013). *Qualitative Research Methods: Collecting Evidence, Crafting Analysis, Communicating Impact*. Hoboken, NJ: Wiley-Blackwell.

Van Hover, S. D., Berson, M. J., Bolick, C. M., & Swan, K. O. (2006). Implications of ubiquitous computing for the social studies curriculum (Republished). *Contemporary Issues in Technology & Teacher Education*, *6*(2). Retrieved from http://www.citejournal.org/vol6/iss2/socialstudies/article3.cfm

VanFossen, P. J. (2001). Degree of Internet/WWW use and barriers to use among secondary social studies teachers. *International Journal of Instructional Media*, *29*(1), 57–75.

VanFossen, P. J. (2006). The electronic republic? Evidence on the impact of the Internet on citizenship and civic engagement in the U.S. *The International Journal of Social Education*, *21*(1), 18–43.

Vanfossen, P. J., & Shiveley, J. M. (2000). Using the Internet to create primary source teaching packets. *Social Studies*, *91*(6), 244–252. doi:10.1080/00377990009602473

VanSledright, B. (2011). *The challenge of rethinking history education: On practices, theories, and policy*. New York, NY: Routledge.

Washburn, M. H., & Miller, S. G. (2005). Still a chilly climate for women students in technology: A case study. In S.V Rosser et al. (Ed.), Women, Gender, and Technology (pp. 169-181). Chicago, IL: University of Illinois Press.

Watson, J., Murin, A., Vashaw, L., Gemin, B., & Rapp, C. (2013). *Keeping pace with K-12 online & blended learning: An annual review of policy and practice.* Evergreen Education Group. Retrieved from http://kpk12.com/reports/

Weber, K., & Custer, R. (2005). Gender-based preferences toward technology education content, activities, and instructional methods. *Journal of Technology Education*, *16*(2), 55–71.

Whitworth, S. A., & Berson, M. J. (2003). Computer technology in the social studies: An examination of the effectiveness literature. *Contemporary Issues in Technology & Teacher Education*, *2*(4). Retrieved from http://www.citejournal.org/vol2/iss4/socialstudies/article1.cfm

Wilson, E., & Wright, V. (2010). Images over time: The intersection of social studies through technology, content, and pedagogy. *Contemporary Issues in Technology & Teacher Education*, *10*(2), 220–233.

Wineburg, S. (2001). *Historical thinking and other unnatural acts*. Philadelphia, PA: Temple University Press.

Zhao, Y. (2007). Social studies teachers' perspectives of technology integration. *Journal of Technology and Teacher Education*, *15*(3), 311–333.

Zhao, Y. (2004-2005). *Social studies teachers' perspectives of technology integration* (PhD dissertation, University of Georgia). ProQuest Digital Dissertations Document ID No. 10727/7484. Available: http://hdl.handle.net/10724/7484

Zuelke, D. C. (2001). Attitude, cost, and school effects on sixth-grade achievement. *Education*, *106*(4), 394–408.

ADDITIONAL READING

Allen, I. E., & Seaman, J. (2010). *Class differences: Online education in the United States*. USA: Babson Survey Research Group.

Barbour, M. (2009). *Today's student and virtual schooling: The reality, the challenges, the promise*. Academic Press.

Barbour, M. K., & Reeves, T. C. (2009). The reality of virtual schools: A review of the literature. *Computers & Education*, *52*(2), 402–416. doi:10.1016/j.compedu.2008.09.009

Bauer, J., & Kenton, J. (2005). Toward technology integration in the schools: Why it isn't happening. *Journal of Technology and Teacher Education*, *13*(4), 519–546. Retrieved from http://www.editlib.org/p/4728

Brush, T., & Saye, J. (2009). Strategies for preparing preservice social studies teachers to effectively integrate technology: Models and practices. *Contemporary Issues in Technology & Teacher Education*, *9*(1), 46–59.

Carnahan, C., & Fulton, L. (2013). Virtually forgotten: Special education students in cyber schools. *TechTrends*, *57*(4), 46–52. doi:10.1007/s11528-013-0677-6

Carnevale, D. (2001). It's education online. Its someplace you aren't. What's it called? *The Chronicle of Higher Education*, *47*(8), A33.

Cassutto, G. (2000). Social studies and the World Wide Web. *The International Journal of Social Education*, *15*(1), 94–101.

Cavanaugh, C., Gillan, K. J., Kromrey, J., Hess, M., & Blomeyer, R. (2004). *The effects of distance education on K-12 student outcomes: A meta-analysis. Learning Point Associates/North Central Regional Educational Laboratory*. NCREL.

Cavanaugh, C. S. (2001). The effectiveness of interactive distance education technologies in K-12 learning: A meta-analysis. *International Journal of Educational Telecommunications*, *7*(1), 73–88.

Clark, T. (2001). *Virtual schools: Trends and issues.* A Study of Virtual Schools in the United States.

Denzin, N. K., & Lincoln, Y. S. (2000). *Handbook on qualitative research* (2nd ed.). Thousand Oaks, CA: Sage.

Doolittle, P. E., & Hicks, D. (2003). Constructivism as a theoretical foundation for the use of technology in social studies. *Theory and Research in Social Education*, *31*(1), 72–104. doi:10.1080/00933104.2003.10473216

Harvey, D., Greer, D., Basham, J., & Hu, B. (2014). From the Student Perspective: Experiences of middle and high school students in online learning. *American Journal of Distance Education*, *28*(1), 14–26. doi:10.1080/08923647.2014.868739

Kennedy, K., & Archambault, L. (2011). The current state of field experiences in K-12 online learning programs in the US. In *Proceedings of Society for Information Technology & Teacher Education International Conference,* (vol. 1, pp. 3454-3461). Academic Press.

Mason, C. L. (2000-2001, Fall/Winter). Collaborative Social studies teacher education across remote locations: Students' experiences and perceptions. *The International Journal of Social Education*, *16*(2), 46–61.

McLeod, S., Hughes, J. E., Brown, R., Choi, J., & Maeda, Y. (2005). *Algebra achievement in virtual and traditional schools*. Naperville, IL: Learning Point Associates.

National Council for the Social Studies. (1994). *Expectations for excellence: Curriculum standards for social studies*. Washington, D.C.: National Council for the Social Studies.

Office of the Legislative Auditor, State of Minnesota (2011). *Evaluation report: K-12 online learning*. Retrieved from http://www.auditor.leg.state.mn.us/ped/2011/k12oll.htm

Queen, B., & Lewis, L. (2011). *Distance education courses for public elementary and secondary school students: 2009-10* (NCES 2012-009). U.S. Department of Education, National Center for Education Statistics. Retrieved from http://nces.ed.gov/pubs2012/2012008.pdf

Rankin, D. T. (2013). *Predictors of success for high school students enrolled in online courses in a single district program*. (Doctoral dissertation). Virginia Commonwealth University, Richmond, VA.

Schlosser, L., & Simonson, M. (2002). *Distance education: Definition and glossary of terms*. Bloomington, IN: Association for Educational Communications and Technology.

Setzer, C., & Lewis, L. (2005). *Distance education courses for public elementary and secondary school students: 2002–03.* U.S. department of education, national center for education statistics. Retrieved from http://nces.ed.gov/programs/quarterly/vol_7/1_2/4_5.asp\

Shafer, S. R. (2013). *Virtual schools in the U.S. 2013: Politics, performance, policy, and research evidence*. Boulder, CO: National Education Policy Center.

Solomon, G., Allen, N., & Resta, P. (2003). *Toward digital equity: Bridging the divide in education*. Boston, MA: Pearson Education.

Thornburg, D. D. (1999). *Technology in K-12 education: Envisioning a new future*. Retrieved from http://www.air-dc.org/forum/Thornburg.pdf

VanFossen, P. (1999-2000). An analysis of the use of the Internet and World Wide Web by secondary social studies teachers in Indiana. *The International Journal of Social Education*, *14*(2), 87–109.

Watson, J., Murin, A., Vashaw, L., Gemin, B., & Rapp, C. (2013). *Keeping pace with K-12 online & blended learning: An annual review of policy and practice*. Evergreen Education Group. Retrieved from http://kpk12.com/reports/

White, C. (1997). Technology and social studies: An introduction. *Social Education*, *61*(3), 147–149.

Zhao, Y., Pugh, K., Sheldon, S., & Byers, J. (2002). Conditions for classroom technology innovations. *Teachers College Record*, *104*(3), 482–515. doi:10.1111/1467-9620.00170

KEY TERMS AND DEFINITIONS

21st Century Skills: Technology skills deemed necessary for success in the 21st century, including critical thinking, invention, problem-solving, and multicultural collaboration.

Access to Technology: Differences in availability of technology resources such as internet, iPads, laptops, SmartBoards, apps, and other software.

Apps: Software technology applications.

Behaviorism: Teacher directed learning and instructional practices. Teacher uses of technology to convey content knowledge.

Blended Learning: Courses that use some face-to-face instruction mixed with some web-based instructional components. A flipped classroom uses a blended learning model.

Constructivism: Student centered learning and pedagogical practices. Student-oriented technologies in which students are the primary users.

Epistemology: Theoretical framework that informs pedagogical beliefs of teachers which influence instructional decision-making.

Gender Divide: the propensity of technology to attract males to the field. Preferred usage of technology by males.

Gender: Differences in male and female approaches to teaching and technology integration.

Integration: A seamless instructional process of technology mediated learning in content areas.

Online Learning: Web-based courses taught 100% in a virtual learning environment.

Secondary Social Studies: a composite discipline represented history and the social sciences. Courses taught in high school include World History, American History, U.S. History, Geography, Political Science, Civics, Government, Economics, Psychology, Sociology, and etc.

Teacher Characteristics: Attributes of teachers including teaching experience, gender, age, training, and professional development.

Technology: Classroom hardware and software, and online learning tools used by both teachers and students.

This work was previously published in Exploring the Effectiveness of Online Education in K-12 Environments edited by Tina L. Heafner, Richard Hartshorne, and Teresa Petty, pages 385-429, copyright year 2015 by Information Science Reference (an imprint of IGI Global).

APPENDIX 1

Interview Protocol

Begin with these questions:

1. How would you define your approach to teaching?
2. How would describe your teaching style on a scale of 1 to 5? 1= behaviorist (teacher directed instruction) or 5= constructivist (student centered instruction). Explain your rating.
3. How would you define technology? Provide an example.
4. How would you classify yourself on a scale of 1-5? 1= digital immigrant or 5=digital native. Please explain.
5. How comfortable are you in using technology on a scale of 1-5. 1= very unconformable or 5= very comfortable. Please explain your rating.
6. What do you think should be the role of technology in teaching? Provide an example from your teaching.
7. What do you think should be the role of technology in learning? Provide an example.
8. When you use technology what are your primary reasons for choosing to use technology? Describe a specific usage of technology.
9. When you use other instructional methods what are your primary reasons for not using technology tools?

Perceptions of technology:

- What types of technologies do you use for teaching social studies?
- How do you integrate technology into the classroom?
- Who are the primary users of technology in your social studies classes: you or your students? Explain.
- How do you define effective integration of technology in social studies?

Additional open-ended questions will be posed when appropriate. These will include questions to explore specific technology tools mentioned by teachers:

- Please describe why you chose to use this technology.
- Please describe how you use this software to teach social studies.
- What does this application of technology looks like in your classroom? Give a specific content example when you have used it.
- How do you think the use of this technology impacts your work or students' learning?
- Please describe your reasons for choosing not using this technology.

Final Questions:

1. Please define in your own words what it means to effectively integrate technology in secondary social studies classes.
2. Please feel free to add any additional comments that you may have concerning technology use in secondary social studies classes.

APPENDIX 2

Table 6. Codes from original study

Meta Theme	Theme	Code	Sub Code	Sub Code
Gender (emerged in all themes)	Workplace environment	Barriers to technology integration	Time, expertise, access, resources, discipline, testing, restrictions, professional development	Content-specific professional development, technology resources and access
	Teacher Autonomy	Perceived restraints	Teacher control (over students, technology, curriculum & pedagogy)	Independent learning Dependent learning
	Links between beliefs and technological practices	Philosophy defines technology use Technology use defines beliefs		
	Epistemological Beliefs	Behaviorist Constructivist	Mixed – middle ground	Non static practices
	Perceptions of Technology	In learning In teaching	Definitional influences	Insecurity about technology Comfort with technology
	Perceptions of Integration	Perceived benefits of technology Perceived limitations of technology	Generational differences	
	Inequalities	Technology access inequality Perceptions of students	Poverty as barrier to BYOT Disciplinary problems Advanced vs. general students	
	Applications	Types of technologies Motivations for and against technology Access levels	Teacher Use Student Use	Maintain attention of students

Table 7. Participant descriptions

Teacher Number	Teacher Characteristics	Teacher
1	**Gender:** Male **Teaches:** World History, Civics and Economics **Experience:** 6 years **Technology Type:** Very comfortable and confident in his technology abilities **Access:** Has access to iPads and uses them. His students also use smartphones and laptops in the classroom	He believes in the integration of technology in the classroom but he also states that technology should not drive the instruction. Rather the right technology should be found to supplement pedagogical decisions because technology is a tool not a pedagogical approach. He is a constructivist and designs his classroom instruction around student centered activities. He is comfortable letting go of the control in the classroom and instead he views himself as a facilitator or learning for the students.
2	**Gender:** Male **Teaches:** U.S. History, World History **Experience:** 5 years **Technology Type:** Considers himself a tech super user of sorts **Access:** His students will soon have iPads in the classroom provided to them by the school. Students have been bringing their own technology for a while.	This teacher describes himself as someone who vacillates between employing traditional teacher directed instruction methods and student centered instruction methods. He believes in giving students an increasing amount of ownership of their learning and he feels that technology is something that can aid this process. He also views technology as a tool to considerably save time when conducting research and as a tool that enables students to accomplish certain tasks otherwise not possible.
3	**Gender:** Female **Teaches:** US History **Experience:** 6 years **Technology Type:** Confident technology user, but a little conservative in her usage **Access:** She uses iPads sometimes but has a hard time accessing them. She does *not* have a smart board in her classroom but her kids have BYOT	She is a young teacher and, in my opinion, a technology native. She seems very confident and comfortable with trying new technology apps and software. However, her view on technology integration in the classroom is a little conservative in that she believes that tech can make students lazy and she therefore makes her students go to the library and use books. In addition she feels that students are best able to "think for themselves" (engage in critical thinking) without technology and she sometimes does not permit technology usage for this reason – which to me is a traditional view of technology. She states however that technology use in instruction is inevitable because students expect it and it's the only way to maintain students' interest and engagement. Technology use is also important in her opinion because it provide students with transferable skills they need for the employment market and for college. I think she integrates technology in her lessons more than she realizes.
4	**Gender:** Male **Teaches:** U.S. History, Civics and American Government **Experience:** 10 years **Technology Type:** Confident in technology use, but not a native **Access:** All his students have iPads in the classroom	He is working within a magnate school with a STEM focus and their teaching philosophy is focused on student centered instruction. He therefore considers his teaching style as constructivist, which I think was less his own doing and more a result of him working in the magnate school. He believes that technology is a supplementary tool to the learning process for example as a way of accessing information quickly and for visual aids. His students use technology *more* than he does on a daily basis. Although he has technology incorporated in his lessons, he still sometimes pursues non-technology class room instruction because he believes that sometimes technology enables students to take short cuts that are not beneficial to their learning.
5	**Gender:** Female **Teaches:** U.S. History, Social Studies **Experience:** 15 years **Technology Type:** Insecure hesitant user, not a native. **Access:** Has access to and uses the computer labs. She has access to iPads, but is a little insecure about them	She is a more traditional teacher in that she employs teacher centered instruction (lecture) in all her classes although she combines it with student centered activities. She does allow her students to use their own technology but she seems to be the main technology user in the classroom. She considers technology mostly as a tool to show visual aids or as a presenter tool. Oftentimes she feels her students are more engaged and that she "gets more out of them" when they are allowed to use technology but she also notes that she feels technology in the classroom is a distraction and she is afraid to give up the control of the learning. Although she appreciates the added value of technology, she actually considers it a burden because it adds to her workload in preparation and planning time. She also feels technology can deter students from learning standard English and can facilitate a tendency to become introverted.

continued on following page

Table 7. Continued

Teacher Number	Teacher Characteristics	Teacher
6	**Gender:** Female **Teaches:** Civics and Economics, Social Studies, U.S. History **Experience:** 15 years **Technology Type:** Fairly confident tech user but not a native **Access:** She has access problems and makes use of BYOT the most	Her teaching philosophy is a combination of teacher and student centered instruction. She feels that with the topics she teaches, the curriculum is so comprehensive that some lecture is unavoidable. She considers technology an aid to enhance learning, to look up information, and also a tool for students to express their comprehension of a topic. Technology can bring visual to the historical in a way otherwise not possible and she makes use of technology in this way to make students understand historical events better. I think she is more student centered in her approach and more of a tech user than she realizes. Although she views technology favorably, she mentions that it can be a little overwhelming and time consuming.
7	**Gender:** Female **Teaches:** All elective classes **Experience:** 25 years **Technology Type:** Not very confident in her tech skills but eager to learn more **Access:** Some access barriers to iPads etc., but her students use their own technology sometimes	Her teaching approach is student centered and she wants students to be engaged in hands on activities. However, she still believes that due to the size of the curriculum in some of her classes, she still needs to give teacher directed instruction such as lectures. She considers technology more than just a way to obtain information. Instead technology is a tool for creating something based on processing learned information and expressing it creatively. Because technology appeals to younger people, younger than her, she feels that they get excited about it and it's a tool for them to express themselves in ways that give her an insight into what her students are thinking: An insight not otherwise possible. She also considers technology a way of keeping her students attention and as a way of giving them options of how to approach a problem. It appears however that she is the main consumer of technology in the classroom, not the students.
8	**Gender:** Male **Teaches:** Social Studies, Government, Civics and Economics **Experience:** 15 **Technology Type:** He is comfortable with technology, but doesn't seem to be a super user **Access:** Some access problems but students bring their own smartphones, iPads and laptops	His teaching philosophy is based on student centered instruction and he believes in allowing his students freedom to debate and discuss. He considers technology aids as tools to enhance the learning but not tools that can replace the teacher. He states that his students use technology in the class room more than himself but when asked about this in detail he states that his students only use technology in the classroom about twice a week whereas he uses it every day. He believes that constructivist instruction style goes hand in hand with technology use however, I think he considers himself more of a tech user than he really is.
9	**Gender:** Male **Teaches:** Social Studies, U.S. History **Experience:** 15 years **Technology Type:** Confident user, but has a hard time incorporating technology into his lesson planning **Access:** He has some access problems, mostly due to a lack of planning. Kids bring their own gadgets	This teacher describes himself as a constructivist and states that his classes are a non-lecture format. He considers technology in two ways, first, as a tool for gathering information and second, as a tool used to create something with – something new that cannot be created without technology. In this way he is (theoretically at least) integrating technology into the students' learning process. It seems to me that in his classrooms, he is the main consumer of technology, not his students. He has ideals that are hard to put in practice and therefore in the end, despite his ideals, it seems his students mostly use technology to access information – not creating.
10	**Gender:** Female **Teaches:** No AP – only general level social studies, primary focus World History **Experience:** 4 years **Technology Type:** She is in my opinion a native – confident in her tech skills **Access:** some access problems, students use their smartphones	Her teaching style is mostly constructivist as she believes in student centered instruction and exploratory learning for the students, with herself as a facilitator only. She considers technology a tool for creating something in the learning process, not just a tool for gathering information, and she is weary of what she considers an over-consumption of technology (she believes in quality over quantity!). Her approach is to use technology when it's possible to create something with it and she also believes in teaching students how to appropriately use technology. She feels that technology makes the students more interested and engaged. It seems that both teacher and students are using technology in the classroom although mostly the teacher.

continued on following page

Table 7. Continued

Teacher Number	Teacher Characteristics	Teacher
11	**Gender:** Female, **Teaches:** World History, Social Studies **Experience:** 1 year of teaching experience **Technology Type:** Hesitant, but confident technology user **Access:** Has access to iPads but does not use them.	She believes in the integration of technology in theory but is insecure in integrating technology in her own classes. Planning and access are barriers for her effectively integrating technology in her classroom. With more teaching experience she will probably become more confident and better able to plan for technology use in her lessons. She does use a lot of technology in her classroom but mostly combined with teacher directed instruction. She would like to use it for more student centered activities.
12	**Gender:** Female **Teaches:** AP US history Holocaust and Genocide **Experience:** 5 years of experience **Technology Type:** Insecure, but capable technology user **Access:** Has access to iPads and uses them in her classroom	She is an able technology user however she is also an insecure and reluctant technology user because she has fear of relinquishing control of the learning process. By incorporating more technology usage in her classroom, she feels a loss of control of the learning process and she does not trust that she will be able to engage the students enough to stay interested. She also fears that if she does not give the students a lecture version of the material they need then they will not learn it (again, fear of letting go of controlling the learning process).

Chapter 71
E-Learning Training Courses on Multicultural Education:
An Example from Greece

Catherine Dimitriadou
University of Western Macedonia, Greece

Nektaria Palaiologou
University of Western Macedonia, Greece

Eirini Nari
Platon School, Greece

ABSTRACT

The implementation of the blended learning model is one of the most flexible and effective ways to organize teacher training courses since it combines contact learning and distance learning. Furthermore, differentiated instruction is the solution of Modern Didactics to the teachers' needs concerning their response to the challenges of the multicultural school. In this chapter, a teacher training seminar combining cultural diversity issues with e-learning methods is presented. The participant teachers were asked to use posters illustrating human and citizenship rights issues in order to create teaching scenarios promoting Multicultural Education. Thus, they were expected both to meet the challenges of differentiated instruction and to be familiar with e-learning approaches. The study points out the significance of the practice of education when developed within e-learning environments, a method which enables the production of collective practice-based knowledge. The authors' main aim is to highlight the importance of the usage of media tools in an e-learning training course.

INTRODUCTION

Teachers differ with regard to the learning patterns they adopt, the quality of their learning and their professional development. These elements, in turn, are associated with the obvious and non-obvious learning activities teachers develop (Vermunt & Endedijk, 2011). All the aspects mentioned above have advanced due to the integration of the Web into the education system. The reason is

DOI: 10.4018/978-1-4666-8246-7.ch071

that this integration has caused a shift from centralised classroom-based education to distributed e-learning courses that can be taken anytime and anywhere (Alonso, López, Manrique & Viñes, 2005, p.234).

Teachers' beliefs, practices and attitudes, and the relationship between these factors are strongly related to the challenges teachers face at work today. With regard to the perspectives of good teaching, contemporary teachers are expected to keep up with developments related to their own skills, knowledge and pedagogy, as well as their students' learning readiness and diverse backgrounds (Vermunt & Endedijk, 2011). As a result, teacher-training practices seem to have shifted from traditional, lecture-based procedures to active, self-regulated initiatives. In addition, teachers' pedagogic role demands the ability to differentiate their instruction, to apply student-centred learning approaches, to promote meta-cognitive regulative strategies for students, to design assignments, to coach project groups and to monitor and reflect on students' learning and thinking strategies (Bakkenes, Vermunt & Wubbels, 2010). Moreover, due to the rapid development of computer science and the popularisation of the Internet, modern educational technology has enhanced education ability and efficiency, changing the traditional education model and the ways of acquiring knowledge (Palaiologou, 2006).

In this chapter, first, we provide some useful background on the educational framework in which our study was developed and implemented. Then we present the context of our study, give our perspective on the issue and support our position. Finally we refer to the conclusions of our study.

1. THEORETICAL UNDERPINNINGS

The issue of teacher education and the training programmes the teachers follow during their studies in order to become effective in multicultural classrooms, that is to be able to provide 'culturally responsive teaching' to their pupils (Gay & Howard, 2000), has been a core topic in international teaching literature (Banks, 2011). Along the same line, at the international level, especially during the last ten years, there has been an increasingly global focus on online and distance education programmes, as new innovative approaches in teacher multicultural education and training programmes.

Taking the above into consideration, the objective of this study is to set a framework for teacher-training, e-learning courses, focussing on issues of multicultural diversity. Specifically, during an e-learning, teacher-training course incorporated into a Multicultural Education project, teachers who participated were asked to create teaching scenarios in congruence with their specialisation. Posters about the issues of human and citizenship rights issues were used as an inspiring tool for the participants. The scenarios served as an arts-informed, narrative inquiry aimed at investigating the teachers' knowledge on how to exploit meaning-making resources as multicultural storytellers through media texts (Dimitriadou, Nari, & Palaiologou, 2012). In other words, story-telling was used both to inspire teachers and motivate diverse students as learners in order to maximize the potential of their critical thinking and expression of their views.

It is worth mentioning here the main characteristics of e-learning procedures as training methods for individuals whose knowledge needs to remain current and competitive (Starr, 1998). Distance learning or e-learning or long distance programmes all constitute an extension of traditional teaching with the use of ICT, 'where learning opportunities can be provided in asynchronous, self-paced formats or in synchronous virtual classes' in keeping with the needs of those being educated (Zahner, 2002, p.12; Keegan, 2001).Thus, what is achieved is the dispensation of the temporal and geographic limitations of conventional training (Zgaga, 2008), while there is a saving of time, money and teaching staff. Distance e-learning programmes should be flexible, innovative, and applicable to the needs of the learners, while their potentials range from the dispatch of texts by correspondence to sound recorded files and teleconferencing. According to Wilson and Harris (2004), the incorporation of ICT into distance e-learning programmes enhances cooperation and learning within a socio-political framework, as well as the development of critical thinking skills, reflection, self-adjustment and meta-cognition of the teachers. Cultural factors are an important dimension which should be taken into consideration in the development of software and educational platforms (Palaiologou, 2006).

Recent international studies show the importance of challenging ourselves as educators to develop a global learning programme that would contribute to multicultural and cross-cultural global education in line with core teacher education courses. An interesting example is the study conducted by Seeberg and Minick (2012, p.2), at Midwestern University in the US (MWU); the researchers used computer-mediated communication (CMC) Web 2.0 tools, including video-conferencing, 'to engage teacher candidates actively, both affectively and cognitively, in diversity and in interaction with others in global contexts by involving them in direct experiences, rather than learning "about" them'. As the researchers stated, 'at MWU students do not appear to be ideal targets for multicultural, cross-cultural global learning projects. They frequently lack multicultural experiences and the personal motivation or social need to know the other' (as above).

Needless to say, the above situation as described by our international colleagues is the same in most European teachers' preparatory and in-service education programmes (see: Palaiologou & Dietz, 2012). During the e-learning teacher-training course described here, we made an effort to cover this gap to some extent.

2. THE CONTEXT OF THE STUDY: A DISTANCE LEARNING TRAINING COURSE FOR TEACHERS AND ITS SIGNIFICANCE

During the spring term of the academic year 2011-2012, a distance learning course on differentiated instruction was held in Florina by staff members of the University of Western Macedonia, within the framework of the Educational Project 'Education for Foreign and Repatriated Students'.[1] The three co-authors have worked as trainers in the e-learning courses of this project.

A six-week training course was addressed to Primary and Secondary education school teachers of various specialisations, who were working in classes with students from diverse socio-cultural backgrounds. Amongst its main objectives was to encourage the participants to design on their own and, then, apply innovative educational strategies in their multicultural classes, combining theory and practice. Thus, the course aimed at the teachers' professional development (Chitpin, & Evers, 2005) by familiarising them with the e-learning practices. Along with other obligations, the participants were asked to design and apply teaching scenarios based on innovative educational strategies by means of ICT application in differentiated instruction.

The seminar was based on two key-concepts of the discipline of teaching: *blended e-learning* and *differentiated instruction*. On the one hand, the blended e-learning was a vehicle for the creation of flexible instructional environments. Since it combines self-paced learning, live e-learning, and face-to-face classroom learning, blended learning helps learning procedures to exceed the traditional 'chalk and talk teaching', which is usually dominated by sterilized, shallow, superficial and controlling practices. Apart from instructors and participants, faculty developers interested in helping instructors and academic administrators interested in supporting hybrid courses cooperated (Aycock, Garnham & Kaleta, 2002). It is worth mentioning that the blended leaning approach has been proved as the most efficient contemporary teaching model (Alonso et al., 2005, p. 234).

What is more, differentiated instruction is optimum since it is personalised to students' needs. Various types of differentiation can be used either separately or in combination, concerning contents, processes, products, affects and learning environments (Scalise, 2007, p. 4-5). Furthermore, computers can be considered the potential saviours of the education system, because they can be used to personalise learning: 'they design our learning according to our needs and record the progress we make' (Alonso et al., 2005, p. 218).

In the course under consideration, differentiated instruction offered the opportunity for applications in specific topics, aiming at enriching the instruction in terms of both content and methodologies. Included among the seminar modules were discussions and real examples of educational and didactic approaches that were targeted at adapting the teachers' practices to the intercultural approach. In this way, it was expected that the teachers' academic performance and self-esteem would be enhanced. Special reference was given to the fundamentals of multicultural education in multicultural settings (Palaiologou & Dietz, 2012; Palaiologou & Evangelou, 2009; Kesidou, 2004), in addition to the application of flexible teaching methods (Dimitriadou, Pougaridou & Vrantsi, 2009; Dimitriadou & Efstathiou, 2008).

It is something of a truism to say that the blended learning model has been broadly incorporated into teacher training courses, because it helps teachers develop both communicative skills and qualifications related to ICT-based learning contexts. For example, we refer to the Comenius in-service training course which took place in Benidorm, Spain (2-6 September 2013) entitled 'Building research-based MOODLE materials in Maths, Science and CLIL'. Some of the objectives of this training course were: to encourage teachers to develop skills to manage blended courses in different ICT-based learning contexts, to develop teaching materials using e-Learning tools and to increase teacher collaboration (http://itemspro.net/?page_id=411).

The significance of e-learning training courses has been commonly pointed out in the international literature for certain reasons. First, e-learning is widely perceived as a learner-friendly mode of learning, provided it offers alternative, self-paced and personalised ways of studying (O' Brien & Beetham, 2008). E-learning programmes extend traditional learning paradigms into new dynamic learning models (Liaw, Huang, & Chen., 2007), since they are designed to be studied at a distance and give participants the flexibility to work from any location using a structured and supportive framework. Instructors are willing to use e-learning environments, since they enable them to make learning more effective, efficient and appealing. Moreover, e-learning programmes also allow participants to complete their courses while keep up with their busy and complex lifestyles (Ausburn, 2004). Sharpe et al. (2006, p. 45) found that 'student response is overwhelmingly positive to the provision of online course information to supplement traditional teaching'.

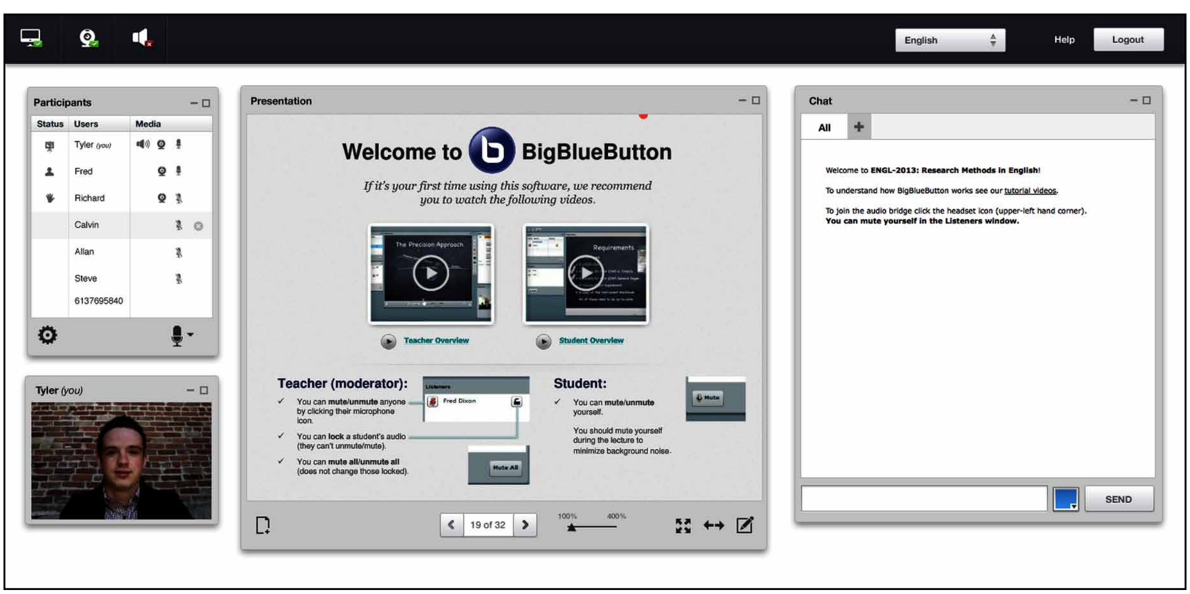
On the other hand, e-learning courses usually set barriers. To start with, a common barrier in e-learning courses is the demand for technological literacy of the learners who participate. Some learners have adequate computer-related experience, some have adequate Internet-related experience (using browsers and e-mail) rather than word processing (Liaw et al., 2007), while others have a negative attitude towards ICT. Additionally, participants expect instructors to help them when they use e-learning environments for assisted learning.

Concerning this point, some researchers claim that most students' problems with technology occur at the start of the courses, something that can be prevented by writing instructions for the students and by dedication to technology orientation and class socialisation (Aycock et al., 2002) during the first week of class. Another important negative factor that has been cited refers to the cultural barriers and the dominance of western cultures in the Internet and e-learning courses (Palaiologou, 2006). In a similar vein, not only do the people lack the technological capacity to interact with classmates and instructors; technical problems, such as poor network quality or malfunctions of digital cameras and microphones, discourage them from using e-learning tools. Collins and Berge (2000) suggest that users' technical problems can be promptly minimized by electing a simple and robust delivery technology. Also, Cho and Berge (2002) identified ten major obstacles in distance learning: technical expertise, administrative structure, evaluation/effectiveness, organisational change and quality, student support service, feeling threatened by technology, access, faculty compensation and time, as well as legal issues.

3. DESCRIPTION OF THE PLATFORM THAT WAS USED

At the beginning as well as at the end of the seminar, two face-to-face meetings took place (during the first and sixth week). Four intervening sessions were conducted by means of an open-source, web conferencing system developed primarily for distance education, called the *Big Blue Button* (http://www.bigbluebutton.org).[2] By using this system, the participants were involved in synchronous activities of distance learning through a virtual classroom, and had the opportunity to attend the instructors' lectures, to see any PDF presentations or office documents with extended whiteboard capabilities (such as a pointer, zooming and drawing),to use a microphone, to take part in a group chat which was viewed by everyone within the conference or to take part in a private chat with the instructor, as well as to communicate feelings and responses to questions or statements (Figure 1). Also, Big Blue Button offers the option of a recording feature that allows online courses to be automatically recorded and posted on the system, while every participant has access to this material.

Figure 1. Big Blue Button (new) interface



It should be noted that there is no built-in limit on the number of simultaneously active webcams.

Big Blue Button provided the environment for synchronous communication which enabled real time communication between the instructor and the teachers. The teachers had the opportunity to express their views, to contribute their experiences, to ask questions and discuss issues with their colleagues. Moreover, the interaction between the electronic (online) instructor and students was vital to avoid the isolation that can occur among participants in distance education programmes (Lewis & Al-Hamid, 2006). It is worth noting that the desired purpose can be better achieved when we use audio and video teleconferencing technologies. In some cases, these media are perceived as more 'potent' communication channels than face-to-face communication (Allen, Bourhis, Burrell, & Mabry, 2002).

In order to support the e-learning training course, the following tools and applications used contributed to the creation of an integrated e-learning environment:

- Announcement board that feeds the teachers with new information about the training course and accesses the teaching scenarios that were asked to be created in the direction of Multicultural Education.
- E-mail applications that serve as asynchronous communication among the interconnected.
- Chat applications over the Internet which offer synchronous communication with video and audio streaming in real time.
- Access to recorded files which contain the previous online courses so that every participant would be able to study part or the whole course in an asynchronous, self-paced format.

4. PARTICIPANTS' INVOLVEMENT AND INTERACTION

The participants attended four modules (thematic divisions) related to the differentiation of teaching, along the axes of: a) multimodal texts, b) concept maps, c) projects and d) scientific and technological literacy. For each module, the trainers uploaded educational material onto the platform on a weekly basis. The participants were asked to study the material, create assignments in the form of teaching scenarios for their students of various socio-cultural origins and then apply these scenarios to their classrooms. In the meantime, they used collaborative Internet resources in order to stay in touch with the trainers and be supported by the trainers' feedback and guidance. In the last face to face meeting, the participants presented these scenarios to the plenary session.

A prevailing element in such a process was the teachers' reflection concerning their task (Schön, 1983), since it not only focused on the formal knowledge of an external 'specialist' transferred to a team of teachers, but also was formulated by the teachers' experience itself, in the way they encountered it in the specific class where they taught.

The teachers' involvement in the procedures described above gave them the opportunity to collaborate with colleagues from higher education, thus taking their place in a 'learning community'. Thus it is assumed they have created knowledge that is more relevant to the practice of education than the knowledge created by research institutes (Enthoven & de Bruijn, 2010, p. 290). Moreover, they were expected to be enabled to adopt a constructivist view of learning (Terhart, 2003) in order to raise their self-esteem, as well as to promote their professional development and emancipation.

The teachers were asked to reflect on their experience twice – upon the completion of the course and in the beginning of the next school year – through questionnaires and semi-structured interviews respectively. The findings indicate that there was a positive effect both with regard to the knowledge the teachers acquired and the flexibility of the e-learning training method they followed. Moreover, when the teachers were asked to reflect on their practices five months after the end of the project, they continued to apply some of the strategies that they had learned during the blended learning course to their own classes (Nari, Dimitriadou, & Spyrtou, in press). This is an outcome which substantiates the efficiency of the course, since, according to research findings, teachers mainly report changes in their knowledge, beliefs and emotions but hardly any changes in teaching practices (Bakkenes, Vermunt, & Wubbels, 2010, p. 545).[3]

Of course, it is apparent that the role of the online instructor in the case under consideration is neither static nor one dimensional (Lewis & Abdul-Hamid, 2006). As Govindasamy (2001) maintains, teachers are responsible for finding the appropriate pedagogical method to use e-learning tools in teaching since the design of tools does not apply to pedagogical principles. As he has also asserts, unless an e-learning implementation exercise is rooted in strong pedagogical foundations, it will not be successful (op. cit.).

5. FUTURE RESEARCH DIRECTIONS

In order to improve the training practices that rely on blended learning, it is urgent that longer and more extensive teacher-training seminars throughout a wider population of teachers take place in the future. The participants' professional development could be examined in relation to factors such as learning motivation, specialty or personal characteristics of the teachers. Furthermore, more effort should be put into defining instructional processes suited to this type of teaching and not leave the ad hoc design to the instructors (Alonso et al., 2005: 218).

6. DISCUSSION AND CONCLUDING REMARKS: USING E-LEARNING TRAINING EDUCATIONAL PROCEDURES IN MULTICULTURAL SCHOOL SETTINGS

The demand for teachers' lifelong learning within e-learning training contexts, the new forms of knowledge production and the differentiated approaches to diverse students' learning have undoubtedly upgraded the quality of the participants' teaching. How did this improvement happen?

We can assume that the teachers gradually shifted from imposed, predefined teaching and learning to reflective collaboration, in accordance with the different needs of different students (Tomlinson et al., 2003). They also responded to the request for 'multiple, dynamic and malleable' literacies: they developed proficiency with the tools of technology; they put together and assigned tasks that sought emancipation, assuming ethical responsibilities towards pupils in multicultural classes. In a word, they supported social learning in favour of the 'pull' models of education, as opposed with the 'push' models, which encourage imposed, predefined and formalised teaching and learning approaches (Lankshear & Knobel, 2011, p. 24-25, p.226-229). The above characteristics are of major importance, since they create added value to e-learning possibilities: they increase the teachers' self-confidence and professional emancipation, features that can enhance their professional development.

We can also assume that the teachers made steps toward their professional development, both technically and pedagogically; the skills they developed with regard to teaching practices correspond to a kind of knowledge creation which, in turn, is expected to involve diverse students in critical thinking, creativity, and self-directing capacity, making use of their learning readiness, learning styles and multiple intelligences (Nari, Dimitriadou & Spyrtou, in press; Gardner, 1983).

In order to fulfil its mission, education needs to keep up with developments in society, science and student awareness. As Gifford (1985) previously declared almost three decades ago, *'educational reform is a sine qua non'*. Since teachers are the most appropriate people to implement innovation and change in educational practices, scientific knowledge about how teachers learn, how they differ in their learning, and how their learning can be improved are of the utmost importance (Vermunt & Endedijk, 2011). Too often, however, educational innovations have failed because the need for teacher learning has not been acknowledged. Consequently, the education systems, including the organisation and form of educational institutions and curricula, must be altered in order to keep up with the learning that occurs using computers and Web 2.0 technologies (Attwell, 2007).

In recent years, multicultural school settings have raised additional teaching needs both for teachers and students. The design and implementation of e-learning training educational systems has become an important asset, especially in multicultural educational settings, with students coming from families of different socio-cultural origins, ethnic backgrounds, or with students with special educational needs or other divergences. With the purpose of presenting a comparative approach of e-learning towards multicultural education, we shall mention in particular three similar programmes that aim to enhance students in multicultural classrooms either in the learning or the psychosocial domain. The criteria for this choice were the following two: first, to give a similar best practice example from Europe as well as from America; and second, to mention similar programmes that have been implemented recently.

Our first example is the MIH (Multicultural Interdisciplinary Handbook: tools for learning History and Geography in a multicultural perspective), a Comenius Multilateral Project which was developed from 2009 until 2011, funded with support from the European Commission. The aim of this project was to involve pupils in contributing to the creation of a sense of European citizenship, by promoting a multicultural approach to education in European schools with the support of Information and Communication Technologies and CLIL methodologies. Each partner institution organised its own teacher-training course in face-to-face or blended learning methodology and the teachers involved had the opportunity to become familiar with the materials and define their use in their classrooms, according to the different school levels and curricular programmes (Peñalvo, Zangrando, Pardo et al., 2012). Another project that supports multicultural and cross-cultural education is *Pupils On the Move* (PUMO, 2013), a European Comenius project for the development of technology-enhanced learning materials for teachers, equipping them to support pupils who have temporarily left their schools and are living with their parents in other countries. This series of online, teacher-training courses, which focus on multicultural education and intercultural pedagogy, use ICT and Web 2.0 tools in order to support learning progress in subject areas specific to their countries of origin. Amongst its main objective is to further train 300 teachers by the end of the 2014-2015 academic year.

Thirdly, we shall refer to a study that was implemented by Aragon and Kaminski (2012) entitled 'Racist Facebook Event Against Native Americans: Preservice Teachers Explore Ethical and Critical Multicultural Implications'. This was an exploratory case study which sought to analyse data from Collaborative Learning Modalities (CLM) on-line threaded discussions in order to examine preservice teachers' thinking and emotions regarding the ethical nature of a Facebook event turned away against Native Americans, and also to highlight sensitive multicultural issues addressed in the training of college students.

After taking all the above studies into consideration, we realise that in e-learning, the concept of differentiated instruction denotes a meaning which is in congruence with well-prepared traditional instruction; yet, different tools are available to help students learn and to provide information in ways most appropriate to them. Types of new media inclusion, levels of interactivity, response actions, and enhanced ability to collect data on the fly and to deliver custom content are included (Scalise, 2007). From a pedagogical point of view, it becomes quite obvious that the stronger the involvement of the learner, the better the result becomes (Kupetz & Ziegenmeyer, 2005).

REFERENCES

Allen, M., Bourhis, J., Burrell, N., & Mabry, E. (2002). Comparing student satisfaction with distance education to traditional classrooms in higher education: A meta-analysis. *American Journal of Distance Education*, *16*(2), 83–97. doi:10.1207/S15389286AJDE1602_3

Alonso, F., López, G., Manrique, D., & Viñes, J. M. (2005). An instructional model for web-based e-learning education with a blended learning process approach. *British Journal of Educational Technology*, *36*(2), 217–235. doi:10.1111/j.1467-8535.2005.00454.x

Aragon, A., & Kaminski, K. (2012). Racist Facebook Event Against Native Americans: Preservice Teachers Explore Ethical and Critical Multicultural Implications. *i-manage's Journal of Educational Technology, 9*(1), 35-43.

Attwell, G. (2007). *Web 2.0 and the changing ways we are using computers for learning: What are the implications for pedagogy and curriculum?* Retrieved November 20, 2013, from http://erinw.edublogs.org/files/2007/12/Web-and-computers-changing-education.pdf

Ausburn, L. J. (2004). Gender and Learning Strategy Differences in Nontraditional Adult Students' Design Preferences in Hybrid Distance Courses. *The Journal of Interactive Online Learning*, *3*(2), 1–17.

Aycock, A., Garnham, C., & Kaleta, R. (2002). Lessons learned from the hybrid course project. *Teaching Scholars Forum, 8*(6).

Bakkenes, I., Vermunt, J., & Wubbels, T. (2010). Teacher learning in the context of educational innovation: Learning activities, and learning outcomes of experienced teachers. *Learning and Instruction*, *20*(6), 533–548. doi:10.1016/j.learninstruc.2009.09.001

Banks, J. A. (2011). Educating citizens in diverse societies. *Intercultural Education*, *22*(4), 243–251. doi:10.1080/14675986.2011.617417

Chitpin, S., & Evers, C. W. (2005). Teacher professional development as knowledge building: A Popperian analysis. *Teachers and Teaching: Theory and Practice*, *11*(4), 419–433. doi:10.1080/13450600500137208

Cho, S. K., & Berge, Z. L. (2002). Overcoming Barriers to Distance Training and Education. *USDLA Journal, 16*(1).

Collins, M. P., & Berge, Z. L. (2000). *Technological minimalism: The Technology Source*. Retrieved January 9, 2014, from http://web.archive.org/web/20031111042905/http://ts.mivu.org/default.asp?show=article&id=812

Dimitriadou, C., & Efstathiou, M. (2008). Teaching approaches in mixed classrooms: The integration of immigrant and foreign students in school (junior high school). In D. K. Mavroskoufis (Ed.), *Intercultural Education and Instruction* (pp. 67–85). Ministry of National Education and Religion. (in Greek)

Dimitriadou, C., Nari, E., & Palaiologou, N. (2012). E-learning teacher training courses for differentiated instruction in multicultural classrooms: Reflections upon the participants' experiences. *i-manager's Journal of Educational Technology, 9*(3), 14-26.

Dimitriadou, C., Pougaridou, P., & Vrantsi, A. (2009). Intercultural Competence of Educators: A Meta-functional Analysis of their Needs and Attitudes. In N. Palaiologou (Ed.), *Electronic Proceedings of the International Education of IAIE*. Intercultural Education.

Enthoven, M., & de Bruijn, E. (2010). Beyond locality: The creation of public practice-based knowledge through practitioner research in professional learning communities and communities of practice: A review of three books on practitioner research and professional communities. *Educational Action Research*, *18*(2), 289–298. doi:10.1080/09650791003741822

García Peñalvo, F. J., Zangrando, V., Seoane Pardo, A. M., Holgado, A. G., Szczecinska, J., Baldner, J. M., & Crivellari, C. (2012). *Multicultural Interdisciplinary Handbook: Tools for Learning History and Geography in a Multicultural Perspective*. GRIAL.

Gardner, H. (1983). *Frames of Mind: The Theory of Multiple Intelligencies*. New York: Basic Books.

Gay, G., & Howard, T. C. (2000). Multicultural teacher education for the 21st century. *Teaching Education*, *36*(1), 1–16.

Gifford, B. R. (1985). Teaching--From Occupation to Profession: The Sine Qua Non of Educational Reform. *New England Journal of Public Policy*, *1*(2).

Govindasamy, T. (2001). Successful implementation of e-Learning pedagogical considerations. *The Internet and Higher Education*, *4*(3-4), 287–299. doi:10.1016/S1096-7516(01)00071-9

Keegan, D. (2001). *Basic elements of Open Distance Learning*. Athens, Greece: Metaixmio.

Kesidou, A. (2004). Intercultural Education: Main Aims and Practices. In N. P. Terzis (Ed.), *Intercultural Education in the Balkan Countries, Education and Pedagogy in Balkan Countries* (Vol. 4, pp. 97–105). Thessaloniki, Greece: Kyriakidis.

Kupetz, R., & Ziegenmeyer, B. (2005). Blended learning in a teacher training course: Integrated interactive e-learning and contact learning. *ReCALL*, *17*(2), 179–196. doi:10.1017/S0958344005000327

Lankshear, C., & Knobel, M. (2011). *New Literacies: Everyday Practices and Social Learning* (3rd ed.). New York: McGraw Hill.

Lewis, C. C., & Abdul-Hamid, H. (2006). Implementing effective online teaching practices: Voices of exemplary faculty. *Innovative Higher Education*, *31*(2), 83–98. doi:10.1007/s10755-006-9010-z

Liaw, S. S., Huang, H. M., & Chen, G. D. (2007). Surveying instructor and learner attitudes toward e-learning. *Computers & Education*, *49*(4), 1066–1080. doi:10.1016/j.compedu.2006.01.001

Nari, E., Dimitriadou, C., & Spyrtou, A. (in press). *E-learning teacher education in Western Macedonia: The effect of an in-service training course*. Paper presented in the International Conference Education Across Borders. Retrieved from http://www.kosmit.uowm.gr/site/EduCbr

O'Brien, R., & Beetham, H. (2008). *Student learning experience, podcast for JISC (Joint Information Systems Committee) & 'In their own words – instigating the learners' experience of learning (associated publication)*. Academic Press.

Palaiologou, N. (2006). Intercultural dimensions in the information society: Reflections on designing and developing culturally-oriented learning. In A. Edmundson (Ed.), *Globalized e-learning cultural challenges* (pp. 74–89). Hershey, PA: Information Science Publishing. doi:10.4018/978-1-59904-301-2.ch005

Palaiologou, N., & Dietz, G. (2012). Mapping the field of Multicultural/Intercultural Education Worldwide. In *Towards the Development of a New Citizen*. Cambridge Scholars Publishing.

Palaiologou, N., & Evangelou, O. (2009). ICT in Intercultural Education: Creating Communication Bridges. *The International Journal of Technology. Knowledge in Society*, *5*(3), 155–164.

Pupils On the Move (PUMO). (2013). *European COMENIUS project*. Retrieved from http://www.pumo.info/

Scalise, K. (2007). Differentiated e-learning: Five approaches through instructional technology. *International Journal of Learning Technology*, *3*(2), 169–182. doi:10.1504/IJLT.2007.014843

Schön, D. (1983). *The reflective practitioner: How professionals think in action*. New York: Basic Books.

Seeberg, V., & Minick, T. (2012). Enhancing Cross-cultural Competence in Multicultural Teacher Education: Transformation in Global Learning. *International Journal of Multicultural Education*, *14*(3).

Starr, D. R. (1998). Virtual education: current practices and future directions. *The Internet and Higher Education*, *1*(2), 157–165. doi:10.1016/S1096-7494(99)80179-2

Terhart, E. (2003). Constructivism and teaching: A new paradigm in general didactics? *Journal of Curriculum Studies*, *35*(1), 25–44. doi:10.1080/00220270210163653

Tomlinson, C. A., Brighton, C., Hertberg, H., Callahan, C. M., Moon, T. R., & Brimijoin, K. et al. (2003). Differentiating instruction in response to student readiness, interest, and learning profile in academically diverse classrooms: A review of literature. *Journal for the Education of the Gifted*, *27*(2/3), 119–145.

Vermunt, J. D., & Endedijk, M. D. (2011). Patterns in teacher learning in different phases of the professional career. *Learning and Individual Differences*, *21*(3), 294–302. doi:10.1016/j.lindif.2010.11.019

Wilson, V., & Harris, M. (2004). Creating change? A review of the impact of Design and Technology in schools in England. *Journal of Technology Education*, *15*(2), 46–65.

Zahner, J. (2002). Teachers Explore Knowledge Management and E-learning as Models for Professional Development. *TechTrends*, *46*(3), 11–16. doi:10.1007/BF02784836

Zgaga, P. (2008). Mobility and the European dimension in Teacher education. In B. Hudson & P. Zgaga (Eds.), *Teacher Education Policy in Europe: A Voice of Higher Education Institutions* (pp. 17–41). Umea, Sweden: University of Umea, Faculty of Teacher Education.

ADDITIONAL READING

Baker, T., & Clark, J. (2010). Intercultural Education. *Cooperative Learning – A Double-Edged Sword: A Cooperative Learning Model for use with Diverse Student Groups, 21*(3), 257-268.

Boyle-Baise, M. (2005). Preparing Community-Oriented Teachers. Reflections from a Multicultural Service-Learning Project. *Journal of Teacher Education*, *56*(5), 446–458. doi:10.1177/0022487105282113

Campbell, C., Gillborn, D., Lunt, I., Sammons, P., Vincent, C., Warren, S., & Whitty, G. (2002). Strategies and issues for inclusive schooling. In C. Campbell (Ed.), *Developing Inclusive Schooling: Perspectives, policies and practices* (pp. 150–165). London: Bedford Way Papers.

Centre for Educational Research and Innovation (OECD). (2010). *Educating Teachers for Diversity: Meeting the Challenge*. Paris: OECD.

Chamberlin-Quinlisk, C. (2012). Teaching Language and Culture In Digital Age. In Technology, Education and Cultural Diversity. [i-manager publications.]. *Journal of Educational Technology, Special Issue*, *9*(1), 6–14.

Clandinin, J. D, Michael F., Connelly, F. M. (2000). Narrative Inquiry: Experience and Story in Qualitative Research. San Francisco: Jossey-Bass.

Dimitriadou, C., & Efstathiou, M. (2012). Fostering Teachers' Intercultural Competency at School: the Outcomes of a Participatory Action Research Project. In N. Palaiologou & G. Dietz (Eds.), *Mapping the Broad Field of Multicultural Education Worldwide. Towards the Development of a New Citizen* (pp. 296–313). Newcastle upon Tyne: Cambridge Scholars Publishing.

Dimitriadou, C., Tamtelen, E., & Tsakou, E. (2011). Multimodal texts as instructional tools for intercultural education: A case study. [Best Practice]. *Intercultural Education*, *22*(2), 223–228. doi:10.1080/14675986.2011.567080

Erlenawati, S. (2011). Dealing with Diversity in Internationalized Higher Education Institutions. *Intercultural Education*, *22*(5), 381–394. doi:10.1080/14675986.2011.643136

Johnson, J. (1994). SPARCS Ignites Multicultural Education. *Educational Leadership*, *51*(8), 36–39.

Kellner, D. (2000). New Technologies/New Literacies: reconstructing education for the new millennium. *Teaching Education*, *11*(3), 245–265. doi:10.1080/713698975

Ladson-Billings, G. J. (1999). Preparing Teachers for Diverse Student Populations: A Critical Theory Perspective. *Review of Research in Education*, *24*, 211–247.

Palaiologou, N. (2012). *Culture,* Education and Pedagogy. *Journal of Educational Technology*. Retrieved August 2012, from: http://www.imanagerpublications.com

Palaiologou, N. (Ed.). (2012). Technology, Education and Cultural Diversity. Journal of Educational Technology, Special Issue. April-June, vol. 9, no1, i-manager publications.

Palaiologou, N. (2014). *Intercultural Education. Conceptual and Empirical Challenges*. Routledge.

Palaiologou, N., & Dimitriadou, C. (2013). Multicultural/Intercultural Education Issues in Pre-service Teacher Education Courses: the Case of Greece. *Multicultural Education Review*, *5*(2), 49–84. doi:10.14328/MER.2013.09.30.49

Revithiadou, A., Dimitriadou, C., & Tamtelen, E. (2013). The image of the 'other' through extra-curricular mother language instruction: The instructors' views. Paper presented in the 16th Conference of Balkan Society for Pedagogy and Education *The Image of the Other/ the Neighbour in the Educational Systems of the Balkan Countries (1998-2013).* Thessaloniki, 26-28/3/2013. (under publication).

Todd, S. (2011). Educating Beyond Cultural Diversity: Redrawing the Boundaries of a Democratic Plurality. *Studies in Philosophy and Education*, *30*(2), 101–111. doi:10.1007/s11217-010-9215-6

Wendy, A., & Gorski, P. C. (2008). Directions and Mis-Directions in Multicultural Education: An Analysis of Session Offerings at the Annual Conference of the National Association for Multicultural Education. *Personal Perspective 10*(3), 167-174.

KEY TERMS AND DEFINITIONS

E-Learning (Electronic Learning): Is a way of teaching and/or learning which concerns new dynamic learning models through computer and Web technologies. It encompasses Web-based learning (WBL), Internet-based training (IBT), computer-assisted instruction or computer-aided instruction (CAI), advanced distributing learning

(ADL), online learning (OL) and virtual learning environments (VLE) (known as learning platforms). It refers to instruction delivered via various electronic media such as the Internet, intranets, extranets, and hypertext/hypermedia documents. What is achieved is the dispensation from the temporal and geographic limitations of conventional training. All involved elements (technology, teachers, students of higher education, professionals who develop ICT for teaching/learning purposes, managers of institutions of higher education, stakeholders, politicians and even representatives of business) are interconnected. As a result, only if the efforts are in synergy, is the balanced development possible for the best benefit of learning.

Blended Learning: Is a formal education program which combines traditional face-to-face teaching forms along with computer-mediated, e-learning formats. Some authors use the term *hybrid* learning interchangeably when referring to courses which mix face-to-face instruction with online methods.

Intercultural/Multicultural Education: Is the development of teaching/learning procedures which take into account the socio-cultural diversity of pupils and create smooth functioning, diversity-positive, learning environments. Multicultural and intercultural education has been much discussed and researched approaches for quite some time. Multicultural education and intercultural education are often used as synonyms, while others indicate that there is a difference between the two. In the multicultural and intercultural literature it is often unclear what the concepts mean and whether they are referring to the same or different things. Often the difference in use seems mostly geographical. In Europe the preferred term is intercultural education while especially the United States but also the rest of North America, Australia and Asia use the term multicultural education (as a broader term referring to diversity). However, in Europe there are differences between countries as well. For example, in Sweden and the Netherlands intercultural education is used while in Great Britain and Finland multicultural education is the commonly used term. Interestingly multicultural and intercultural education are often used as if the terms are universally understood and referring to only one type of inclusive education. Multicultural education can take many different directions; likewise intercultural education is sometimes mostly focused on intercultural relations or intercultural competence issues. Teachers with intercultural competence are able to positively address students coming from diverse cultural environments, even if these are 'culturally invisible' in the classroom, marginalised or have difficulties in language communication and literacy practices. Moreover, teachers who are competent in intercultural education are able to manage diversity and know how to use appropriate methodological approaches: to remove prejudice, stereotypes and images of enemies from the curricula and textbooks; to emphasise the teaching context which displays not only cultural differences but also existing similarities between peoples; to introduce literary texts by authors from the country of the other; to organise common projects by students of different cultural origins in history, literature, music, etc., which facilitate contact between cultures and the acceptance of cultural similarities. Furthermore, these teachers are able to use effective curricular strategies such as simulations, advanced organisers and scaffolding-manipulation techniques, or to create teaching scenarios that may bring about the impact of inclusion. Teachers competent in intercultural education take initiatives for socially transformative education and enhance their awareness, authenticity and effectiveness while creating a classroom climate open to critical considerations of equity, social justice and human rights.

Differentiated Instruction: Addresses equal opportunities for a broad range of learners, based on the acknowledgment of their varied readiness levels, interests, and learning preferences. It refers to the teachers' tendency to overcome the technical rationalism of traditional teaching models and make modifications in order to meet the learning needs of academically diverse populations. Effective differentiation arises from consistent, reflective, and coherent efforts to address the full range of student readiness, interests, and learning profiles in the presentation of information, student practice or sense making, as well as student expression of learning. Within the frame of differentiated instruction, flexible teaching practices are used, such as: group-collaborative teaching, inquiry learning, collaborative project work, experiential learning, role-play games, brainstorming, advanced organisers, didactic exploitation of pictures, as well as procedures which promote creative thinking.

Technology Literacy: Is the ability to employ the latest technological means in order to improve day-to-day communication and social practices. Technological means refer to the different kind of "technical stuff" from conventional means such as screens, digital code, multimodal and electronic networks instead of paper, material print, distinct modes or hard-copy publishing. By facilitating these means, one is able to communicate by producing, receiving and distributing information, to solve problems by accessing and managing information and to improve learning by acquiring lifelong knowledge and skills in the new media age. As a result, someone who is familiar with ICT-based learning contexts and thus capable of using digitally mediated information, knowledge, and representations of the world is considered literate in technology.

Reflection: Is the ability of teachers to adopt an analytical approach toward their practice and take an active role in decision making, especially when facing problematic situations. Reflection is a notion strongly connected to any effort toward understanding the theory and practice of teaching and learning. Its establishment as a core ingredient of successful instruction has been viewed with regard to different aspects concerning teaching. Reflective teachers can see the correspondence between everyday actions and scientific or theoretical concepts and are able to utilise theory in order to analyse, evaluate and change their own practice. Two main types of reflection have been identified, namely 'reflection-in-action' and 'reflection-on-action'. Reflection-in-action occurs during the teaching activity, whereas reflection-on-action has a retrospective character and occurs when teachers think about their teaching experience and, making further steps, change their planning and enrich their practice with new teaching-learning ideas.

Teachers' Professional Development: Means the growth teachers attain in their profession when engaged in action learning as a continuous development of practice and when they put their 'knowing how' into words. The term denotes a procedure which is built on confidence, trust, learning and dialogue and occurs when teachers look ahead and avoid dwelling on their experiences. It corresponds to the teacher's ability to attain learning which is internally directed and presupposes sub-competences such as subject-knowledge competence, competence in planning the instruction, social competence, a good work ethic and also personal-development competence. A teacher develops professionally when she becomes aware of substantiating her teaching, sharing experiences, connecting experiences to theories, reflecting on her own practice, helping each other in a busy work situation, being aware of what is good or not in her teaching, sharing ideas, and integrating reflection in the planning of her lesson. In this sense, a teacher's professional development encompasses the teacher's readiness to take a step backward and to become aware of the fact that she has a choice whether or not to allow limiting factors to determine her behaviour. This awareness of having a choice is one of the most fundamental parameters in a teacher's professional growth, since it contributes to personal autonomy.

ENDNOTES

[1] Here, the terms 'distance' and 'e-learning' are used alternatively. The project has been planned and developed by the Aristotle University of Thessaloniki, Greece (2010-2013) (http://www.diapolis.auth.gr/index.php). The project is supported by the programme 'Education of Foreigners and Repatriated Students' funded by the National Strategic Reference Framework (NSRF) 2007-2013 and national resources. The seminar was incorporated in the Activity 'Training of Teachers and Members of the Educational Community', Sub-Activity 'Distance Learning'.

[2] Big Blue Button (New) Interface http://www.bigbluebutton.org/overview/

[3] Part of this study was published at the *i-manager's Journal of Educational Technology,* October-December 2012, Special issue, 9(3), 14-26 (see the reference above). The results of a research approach to the seminar reveal the innovative character and the efficiency of the model for teacher training and teacher professional development.

This work was previously published in E-Learning as a Socio-Cultural System edited by Vaiva Zuzeviciute, Edita Butrime, Daiva Vitkute-Adžgauskiene, Vladislav Vladimirovich Fomin, and Kathy Kikis-Papadakis, pages 102-116, copyright year 2014 by Information Science Reference (an imprint of IGI Global).

Chapter 72
Academics' Perceptions of Using Technology with Face-to-Face Teaching

Geraldine Torrisi-Steele
Griffith University, Australia

ABSTRACT

Many academics are using technology in their teaching, and universities are strongly involved in the provision of support to help academics make the most effective use of the technology. How academics perceive technology for teaching partly filters their response to the provided support. It is therefore useful to explore academics' perceptions of the use of technology in teaching. The study (N=53) reported on in this chapter provides insights into academic perceptions of teaching with technology by addressing the questions: (1) Which teaching tools (both face-to-face teaching and digital) are most popular? (2) For what purpose are the tools being used? (3) Do academics intend to extend their current use of technology with face-to-face teaching for the purposes of implementing learning strategies? and (4) Which feasibility conditions do academics perceive to be important to the realization of their intended use of technology ? The results of the study show that, for the academics in the study, face-to-face teaching is perceived as the preferred tool, especially for learning purposes such as helping students to understand concepts. The use of technology by the academics was limited to the simpler digital tools, and these were used mostly for non-learning-related purposes such as communication. However, the academics expressed the intent to increase their use of technology for improving learning in the future, and perceived feasibility conditions such as professional and technical support, teaching facilities, and especially time to be important to the realization of their intentions.

INTRODUCTION

For most academics, technology is a feature of their university teaching activities. The use of technology for teaching is strongly encouraged in universities, at an institution-wide level, for social, pedagogical and economic reasons, and thus many universities are placing significant strategic emphasis on the provision of support to assist academics to make more effective use of technology in their teaching.

DOI: 10.4018/978-1-4666-8246-7.ch072

Given that it is partly through the filter of their perceptions that academics will view, and subsequently respond to, the provided support, the present chapter seeks to shed some light on academics' perceptions of using technology in their teaching. The study (N=53) reported on in this chapter is a subset of a broader study, which aims to better understand academics' use of technology with face-to-face teaching. For the purposes of the present chapter, the focus question is "how do academics perceive the use of technology with face-to-face teaching strategies?." Pertinent to the focus question, the following more specific questions are addressed in the chapter: (1) which teaching tools (both face-to-face teaching and digital) are most popular? ', (2) 'For what purpose are the tools being used?', (3) 'Do academics intend to extend their current use of technology with face-to-face teaching for the purposes of implementing learning strategies?', and finally, (4) 'Which feasibility conditions do academics perceive to be important to the realization of their intended use of technology?'

Before describing the study and reporting on results, it is important to contextualize the study firstly, by explaining what is meant by the term 'technology' as used in the study, and then giving a brief historical perspective to highlight developments in technology, and identify underlying pedagogical mindsets.

BACKGROUND

The term 'technology' as used in the context of this chapter refers to the suite of digital technologies, both existing and emerging. The suite of technology includes laptop and desktop computers, smart mobile digital devices (phones, tablets, pens), Internet based services such as social networking tools, learning management systems, video streaming tools such as lecture capture and video conferencing, digital classroom software and so on.

The use of digital technologies for teaching has its roots in computer-based training. Computer-based training was made possible by mainframe computers in the 1960's and 70's. As the 1970's approached there arose a need to provide education to an increasing number of students. This lead to the development of the PLATO (Programmed Logic for Automated Teaching Operations) system, one of the earliest uses of digital technology for learning (Bersin, 2004). PLATO enabled access to more than 3500 hours of training materials across over 100 subject areas, and it remained in operation for more than forty years (Smith & Sherwood, 1976). Terminals were located within educational institutions. The interface used a character-based system and the only input mechanism was the keyboard. The presentation of content was limited to line drawings, graphs and color photographs, displayed on a small 22cm screen. The system's limited support for media and interaction meant that learning experiences with the PLATO system were restricted to drill and practice approaches.

The mainframe systems of the 1970's severely confined access locations because the systems were expensive and complex, and were only available for installation within larger organizations. It was the emergence of the personal computer in the 1980's that placed access to computer based learning within the reach of the general population, in their own homes, and made it possible for more educational institutions to acquire the technology. With increasing technical sophistication of the personal computer the ability to produce highly interactive and media rich computer based content became a reality in the early 1990's. It became possible to present content on a digital platform that supported the integrated use of various media (audio, video, still images, animation, text), and the capacity to support sophisticated user interactions. This mode of presenting content became known as 'interactive multimedia'. The advent of the CD-ROM, with its cheap and high storage capacity, enabled the distribution of interactive multimedia content to a wide audience.

Very soon, designers of computer-based instruction began to shift their mindset away from the idea of 'drill and practice' towards the idea that interactive multimedia could potentially facilitate deeper, more meaningful learning experiences. It was with some excitement that instructional designers and other educators explored the capacity of interactive multimedia to support multiple learning styles, and provide self-paced more individualized learning experiences. Educators speculated that interactive multimedia might not only improve learning but perhaps it could even replace instructor-led experiences (Bersin, 2004). Literature of the time was characterized by a plethora of research was investigating if technology was better than face-to-face teaching. In many cases researchers published works praising the potential of the technology to significantly enhance learning:

All of the elements will soon be in place to benefit language learners and teachers: communicatively oriented, learner-centred materials, authoring systems allowing for adaptation to individual circumstances, and truly interactive distance learning [...] interactive multimedia can empower the learner to an unprecedented degree. (Morgenstern, 1998, p. 86)

Educators saw that the potential of interactive multimedia to provide highly interactive and individualized learning experiences aligned closely with the constructivist ideals of active learning and individualized knowledge construction (based on Piaget's (1952) cognitive constructivism). Thus, cognitive constructivism became popular (and remains popular today) as a guiding philosophy for the design of interactive multimedia learning experiences. Proponents of technology for teaching and learning advocated for the use of technology based learning because with its potential to support constructivist frameworks it would be a catalyst for a paradigm shift in teaching - from instructor-centered instructivist strategies to the more student-centered constructivist approaches (Sandholtz, Ringstaff & Dwyer, 1997; Roschelle, Pea, Hoadley, Gordon, & Means, 2007; Duffy & Cunningham, 1996; Jonassen & Reeves, 1996).

The next major development in the history of technology in teaching was the arrival of the World Wide Web in the late 1990s-2001. Initially, the Web only supported basic text and graphics. The early Web offered the ability to link to other content and resources on the Web but it offered only a little more interactivity than the very early computer-based training systems. The situation rapidly changed as Internet services matured, bandwidth increased and technologies became available to support not only highly interactive, media rich experiences but also a range of communications tools for both online synchronous (same time, same place or same time, different place) and asynchronous (different time, different place) communication. Terms such as 'e-learning'- the "online access to learning resources, anywhere and anytime" (Holmes & Gardner, 2006, p. 14), and 'online learning' (sometimes used interchangeably with e-learning) were popularized and remain with us at the present time.

The capacity of the social networking tools, which accompanied the arrival of the World Wide Web, brought focus to socio-constructivism as an important base informing the design of learning experiences. Socio-constructivism holds to the cognitive constructivist principles of learner-centered learning and knowledge as construction. However, according to socio-constructivist views deep learning is achieved when learners share and question their understandings (Laurillard, 1993). Socio-constructivism stems from Vygotsky's (1978) emphasis on social learning and the power of collaboration. According to Vygotsky (1978), there exists a zone of proximal development, that is, there is a difference between what the learning can do independently and what the learner can potentially do when engaging in interaction with others (instructor of more capable peers). The role of instruction is to provide scaffolded experiences along the zone of proximal development so that the learner may advance.

Web-based communications technologies have the potential to support socio-constructivist ideals in that they provide a means of enabling students to collaborate and engage in discussion with each other and with teachers outside of on-campus contact time. Terms such as 'e-learning communities', 'e-communities', 'Web-mediated learning communities', or 'communities of practice' have become commonly used to refer to the idea that groups of individuals come together online to collaborate, discuss their learning and share learning activities for the purpose of achieving deeper learning, (Alonso, López, Manrique, & Viñes, 2005; Holmes & Gardner, 2006).

Today, the Internet and a host of associated information and communications digital technologies feature in teaching and learning contexts. The connectivity infrastructure established for the Internet now supports an array of mobile smart technologies (e.g. phones, tablets, pens) that are capable of high levels of interaction, media rich experiences and social connectivity. As a result, there is currently some focus on mobile learning. From a pedagogical perspective, the question is no longer 'is technology better than face-to-face teaching?' but rather 'How can the attributes of technology be best exploited in teaching contexts?'. Constructivism and social constructivism remain as guides for the design for the potentially complex, media rich, interactive learning experiences (Jonassen, 1994; Kramer & Schmidt, 2001; Strommen, 1999) that can be designed (Table 1).

Evidently, technology is firmly established in teaching and learning contexts. Academics may be motivated to use technology because of advantages related to pedagogy, flexibility and efficiency. The pedagogical potential of technology may be realized through instructional designs based on the constructivist approaches outlined previously. Furthermore, the presence of technology offers the opportunity for student learning experiences that might not otherwise be feasible. For example, virtual laboratories (Sancho, Corral, Rivas, a Jesu´s Gonza´lez, Cho, & Tejedor, 2006) may enable students to develop competencies that would not otherwise be possible, perhaps due to safety reasons or lack of access to sophisticated equipment. Networked technologies allow for flexibility by enabling teaching and learning to take place across time and place for both academics and students (Wang, 2007; Uğur, Akkoyunlu, & Kurbanoğlu, 2011). The capacity of using technol-

Table 1. The capacities of technology to support constructivist principles

Constructivist Principle	Capacity of Technology
Learners have different learning styles	Supports multimodal presentations which cater to different learning styles
Individual construction of knowledge	Flexible navigation is designed to enable learners to proceed at their own pace and to choose their own pathways through content
Learning through problem solving	Sophisticated interaction with content can be designed which provides opportunities for experimentation with constructive feedback. Interaction is able to be tailored to learner needs to either provide flexibility so that learners choose their own pathways through content or provide either more rigid sequences or more guidance as needed.
Authentic learning contexts; context dependent learning that mirror the natural complexity of the real world.	It is possible to construct activities that offer near authentic situations that might otherwise be impractical in reality, for example, virtual laboratories and simulations. Mobile technologies enable learning activities to take place in the field so students can undertake authentic tasks that incorporate the natural complexity of the real word.
Learning through collaboration	Asynchronous and synchronous communication and collaboration facilities enable collaboration outside constraints of location. For example, students undertaking field exercises can collaborate with peers in another location to negotiate understanding of the content found in their particular context (Jonassen, 1994).

ogy for more efficient teaching is obvious. Course materials are easier to re-use and materials can be delivered to a larger number of students (Wang, 2007) without the need for physical location to physically accommodate students and teachers.

Despite the documented potential advantages of using technology in teaching (De George-Walker & Keeffe, 2010; Garrison & Kanuka, 2004; EL-Deghaidy & Nouby, 2008; Haripersad & Naidoo, 2008;) not all academics embrace technology in teaching with the same enthusiasm or to the same extent. Some may use technology at its most basic level for reasons of convenience (for example, using a learning management system to post course announcements), whilst others may invest significant effort into developing complex, fully interactive learning designs. There is some focus in literature on identification of the barriers to adopting technology. For example, Wang (2007) found that the principal barriers to adoption included: preparation time and effort, "the challenge of instructional design with new media," the increased demands of online interaction" (p. 585). The anxiety of using technology or "being videoed when lecturing" was also impeding factors (p. 585). Ocak (2010) identified eight barriers to the adoption of technology in teaching: (1) complexity of the instruction, (2) lack of planning and organization, (3) lack of effective communication, (4) need for more time, (5) lack of institutional support, (6) changing roles, (7) difficulty of adoption to new technologies and (8) lack of electronic means.

Surveying other literature (Bagher, Marek, & Sibbald, 2007; Davis & Fill, 2007; Kistow, 2009; Stewart, Bachman, & Johnson, 2010;) concerned with barriers and facilitators of academics' use of technology for teaching brings to the fore five major factors that play an important role in facilitating or preventing use of technology in teaching: professional support, technical support, time, teaching facilities, and funding reoccur in literature in relation to facilitating academics' use of technology with face-to-face teaching

With the preceding discussion as a backdrop, attention is now directed towards adding insight into academics perceptions of the use of technology with face-to-face teaching. Prior to presentation of results and discussion the study methods are now outlined.

METHOD AND INSTRUMENTS

The study, from which the research described in this chapter is drawn, used a mixed methods approach. Following data collection via a survey a subsample of seven survey respondents were interviewed (respondents indicated their willingness to be interviewed on the survey). The survey was distributed via email and in person to academics in the Science, Environment and Engineering (SEET) group within Griffith University, Australia. A total of 53 academics responded to the survey.

In order to obtain data related to which digital tools are most used, and the purpose for which the tools are used, a matrix (Figure 1) was developed. Notice, in Figure 1, that face-to-face teaching is included in the tool list. The list of digital tools was generated from tools available on Griffith's learning management system. A consideration of the case study literature (De George-Walker & Keeffe, 2010; Sancho, Corral, Rivas, Gonzalez, & Chordi, 2006; Shen, Wang, Gao, Novak, & Tang, 2009) assisted with determining the main reasons why academics use technology together with face-to-face teaching. To complete the matrix in Figure 1, academics were asked to nominate one course they were teaching for which they made most use of technology. Academics were able to select more than one purpose of use category for each tool.

The second area of interest in the present study is the extent to which academics intend to increase their use of technology in teaching for pedagogical reasons. Data was collected using two sets of Likert scale items shown in Figure 2a and Figure 2b. To generate the items, the constructivist

Figure 1. Matrix of tools and purpose for which the tools may be used

	Efficiency	Access	Understanding concepts	Practice skills	Sharing ideas	Commun-ication
Lectures	❑	❑	❑	❑	❑	❑
Small groups	❑	❑	❑	❑	❑	❑
Clickers	❑	❑	❑	❑	❑	❑
Video conf.	❑	❑	❑	❑	❑	❑
Wikis	❑	❑	❑	❑	❑	❑
lecture capture	❑	❑	❑	❑	❑	❑
Email	❑	❑	❑	❑	❑	❑
Blogs	❑	❑	❑	❑	❑	❑
Twitter	❑	❑	❑	❑	❑	❑
Facebook	❑	❑	❑	❑	❑	❑
You tube	❑	❑	❑	❑	❑	❑
Discussion board	❑	❑	❑	❑	❑	❑
Virtual classroom	❑	❑	❑	❑	❑	❑
Live chat	❑	❑	❑	❑	❑	❑
Online assessment	❑	❑	❑	❑	❑	❑
Mobile	❑	❑	❑	❑	❑	❑
Podcasting	❑	❑	❑	❑	❑	❑
Wimba	❑	❑	❑	❑	❑	❑
Interactive learning objects	❑	❑	❑	❑	❑	❑
Other	❑	❑	❑	❑	❑	❑

philosophy is used as the foundation for strategy design, and thus some items relate to individualized learning experiences, alternative learning experiences and authentic learning activities. The seven items enabled respondents to indicate the extent to which they would like to use technology to achieve certain practice objectives in their nominated course.

To collect data related to the third of interest in the present study – feasibility conditions- a five item, seven-point Likert scale (Figure 3.0) instrument was used. The individual feasibility conditions, namely, professional support, technical support, time, teaching facilities, and funding, arose from findings of existing literature related to factors inhibiting or facilitating academics' acceptance of technology with face-to-face teaching

Figure 2. (a) Measure of academics' use of technology with face-to-face teaching for the purpose of developing learning strategies. (b) Measure of academics' intended future use of technology with face-to-face teaching for the purpose of developing learning strategies.

Indicate the extent to you use technology with face-to-face teaching to do each of the following:	
Address areas in which students experience difficulty	Not at all Extensively 1 2 3 4 5 6 7
Achieve course objectives.	Not at all Extensively 1 2 3 4 5 6 7
Present ideas in different ways.	Not at all Extensively 1 2 3 4 5 6 7
Provide learning activities.	Not at all Extensively 1 2 3 4 5 6 7
Implement assessment tasks closely aligned with real world contexts.	Not at all Extensively 1 2 3 4 5 6 7
Provide a high degree of individual autonomy for students.	Not at all Extensively 1 2 3 4 5 6 7
Develop innovative strategies.	Not at all Extensively 1 2 3 4 5 6 7

(a)

Indicate the extent to you would like to use technology with face-to-face teaching, *in the future*, to do each of the following:	
Address areas in which students experience difficulty	Not at all Extensively 1 2 3 4 5 6 7
Achieve course objectives.	Not at all Extensively 1 2 3 4 5 6 7
Present ideas in different ways.	Not at all Extensively 1 2 3 4 5 6 7
Provide learning activities.	Not at all Extensively 1 2 3 4 5 6 7
Implement assessment tasks closely aligned with real world contexts.	Not at all Extensively 1 2 3 4 5 6 7
Provide a high degree of individual autonomy for students.	Not at all Extensively 1 2 3 4 5 6 7
Develop innovative strategies.	Not at all Extensively 1 2 3 4 5 6 7

(b)

Figure 3. Importance of feasibility conditions

How important are each of the following in enabling the technology use you would like for future offerings of the course:

Professional support	Not at all important	Very unimportant	Somewhat unimportant	Neutral	Somewhat important	Very important	Extremely important
Technical support	Not at all important	Very unimportant	Somewhat unimportant	Neutral	Somewhat important	Very important	Extremely important
Time	Not at all important	Very unimportant	Somewhat unimportant	Neutral	Somewhat important	Very important	Extremely important
Suitable teaching facilities	Not at all important	Very unimportant	Somewhat unimportant	Neutral	Somewhat important	Very important	Extremely important
Funding	Not at all important	Very unimportant	Somewhat unimportant	Neutral	Somewhat important	Very important	Extremely important

(Bagher, Marek, & Sibbald, 2007; Davis & Fill, 2007; Kistow, 2009; Ocak, 2010; Stewart, Bachman, & Johnson, 2010; Wang, 2009).

RESULTS

Which Teaching Tools (Both Face-to-Face Teaching and Digital) Are Most Popular?

A count of the number of respondents using each tool yields the numbers shown in Table 2.

From Table 2 it is interesting to note that the teaching context is dominated by face-to-face teaching strategies. It is also worth noting that the simpler tools such as email and lecture capture are more commonly used than potentially more complex tools such as learning objects (which would require a greater investment of time, knowledge and effort to produce).

Table 2. The number of academics using the tools, arranged in descending order of count

Tool	Number of Academics
Face-to-face lectures	51
Email	50
Face-to-face small groups	42
lecture capture	32
You tube	30
Discussion board	29
Online assessment	28
Wikis	18
Blogs	13
Interactive clickers	12
Other technologies	9
Wimba	7
Face book	6
Virtual classroom	6
Online Peer/Self assessment	6
Podcasting	5
L@G Expo tool	5
mobile technologies	4
video conferencing	3
Live chat	3
L@G Group management tool	2
Twitter	1
Interactive learning objects	1

For What Purpose Are the Tools Being Used?

Table 3 shows the tools used by at least 25% of the academics for each purpose category. Note that the first three purpose categories in Table 3 (efficiency, access to content, communication) are not directly concerned with strategies aimed at achieving learning objectives, rather they are more related to convenience. The bottom three categories, on the other hand, are related to shaping learning strategies for achieving learning objectives.

An inspection of Table 3 shows the domination of face-to-face teaching strategies. A large percentage (84.9%) of respondents use face-to-face lectures for the purpose of helping students to understand ideas. Given the high percentage of participants using face-to-face lectures for the purpose of understanding concepts, it is clear that this group of academics, at least, perceive in person delivery of content to be most suited to helping students understand ideas. Face-to-face strategies are the tool of choice across all purpose categories except for communication, in which email is the preferred method. Interestingly, most of the academics considered face-to-face lectures as being the most efficient method of delivering and accessing content – purposes that are often reported in literature as being perceived as advantages for technology in teaching.

Clearly then, the academics in the study continue to favor the use of face-to-face teaching, and it is the simpler digital tools being used. Much of the use of digital tools is for purposes of conve-

Table 3. For each purpose category, the list of tools used for that purpose by 25% or more of academics

Purpose Category	Tools Used	% of Academics Using the Tool
Efficiency	Face-face lectures	60.3
	Online assessment	41.4
	Email	41.5
	Lecture capture	37.7
	Group Management tool	32
	Face-face small groups	26.4
Access to Content	Face-face lectures	52.8
	Lecture capture	43.4
	Email	39.6
	Online assessment	28.3
Communication	Email	81.1
	Face-face lectures	64.1
	Face-face small groups	50.9
	Discussion board	39.6
	Lecture capture	35.8
	Group Management tool	25.0
Practising Skills	Face-face small groups	49.1
	Face-face lectures	32.1
Sharing Ideas	Face-face small groups	58.5
	Face-face lectures	56.6
	Discussion board	34
	U tube	24.5
	Wikis	24.5
Understanding Concepts	Face-face lectures	84.9
	Face-face small groups	56.6
	U tube	47.1
	Discussion board	28.3
	Lecture capture	26.4

nience such as efficiency and access to content. It is interesting to ask if this group of academics is considering extending their use of technology for learning, rather than convenience, purposes.

Do the Academics Intend to Extend Their Current Use of Technology with Face-to-Face Teaching for the Purposes of Implementing Learning Strategies?

In addressing this question a paired samples t-test was used (the paired samples t-test compares of the means of two variables and enables the researcher to determine if the difference between the means is significant).

The results of the paired samples t-test are shown in Table 4.

The paired samples t-test demonstrates a statistically significant difference between the means of current and intended future practice objectives. Thus, the academics in this group were intending to increase the use of technology with face-to-face teaching towards the creation of learning experiences. This may represent a generally favorable attitude towards the use of technology for teaching by the participants.

Having established that the participant academics generally favored increasing their use of technology for creating learning experiences, it is important to now consider the feasibility conditions which academics perceive to be most important to the realization of their future plans.

Which Feasibility Conditions do Academics Perceive to be Important to the Realization of Their Intended Use of Technology?

The means for feasibility conditions are shown in Table 5.

Recalling that the means relate to a seven-point scale, it appears that time, technical support and teaching facilities rank amongst the most important considerations. To better ascertain whether there is any statistically significant difference between each of the feasibility conditions Tukey's HSD test was able to be performed (after performing a one-way ANOVA and checking that the assumption

Table 4. Results of paired samples t-test for perceived current and intended future practice objectives

Perceived Current Practice	Mean	Intended Future Practice	Mean	Sig. (2-Tailed) *
Address areas in which students experience difficulty	4.32	Address areas in which students experience difficulty	5.38	.000
Achieve course objectives	5.21	Achieve course objectives	5.53	.034
Present ideas in different ways	4.89	Present ideas in different ways	5.62	.000
Provide learning activities	4.98	Provide learning activities	5.57	.000
Implement assessment tasks closely aligned with 'real world' contexts	4.09	Implement assessment tasks closely aligned with 'real world' contexts	5.21	.000
Provide a high degree of individual autonomy for students	4.40	Provide a high degree of individual autonomy for students	5.23	.000
Develop innovative strategies	4.19	Develop innovative strategies	5.45	.000

*Significant at 0.05 levels

Table 5. Feasibility condition means

Feasibility Condition	Mean
Professional support	5.94
Technical support	6.30
Time	6.43
Teaching facilities	6.32
Funding	5.79

of homogeneity of variances is met). The results of Tukey's HSD are shown in Table 6.

Examination of Table 6 reveals that there is a statistically significant difference (0.642) between the means for Time (6.43) and Funding (5.79) factors. It is hence reasonable to conclude Time is a more important factor than funding for the realization of future use of strategies using technology with face-to-face teaching..

DISCUSSION

The results of the present study paint a picture of a teaching context dominated by face-to-face teaching with the use of digital tools serving mostly a supplementary role or being used for purposes of convenience such as access to content or efficiency. The academics participating in the study clearly perceived the use of face-to-face teaching to be the tool of choice for achieving learning related purposes such as understanding content, practicing skills and sharing ideas. Furthermore, the use of more sophisticated digital tools such as interactive learning objects, virtual classroom tools and mobile technologies were only used by a small number of the participant academics. It seems that, as has been noted by others in literature (Collis & Van Der Wende, 2002; Graham & Robison, 2007) few academics are fully exploiting the potential of digital technologies to provide learning experiences, rather, technology is being used in a supplementary or convenience role. The results presented in this chapter add strength to the argument that professional support is needed to help academics gain the knowledge and skills necessary to exploit the attributes of technology to provide more effective learning experiences. This being said, the academics taking part in the study generally intended to increase their use of technology for the purposes of providing learning experiences. especially those that support course objectives. However, in order to realize their future intentions, it became clear that the academics perceived as important professional and technical support, facilities, funding and especially time

Table 6. Tukey's HSD results

(I) Factor	(J) Factor	Mean Difference (I-J)	Sig.
Professional Support	Technical Support	-.358	.451
	Time	-.491	.150
	Teaching facilities	-.377	.397
	Funding	.151	.955
Technical Support	Professional Support	.358	.451
	Time	-.132	.972
	Teaching facilities	-.019	1.000
	Funding	.509	.124
Time	Professional Support	.491	.150
	Technical Support	.132	.972
	Teaching facilities	.113	.984
	Funding	.642*	**.025***
Teaching Facilities	Professional Support	.377	.397
	Technical Support	.019	1.000
	Time	-.113	.984
	Funding	.528	.101
Funding	Professional Support	-.151	.955
	Technical Support	-.509	.124
	Time	-.642*	**.025***
	Teaching facilities	-.528	.101

* Significant at 0.05 levels

The academics' perceptions of feasibility conditions were one area that was explored further in the open-ended interviews conducted with seven of the participants. During interviews, the time dominated the discussion of feasibility conditions. Given that it is seemingly such an important focus for the interviewed academics, key references made to time by interview participants were recorded in a table. Upon inspection of the recorded instances, it became evident that references to time could be categorized in one of four categories: Preparation, Implementation, Efficiency and Wasted time. Preparation time included time to discover possibilities and learn the skills to use technologies. Implementation time referred to the time consumed during actual use of the technology. Efficiency referred to how much time using the technology would take to achieve a teaching goal and was usually expressed as a comparison with the time it would take using other methods. 'Time' wasted referred to time lost due to technical failures. From Table 7 it can be seen that the most frequent reference made to time was in terms of preparation time.

Time for preparation was perceived as a major issue by the interviewed academics. Notably, some academics expressed a 'cost-benefit' mentality in relation to preparation time. It seems that the amount of time academics are willing to invest in preparation is related to the benefit for students in terms of improving the learning experience.

It is also important to note that other feasibility conditions such as professional support, facilities and technical support arose in the context of

Table 7. References made to time by participants (N=7) during interviews

Time Related Comment	Prepare	Implement.	Efficiency	Wasted Time
1. Having things set up online frees up a lot of my time. but once it's set up it takes less time because things are streamlined.	X			
2. Having X [blended learning advisor] there means I have more time... means I know what facilities are there.	X			
3. Discussion boards – don't use "because that means I've got to go in there and read them and that's very time consuming."		X		
4. There was help but I tried to get other staff interested but they said they didn't have time.	X			
5. I did all the background running around, I had to do all that.	X			
6. Any plans I have involve more work for me to prepare – that will require a lot of extra effort/time.	X			
7. But I knew which tool to use. I think that's the issue" "If I don't know.." it takes time to learn how to use it.	X			
8. It's all about time [to prepare].	X			
9. My time in [setting this up] this has been huge.	X			
10. I don't find time an issue for implementation just more time to learn how to use it.	X			
11. More time [to prepare].	X			
12. Time to enable me to learn what it can do.	X			
13. Again its time, if someone would come to me and say well here's all your options that'd be great.	X			
14. Time and effort relate more to finding out what's there than implementing it.	X			
15. At the moment it is such an effort just to get lectures done and out let alone anything else. Additional effort, got to have lectures done and then work on improving.	X	X		
16. Technology has 'gotten in the way' of student engagement to a certain extent, fiddling and messing around can slow you down, equipment can fail and nothing happen, so it has risks; in terms of a lecture does it really make you do more, I don't think so.				X
17. Compared to baseline – still creation of ideas and synthesis (academic part) then all this stuff you do to present it to modern standards. Does it save time NO.			X	
18. I read a paper by someone in …who was marking group discussion contributions...she said she spent over 140 hours over a semester… I was thinking about it but as soon as I read that it just turned me off that -I don't have time for that.		X		
19. Things go wrong all the time … I had to apologise to a large class – a lock up like that rips out 100's of hours.				X
20. I haven't got time to use technology with face-to-face ... if I want to use the full potential and turn it into a proper teaching system need 6 months to get up – don't have that time.	X			
21. I have a feeling I can use technology to teach and teach well, but I think it requires a terrific investment from the academic and other people – I really wonder how efficient it is.	X		X	
22. When does it [using technology] become worth it on a cost-benefit basis. Is it [technology] better than carefully planned face-to-face teaching?"			X	

discussions of time. Technical support and suitable facilities are seen as important contributors to wasting of time. Professional support is seen as mitigating the amount of time needed for development.

On the basis of the insights provided by the study two core recommendations are made:

1. *In providing professional support, institutions need to consider strategies to assist academics to exploit the attributes of technology in order to enhance (or develop new) instructional.* Although technology is being used in academic teaching, academics are not fully exploiting its potential to provide enriched learning experience. There is a need to fully explore why this is so. One possible explanation is that although academics possess the knowledge and skills to teach in more traditional face-to-face settings, they may not have the technical skills and knowledge that will enable them to fully exploit the attributes of the technology to the best advantage of the learning situation. As Mishra & Koehler (2006) propose, to effectively use technology teachers must possess technical, pedagogical and content knowledge. To facilitate the connection among technical, pedagogical and content knowledge it is important that professional development related to the use of technology for teaching should take place within a pedagogical context rather than in isolation. That is, technical training related to tool attributes and use, should be relevant to academics' pedagogical needs at the time. In this way, learning what a particular technology can do or how to use it, is perceived as knowledge required to address an issue related to teaching strategy implementation.
2. *The issue of time investment as a potential barrier to the adoption of technology for teaching must be acknowledged and strategies be put in place to address it.* Since the issue of time is linked to other feasibility conditions, possible strategies for mitigating the 'expense' of time may include: providing avenues for 'just in time' technical support (should things go wrong); academic access to instructional design advisers that are able to work with the academic on a one-one basis to help the with identification of technologies for designing learning strategies for attaining learning objectives specific to the course.

CONCLUSION

The present study has the limitations of a small sample of 53 academics, and of being institution and location specific. Furthermore, there are potentially factors not addressed in the present study that may influence academics' response to support. Despite limitations the present study has shed some light on academics' perceptions of technology for teaching. The results of the study suggest that despite technology being used by many academics for teaching, the types of digital technology being most commonly used are simple. Overall, technology is playing a relatively minor role in the creation of learning experiences. However, the participant academics expressed the intention to extend their use of technology for the purposes of creating learning experiences, especially to meet course objectives. This outcome suggests that the academics have a generally positive perception of the application of technology for the purposes of teaching and learning. Given that the academics placed considerable importance on factors such as technical and professional support, facilities, funding and time it becomes important to consider the extent of impact these feasibility factors are having on the extent to which academics are using technology for teaching. Of the feasibility conditions, time emerged as being most important, and the interview data suggested that other feasibility conditions are integrated with the availability of time.

The study reported in this chapter has served to reinforce the importance of providing institutional support for facilitating academics' more effective use of technology for teaching and learning, and the importance of implementing strategies to reduce the 'time cost' of developing and implementing teaching strategies that are enriched by the use of technology.

REFERENCES

Alonso, F., López, G., Manrique, D., & Viñes, J. M. (2005). An instructional model for web-based e-learning education with a blended learning process approach. *British Journal of Educational Technology*, *36*(2), 217–235. doi:10.1111/j.1467-8535.2005.00454.x

Bagher, M., Marek, S. A., & Sibbald, A. (2007). Implementing web-assisted learning and engaging academic staff in the change process. *Journal of Organisational Transformation and Social Change*, *3*(3), 269–284. doi:10.1386/jots.3.3.269_1

Bersin, J. (2004). *The blended learning book: Best practices, proven methodologies, and lessons learned*. San Francisco, CA: John Wiley & Sons.

Collis, B., & van der Wende, M. (2002). *Models of technology and change in higher education: An international comparative study on the current and future use of ICT in higher education*. Twente, The Netherlands: Center for Higher Education Policy Studies.

Davis, H. C., & Fill, K. (2007). Embedding blended learning in a university's teaching culture: Experiences and reflections. *British Journal of Educational Technology*, *38*(5), 817–828. doi:10.1111/j.1467-8535.2007.00756.x

De George-Walker, L. D., & Keeffe, M. (2010). Self-determined blended learning: A case study of blended learning design. *Higher Education Research & Development*, *29*(1), 1–13. doi:10.1080/07294360903277380

Duffy, T. M., & Cunningham, D. J. (1996). Constructivism: Implications for the design and delivery of instruction. In D. H. Jonassen (Ed.), *Educational communications and technology* (pp. 170–199). New York, NY: Simon & Schuster Macmillan.

EL-Deghaidy, H., & Nouby, A. (2008). Effectiveness of a blended e-learning cooperative approach in an Egyptian teacher education programme. *Computers & Education*, *51*(3), 988–1006. doi:10.1016/j.compedu.2007.10.001

Garrison, D. R., & Kanuka, H. (2004). Blended learning: Uncovering its transformative potential in higher education. *The Internet and Higher Education*, *7*(2), 95–105. doi:10.1016/j.iheduc.2004.02.001

Graham, C. R., & Robison, R. (2007). Realizing the transformative potential of blended learning: Comparing cases of transforming blends and enhancing blends in higher education. In A. G. Picciano & C. D. Dziuban (Eds.), *Blended learning research perspectives* (pp. 83–110). Needham, MA: The Sloan Consortium.

Haripersad, R., & Naidoo, R. (2008). Errors made by first year students in an integral calculus course using web-based learning. In *Proceedings of the 7th International Conference on Circuits, Systems, Electronics, Control and Signal Processing* (CSECS 08). Puerto De La Cruz, Spain: CSECS. Retrieved January 7, 2012, from http://www.wseas.us/e-library/conferences/2008/tenerife/CD-CSECS/papers/CSECS53.pdf

Holmes, B., & Gardner, J. (2006). *E-learning concepts and practice*. London, UK: Sage.

Jonassen, D., & Reeves, T. (1996). Learning with technology: Using computers as cognitive tools. In D. H. Jonassen (Ed.), *Handbook of research in educational communications and technology* (pp. 693–719). New York, NY: Simon & Schuster Macmillan.

Jonassen, D. H. (1994). Thinking technology: Toward a constructivist design model. *Educational Technology Research and Development*, *34*(4), 34–37.

Kistow, B. (2009). E-learning at the Arthur Lok Jack Graduate School of Business: A survey of academics members. *International Journal of Education and Development using ICT, 5*(4), 14-20.

Kramer, B. J., & Schmidt, H. (2001). Components and tools for on-line education. *European Journal of EducationEuropean Journal of Education*, *36*(2), 195–222. doi:10.1111/1467-3435.00060

Laurillard, D. (1993). *Rethinking university teaching: A framework for the effective use of educational technology*. London: Routledge.

Mishra, P., & Koehler, M. J. (2006). Technological pedagogical content knowledge: A framework for teacher knowledge. *Teachers College Record*, *108*(6), 1017–1054. doi:10.1111/j.1467-9620.2006.00684.x

Morgenstern, D. M. (1998). Shifting paradigms, shifting sands: Interactive multimedia for language learning. *Simulation & Gaming*, 82–87. doi:10.1177/1046878192231007

Ocak, M. (2010). Why are academics members not teaching blended courses? Insights from academics members. *Computers & Education*, *56*(3), 689–699. doi:10.1016/j.compedu.2010.10.011

Piaget, J. (1952). *The origins of intelligence in children*. London, UK: Routledge and Kegan Paul. doi:10.1037/11494-000

Roschelle, J. M., Pea, R. D., Hoadley, C. M., Gordin, D. N., & Means, B. M. (2000). Changing how and what children learn in school with computer-based technologies. *Children and Computer Technology*, *10*(2), 76–101. PMID:11255710

Sancho, P., Corral, R., Rivas, T., Gonzalez, M. J., & Chordi, A. (2006). Instructional design and assessment: A blended learning experience for teaching microbiology. *American Journal of Pharmaceutical Education*, *7*(5), 1–9.

Sandholtz, J., Ringstaff, C., & Dwyer, D. (1997). *Teaching with technology*. New York, NY: Teachers College Press.

Shen, R. R., Wang, M., Gao, W., Novak, D., & Tang, L. (2009). Mobile learning in a large blended computer science classroom: System function, pedagogies, and their impact on learning. *IEEE Transactions on Education*, *52*(4), 538–546. doi:10.1109/TE.2008.930794

Smith, S. G., & Sherwood, B. A. (1976). Educational uses of the PLATO computer system. *Science*, *192*(4237), 344–352. doi:10.1126/science.769165 PMID:769165

Stewart, C., Bachman, C., & Johnson, R. (2010). Predictors of academics acceptance of online education. *MERLOT Journal of Online Learning and Teaching*, *6*(3), 597–616.

Strommen, D. (1999). *Construcitivism, technology and the future of classroom learning*. Retrieved from http://www.ilt.columbia.edu/ilt/papers/construct.html

Uğur, B., Akkoyunlu, B., & Kurbanoğlu, S. (2011). Students' opinions on blended learning and its implementation in terms of their learning styles. *Education and Information Technologies*, *16*, 5–23. doi:10.1007/s10639-009-9109-9

Vygotsky, L. (1978). *Mind in Society: The Development of Higher Psychological Processes*. Cambridge, MA: Harvard University Press.

Wang, S.-C. (2007). University instructor perceptions of the benefits of technology use in e-learning. In K. Jusoff, S. S. Mahmoud, & R. Sivakumar (Eds.), *Proceedings of the Second International Conference on Computer and Electrical Engineering* (pp. 580-585). Dubai, UAE: IEEE Computer Society Washington.

KEY TERMS AND DEFINITIONS

Cognitive Constructivism: A set of beliefs about teaching and learning stemming from the work of Piaget (1952). The learner is viewed as an active participant in their own knowledge building process, and the teacher as a facilitator of that active knowledge building process. Constructivist views espouse to the idea of learner-centered teaching.

Computer-Based Training: Presenting content on a computer and using 'drill and practice' approach to learning. Typically computer-based training includes simple interactivity such as multiple-choice exercises.

Interactivity: In the context of using computers or other digital devices, interactivity requires input from the user that triggers an output response from computer system. For example, the user submits an answer to a multiple choice quiz by clicking the selected answer (input), the system responds (output) with an image of either a tick for a correct answer or 'x' for incorrect answer. Interactivity may relate to either controlling movement through the content (pace or pathway), or to interaction with the content itself (e.g., manipulate a component in a simulation to see the result).

Socio-Constructivism: A set of beliefs about teaching and learning stems from Vygotsky's (1978) work on social learning and the power of collaboration. Deep learning is achieved when learners share and question their understandings.

Technology: Refers to the suite of digital technologies, both existing and emerging. The suite includes laptop and desktop computers, smart mobile digital devices (phones, tablets, pens), Internet based services such as social networking tools, learning management.

Zone of Proximal Development: According to Vygotsky (1978), there exists a zone of proximal development, that is, there is a difference between what the learning can do independently and what the learner can potentially do when engaging in interaction with others (instructor of more capable peers). The role of instruction is to provide scaffolded experiences along the zone of proximal development so that the learner may advance.

This work was previously published in a Handbook of Research on Education and Technology in a Changing Society edited by Victor C. X. Wang, pages 1135-1150, copyright year 2014 by Information Science Reference (an imprint of IGI Global).

Chapter 73
Multicultural Considerations for Curriculum Developers of Online Courses

Beth Sargent
California State University, USA

Cynthia Gautreau
California State University, USA

Kristin Stang
California State University, USA

ABSTRACT

Grounded in the dimensional model of national culture, the purpose of this literature review was to investigate (a) the cultural impact of globalization on online instruction (in particular Eastern and Western beliefs and values), (b) the knowledge needed by curriculum developers (i.e., instructional designers and online instructors) to create multicultural appropriate content, (c) the identification of appropriate design strategies to promote cultural inclusion; and (d) cultural and functional priorities in the global workplace. Findings from the review of pertinent literature were used to create six guidelines appropriate for curriculum developers who design content for multicultural audiences. These guidelines are intended for online curriculum developers as they design coursework using multicultural design strategies.

INTRODUCTION

Globalization impacts today's multicultural society. The need for different cultures to effectively communicate and to cooperate in diverse settings is commonplace. There is a growing demand for effective design of online learning, as noted by Allen and Seaman (2014) the number of students enrolled in online courses has grown to 7.1 million. Enrollment in online courses indicates that 33.5 percent of high education students are enrolled in at least one online course. Research focusing on the impact of globalization in multicultural learning environments offers a range of effective practices (Alessi & Trollip, 2000; Beamer & Varner, 2001; Vatrapu, 2008). Curriculum

DOI: 10.4018/978-1-4666-8246-7.ch073

developers of online courses (i.e., instructional designers (ID) and online instructors) should be aware of their own cultural biases and use sound judgment when designing instructional content (Alessi & Trollip, 2000). A lack of knowledge about the cultural needs of audiences encumbers the design process (Vatrapu, 2008).

This research addresses the five dimensions of national culture as defined by Hofstede, Hofstede, and Minkow (2005). Particular attention is given to each dimension to demonstrate the connection to curriculum development in online courses. After the dimensions are discussed, multicultural design strategies and cultural inclusion in online learning are detailed. The researchers then provide a list of six recommendations and implications for future research based up on the literature synthesis and review. For the purposes of this work, an online course is defined as a course taught through a learning management system. This course is one that does not require face-to-face meetings by students and faculty. All instruction, either synchronous or asynchronous, occurs in the online learning format.

DIMENSIONAL MODEL OF NATIONAL CULTURE

In the dimensional model of national culture, cultures are divided into five dimensions: power distance, individualism versus collectivism, masculinity versus femininity, uncertainty avoidance, and long term orientation versus short-term orientation (Hofstede et al., 2005). As defined by Hofstede et al. (2005), power distance refers to social hierarchy and an individual's perceived place among the hierarchy. Collectivism is related to group dynamics and belonging to a group. In contrast, individualism refers to an individual or immediate family identity. Masculinity relates to success through the attainment of money and power, whereas femininity is related to caring and the quality of life. Uncertainty avoidance is the way people feel about changes and innovation, and the avoidance of new or unfamiliar situations. Dimension five, long-term orientation, is when societies place value on the future. In contrast short-term orientation is when value is placed on the past and present.

These cultural dimensions may be of importance to online course development. Subsequently, the foci are applied as the theoretical foundation for this literature review and the multicultural course design recommendations that follow.

CULTURAL IMPACT OF GLOBALIZATION ON COURSE DESIGN

Curriculum developers face unique challenges when attempting to design courses addressing multicultural audience needs and promoting cultural sensitivity. Several researchers investigated the contrast between Eastern and Western cultures (Ellsworth, 1994; Hofstede et al., 2005; Imada & Ellsworth, 2011; Kim, Pan, & Park, 1998; Nisbett, Peng, Choi, & Norenzayan, 2001; Perkins, 2008; Walsham, 2002; Yang, 1993). Respect between cultures was emphasized by Walsham (2002), who noted the need to understand, to feel empathy, and to show respect in an outwardly manner. Walsham (2002) believed empathy and understanding would create a copacetic environment where multiple cultures could work together. In contrast to Hofstede et al.'s (2005) belief in a national culture, Walsham (2002) noted many national cultures are heterogeneous encompassing various religious, social, and racial backgrounds. In determining the importance structure analysis had on cultural heterogeneity, Walsham (2002) described the viewing of cultures as homogenous as unimportant and "one should be looking for a measure of systemness or homogeneity within particular social groupings," (p. 375). Although various heterogeneous cultures exist, it is important to address the differences when designing courses for online instruction. Exploring power distance and culturally sensitive design options is the first dimension that we address.

DIMENSION ONE: POWER DISTANCE AND CULTURALLY SENSITIVE DESIGN CONSIDERATIONS

A curriculum developer's level of cultural knowledge influences the overall course design. Understanding Hofstede et al.'s (2005) *dimension of power distance* among cultures influences a curriculum developer's design and activity choices. *Power distance* refers to the hierarchy of social status and what one perceives as his or her place in society. Online participants whose culture is collective may perceive synchronous discussions and online discussion boards as problematic and therefore participate less than the instructor expects. Since participation is required, Vatrapu (2008) suggested alternatives to discussion board collaborations that typically occur in online courses, such as the use of embedded messages and the facilitation of both individual and collective communications. Research suggests curriculum developers should provide a range of communication options to ensure multicultural needs are addressed (Reiser & Dempsey, 2007; Rogers, Graham, & Mayes, 2007; Vatrapu, 2008).

Information related to multicultural design of online courses may often be difficult to locate and apply. Rogers et al. (2007) discussed a lack of research and difficulties in finding best practices when online course developers design content for multicultural audiences. Furthermore, Rogers et al. (2007) stressed that curriculum developers should demonstrate a strong desire to find materials related to cultural needs and understand to support participants.

Cultural Context

Curriculum developers ought to recognize the cultural needs of audiences when designing online courses. Reiser and Dempsey (2007) noted different cultural context promotes the development of global education to address multicultural audiences' needs. Internationalization is the removal of cultural context. Localization refers to the inclusion of local cultural features customized to fit the cultural needs of an audience (Reiser & Dempsey, 2007). Modifications to cultural context by internationalization or localization can be used to effectively meet cultural needs while addressing the multicultural audiences of online courses (Alessi & Trollip, 2000; Reiser & Dempsey, 2007).

Researchers have explored the fundamental thinking differences between Eastern and Western cultures (Imada & Ellsworth, 2011; Nisbett et al., 2001; Yang, 1993). Nisbett et al. (2001) explored the notable differences between Eastern and Western thinking and cultures and believed Easterners think holistically and Westerners think analytically. As a curriculum developer, it is important to understand and address the multifaceted views of participants. Imada and Ellsworth (2011) analyzed the "cultural differences in appraisal and corresponding emotion" (p. 329). In particular, the relationship between events and the interpretation of the events with Japanese and American participants were explored by these authors as they identified differences in what was attributed to collective thought processes (i.e., Japanese) and individual thought processes (i.e., American). Imada and Ellsworth (2011) found individualistic thinkers "attributed success to themselves" (p. 330) and collective thinkers generally linked success to luck or to outside factors. Conversely the authors believed collective thinkers associated failure with shame and individualistic thinkers were angered by their failures (Imada & Ellsworth, 2011).

To further support the depth of difference between Asian and American cultures, Yang, (1993) emphasized the difficulty Asian (i.e., Chinese and Japanese) participants may experience when adjusting to mainstream America. Yang (1993), like Nisbett et al. (2001), cited the differences in thinking between the cultures and recognized that generally Asian culture taught collectivism whereas American culture taught individualism. Furthermore, Yang (1993) noted the differences in language and recognized Asian languages typically use fewer words and Western languages emphasize eloquence. Yang (1993) iterated the importance of communicating Eastern and Western value differences when developing curriculum.

Yang (1993) described collectives as "for the purpose of maximizing (the) individual's well-being and advancement" (p.4) in Western culture and explained in Eastern culture, individuals do things to better the collective. The difference noted is in Western culture, the collective subordinates to better the individual, and in Eastern culture the individual subordinates to better the collective.

High and Low Context Cultures

Kim et al. (1998) studied the validity of Hall's (1976) theory of high context (HC) and low context (LC) between cultures. Kim et al. (1998) explained in HC culture countries people are more deeply involved with one another than in LC culture countries. High context culture countries also have more of a social hierarchy than LC culture countries and the people are more reserved and self-contained. Communication in HC culture countries tends to be personal, simple, and with deep or implied meaning. Low context culture countries, on the other hand, tend to be more individualized and not deeply involved, rather more distanced. In LC culture countries social hierarchy is less important and communication is more impersonal and exact, (Kim et al., 1998).

Curriculum developers may benefit from considering high context and low context differences among cultures (Hall, 1976; Kim et al., 1998; Perkins, 2008). In a high context culture, such as Western Culture, communication is a deeply involved and idiomatic change occurs within the culture (Hofstede et al., 2005; Perkins, 2008). Communication tends to be personal, and simple with deep or implied meaning. Drawing on the needs of a high context culture, curriculum developers may draw on characteristics and design content that is designed to be simple, straightforward and direct. Provide specific instructions and a detailed grading rubric for the various activities and provide examples to supply high context cultures with implicit details. Create a social environment where individuals may freely express their ideas within a group and receive feedback.

In contrast, in a low context culture (i.e., Eastern Cultures), communication tends to be more individualized and not deeply involved (Hofstede et al., 2005). In this type of culture, the curriculum developer may opt for a less social environment and communicate individually with participants. Group based activities would be kept to a minimum to ensure that the needs of the individual are addressed. In low context countries, social hierarchy is more important and communication tends to be more impersonal and exact, and the resulting impact is the people may tend to be more reserved and self-contained. Based on the social hierarchy curriculum designers would limit the use of discussion board forums and opt for individual assignments where participants express their opinions in a private exchange with instructors.

Language Differences

The differences in languages between Eastern and Western cultures impact online communication. Rogers et al. (2007) discussed challenges curriculum developers faced when designing for multicultural audiences. The authors' researched cultural and learning expectations and language differences, noting there was a need to have "a deeper understanding of cultural expectations, especially when working cross-culturally" (p. 204). Rogers et al. (2007) also found curriculum developers are often faced with adversity and challenges that require analysis and evaluation in order to design better cross-cultural instruction, especially when language differences exist.

Similar to Rogers et al. (2007), Yang (1993) noted Asian languages typically use fewer words to express ideas than do Western languages. Yang (1993) expressed differences in thinking between Eastern and Western cultures and explained the differences on several levels including: beliefs and ways of life, competition, individualism, relationships, and cooperation. Furthermore, Yang (1993) revealed the importance of communicating Eastern and Western value differences when developing curriculum and suggested when teaching speech communication cultural ideas and beliefs should be addressed.

Morse (2003) explored online asynchronous learning through the use of high and low cultural context and learning. Morse's findings suggested high context participants were obstructed by technology and "communication norms implicit in their culture" (p. 51) and language differences were extremely important to the understanding of online training (Morse, 2003).

Website Design Considerations

Website design is one area where high and low context communication is a concern. Usunier and Roulin (2010) explored high versus low context communications and the implications on website design. They found when designing in a low context communication style it was "easier to find, use colors and graphics more effectively, make navigation more user-friendly, contain more corporate and product information cues, and offer more contract-and relationship-related content than websites from high context communication countries" (Usunier & Roulin, 2010, p. 189). Usunier and Roulin (2010) noted low context websites provided a better way of communicating to a global audience because contextual cues are not a priority.

Alessi and Trollip (2000) discussed methods of control and recommended when designing any application interface, the designer should keep it simple. This information is relevant to online course designers, as ease of access should be a priority consideration for the target audience. The authors specified three "user-friendly" (p. 53) types of controls; buttons, menus, and hyperlinks (Alessi & Trollip, 2000). When using buttons, the authors recommended designers use a small number of buttons and they be used for "local controls" (p. 53) not "global controls" (p. 54). A final recommendation when using buttons was to ensure visual confirmation was included to inform the user the button had been clicked (Alessi & Trollip, 2000). The next control was through the use of menus; "full-screen menus, hidden menus, and frame menus" (p. 54). Designers of online courses are geared for multicultural audiences and require ease of navigation should note course design considerations. The next dimension explored is individualism and collectivism, a pertinent consideration for curriculum developers.

DIMENSION TWO: INDIVIDUALISM AND COLLECTIVISM ADDRESSED

The second component of the dimensional model of national cultures (Hofstede et al., 2005) is individual and collectivism. The differences between individualism and collectivism are important for curriculum developers to understand in the design process. A curriculum developer has many options to consider when creating group and individual activities in an online course. Collectivism will influence group dynamics and the overall contributions of each group member. Collectivism is defined as group dynamics, where, in exchange for loyalty the group will care for individual members (Hofstede et al., 2005). In general, Eastern cultural thinking is holistic, and collectivism is taught and appreciated as part of the culture (Hofstede et al., 2005; Imada & Ellsworth, 2011; Nisbett et al., 2001). Collective thinkers tend to attribute success to luck or to outside factors. Many curriculum developers include a self-evaluation component to group projects, asking individuals to rank their contributions and their group members' contributions to the project. When integrating self-evaluation instruments curriculum, developers should use detailed and specific checklists to ensure participants clearly indicate their contributions. Yang (1993) asserts in Eastern culture, individuals act to improve the collective, and the main purpose is to support the collective culture.

Hofstede et al. (2005) defined individualism as the opposite of collectivism. Individuals are expected to care for only themselves and their immediate families. In contrast to Eastern culture, typically Western culture is analytical and individualism is encouraged (Imada & Ellsworth, 2011; Yang, 1993). Imada and Ellsworth (2011) found individualistic thinkers "attributed success to themselves" (p. 330). As noted in the previous example, the integration of group self-evaluation instruments may be proactive when designing instruction for a multicultural audience. The self-evaluation instrument would permit users to define their specific contributions to the group project and earn credit for their work. One characteristic of individualism in Western culture is the collective subordinates are used to better the individual. Another issue contributing to cultural differences, and relevant to curriculum developers, is the variations among masculinity and femininity in cultures.

DIMENSION THREE: MASCULINITY VERSUS FEMININITY

The third dimension of the dimensional model of national cultures (Hofstede et al., 2005) is masculinity and femininity in cultures. Hofstede et al. (2005) viewed gender from a national perspective and found countries to be either masculine or feminine. Countries such as Norway and Sweden were deemed feminine while countries such as Japan and the U.S. were seen as masculine. The feminine countries were considered modest while the masculine countries were assertive. This carried over into the perspectives of the people in each of these countries where someone from a masculine country might see a lack of self-adulation as underselling oneself and someone from a feminine country would see self-adulation as bragging about oneself.

Hofstede et al. (2005) noted gender differences are only partly influenced by biological makeup and women can behave in masculine ways and men can behave in feminine ways. The distinction between masculine and feminine was stated as masculine being more concerned with earning high pay, getting recognition for their endeavors, opportunities for advancement, and having challenging work; feminine was distinguished by propensities towards managing copacetic work relationships, cooperating with others, enjoying pleasant living areas, and job security. Hofstede et al. (2005) contended that while individuals can possess both masculine and feminine traits, country cultures are either predominately one or the other. As noted by Hando and Ahern (2012) the masculine and feminine of cultures may extend to the online course platform and based on the cultural traits individuals may prefer to work with like genders. This should be a consideration for curriculum developers when designing group activities. Expanding on the traits of cultures, the next dimension explored is that of uncertainty avoidance issues.

DIMENSION FOUR: ADDRESSING UNCERTAINTY AVOIDANCE ISSUES

Curriculum developers should select activities and designs sympathetic to the target audience. As noted by Hofstede et al. (2005) *uncertainty avoidance* may be a hindrance for multicultural audiences and present challenges to curriculum developers because of lack of knowledge about cultural needs. However, in a multicultural situation, a blended methodologies approach benefits the cultural needs of the group. Although, researchers noticed appropriate multicultural design may be difficult to master because cultures perceive content and activities differently (Beamer & Varner, 2001;Vatrapu, 2008; Yang, 1993).

Another factor to consider when designing for a multicultural audience is cultural inclusion. Oosthuizen (2004) explained the importance of communication in marketing to global communities and believed effective communication would have to be empathetic and relevant to the target audience, which included local language. Hanvey (1976) recognized people have different perspectives and referred to this as "perspective consciousness", (p. 5). The author suggested cross-cultural awareness are attained by overcoming the cultural influences learned from childhood; in other words, the ability to think beyond that which one knows and understand the perspectives of others. Hanvey (1976) noted the need to select activities and methods that are sympathetic to the culture addressed and further, he explained that in a multicultural setting a blended methodology may be necessary. Another area pertinent to cultural needs and relevant to the instructional design process is that of long term versus short-term orientations.

DIMENSION FIVE: LONG-TERM VERSUS SHORT-TERM ORIENTATION

Hofstede et al. (2005) defined Long Term Orientation (LTO) as a fostering of future ideas and trends as they relate to perseverance and thrift. The definition of Short Term Orientation (STO) was the opposite and it held the past and present and values steeped in tradition as important. Using the Chinese Value Survey (CVS) some of the key differences between LTO and STO cultures were quick results versus sustained, slow results; concern with social status versus willingness to subordinate; and humility is for women versus humility is for men and women (Hofstede et al., 2005, p. 243).

Implications in education were determined by an analysis of the Trends in International Mathematics and Science Study (TIMSS) in which Hofstede et al. (2005) discovered a correlation between high math skills and Eastern countries. Specifically LTO-CVS countries possessed strength in solving problems and were explicit rather than ambiguous. The emphasis is placed on what works rather than on why it is effective. To this extent practical consideration in curriculum development and implementation should be part of the instructional process and design. Based on the literature review findings and the detailed information provided pertaining to the dimensions of national culture, as researchers, we assert that numerous multicultural design strategies promote cultural inclusion. The following section addresses the strategies that may be integrated by curriculum developers to effectively promote the inclusion of culture in online courses.

MULTICULTURAL DESIGN STRATEGIES TO PROMOTE CULTURAL INCLUSION

Several researchers detail specific strategies that may promote cultural inclusion in online course development. King, Gulick, and Avery (2010) explored the differences between diversity training and diversity education and took those practices they thought were the best to create a set of best practices for each vocation. The authors found themes that included a needs assessment, the context in which the training would take place, and development of successful programs. Successful programs were those that allowed for the transfer of knowledge into the work place and also those that benefited the learner (King et al., 2010). The authors then discovered several themes pertaining to best practices in diversity education including: "developing awareness and understanding of differences through self-evaluation, feedback, and active learning" (King et al., 2010, p. 895). The authors' final conclusion was that by "bridging the divide" between the two disciplines future considerations for each approach would allow for more effective diversity training and education in corporations and schools (King et al., 2010).

Rasmussen, Nichols, and Ferguson (2003) discussed the implementation of multiculturalism in education and training. The authors viewed the need for multiculturalism as critical in today's global online community and offered a training model on which to build eLearning programs. The model was based on the web-based instructional design (WBID) model developed by Davidson-Shivers and Rasmussen (2006) and based upon well-established online pedagogical principles. The methods included in the model were orientation, content, conclusion, interaction, and motivation. Orientation included the course description, syllabus, and requirements, content included a variety of ways to encourage interaction and motivate learners, and conclusion entailed a review and assessment of the course (Rasmussen et al., 2003).

Cultural competency and distance training through the use of television were discussed by Ancis (2001). Ancis (2001) pointed out the challenges and potential worth of using this medium in an online environment. Some of the challenges included one-way video where instructors could not observe student's behavior and student isolation was impeded by geographic location. Technology also played a role in the challenges of offering televised learning because relying upon it meant both the source generating the instruction and the source receiving the instruction needed to support communication efforts (Ancis, 2001).

One potential worth of using televised learning was viewed as the element of *humanizing*. Ancis (2001) explained humanizing as the process of creating an environment that made students feel comfortable in a diverse environment. This allowed the instructors to embrace the opportunity to educate students from all over the world. By setting ground rules, Ancis (2001) paved the way for successful active and interactive learning where students were encouraged to send photos and other forms of media in which to engage each other in a collaborative process.

A mobile learning (m-learning) and sociocultural study was conducted by Male and Patterson (2011) to research "how culturally aware convergence developments in mobile technology" (p. 331) could be used to help improve online learning between two continents. The authors discussed interface design as it pertained to both the device and application levels and emphasized the use of interface design on mobile devices. Using the "cultural pedagogy theory" (p. 333), Male and Patterson (2011) proposed a macro and micro social cultural method where the macro was the approach from a national perspective and the micro was the approach from the individual perspective. This allowed the authors to adopt Korat's (2001) "individualism and collectivism approach" and place emphasis on the learner (Male & Patterson, 2011, p. 333).

From the technology perspective the authors concentrated on infrastructure and application. The authors explained infrastructure as a means of supporting the application deployment and technology and the application as the medium through which the learners engage in learning. Male and Patterson (2011) used specific socio-cultural views, including, "the culture-aware-pedagogy view, the pedagogy-aware view, the indigenous knowledge domain view, (and) the learner profile view" (p. 336). The authors then applied these views and suggested several technical specifications such as enhancing the use of the mobile device by having the ability to connect to a larger "display device" or by connecting to an "advanced audio device" (p. 338). Male and Patterson (2011) continued with learner interaction suggestions such as engaging students through "ease of navigation and acceptable response times" (p. 340). Learner interaction is a key element in the design process. Curriculum developers who are designing content for a multicultural audience are responsible for understanding the cultural needs of the target audience.

KNOWLEDGE ABOUT CULTURE IN THE DESIGN PROCESS

Curriculum developers should be knowledgeable of cultural customs, traditions, and protocol to create an online course that is culturally sensitive and meets the needs of a global audience (Reiser & Dempsey, 2007). Rasmussen et al. (2003) discussed the implementation of multiculturalism in online instruction and considered it as critical in today's global online curriculum development. Knowledge and awareness of culture must be learned by the curriculum designers and must be implemented during the design process (Beamer & Varner, 2001). Furthermore, Beamer and Varner (2001) stressed that curriculum designers need to understand the rationale for various cultural concepts as well as appropriate or inappropriate acts. Understanding the underlying meaning associated with actions and individual perception based on culture is crucial. Reiser and Dempsey (2007) pointed out different cultural context can help trainers develop global training. One method of understanding the culture is a needs assessment of the multicultural audience. This was a common theme in the literature.

Needs Assessment

The recommendation to use a needs assessment to identify the culturally related needs of the target audience is another prominent theme in literature. King et al. (2010) stressed that among the best practices of online instruction, a needs assessment is prominent and should be included to create a successful program. The inclusion of a needs assessment informs the curriculum developer of the specific cultural and academic needs of the target audience (Rossett & Sheldon, 2001). Likewise, Flowers (2001) emphasized the need to evaluate, and re-evaluate the needs of the audience to create a positive learning environment that evolves to meet the specific targeted needs.

Addressing Cultural Differences in Design

Unique differences exist among Eastern and Western cultures that impact the design process. One method of addressing cultural differences is through establishment of Netiquette guidelines (Shea, 1994) for communications that are culturally sensitive. As noted by Tedre, Kamppuri, and Kommers (2006) and Preece (2004), a global society requires cultural differences in communication be identified and a mutually agreed upon code of conduct be established. Research suggests curriculum developers consider using guidelines consistent with the culture of the target audience.

RECOMMENDATIONS

Based on this review of the literature, we offer the following six guidelines for curriculum developers who are designing online courses for multicultural audiences:

1. Incorporate multicultural elements into the design and development process with special emphasis on high-context and low-context concerns related to language (Kim et al., 1998; Hall, 1976; Hofstede et al., 2005);
2. Conduct a needs assessment of your audience to determine the presence of collectivism and individualism (Hofstede et al., 2005, King et al., 2010; Rasmussen et al., 2003). The information collected during the needs assessment will provide information about how your audience thinks and feels, their culture, and their values. Analyze the pre-assessment and include learning activities addressing the multicultural needs of the target audience;
3. Respect cultural differences by integrating blended learning methodologies into the online course (Rasmussen et al., 2003). Plan activities that are multicultural and include a range of options; consider adding group and individual projects, and research-based assignments;
4. Make informed decisions about the design of the online course (Reiser & Dempsey, 2007). Ensure the website or multimedia learning object's navigation is consistent, easy to use, and colors used are culturally sensitive (Usunier & Roulin, 2010);
5. Encourage and support multicultural conversations as part of the online course. The suggested standard emphasizes that culturally relevant Netiquette (Preece, 2004; Shea, 1994; Tedre et al., 2006) is followed during online discussions and communication exchanges;
6. Reflect on the planning, using the Multicultural Design Considerations for Curriculum Developers (see Table 1) as a guideline. Consider each question and ensure the development of course content and design respects a multicultural perspective.

The Multicultural Design Considerations for Curriculum Developers presented in Table 1 were designed based on a review of literature. The purposes of the questions are to provide a multicultural design framework for curriculum developers. The overarching multicultural topics include acknowledgement of cultures, design methods, diversity and respect, inclusion of multiculturalism, and empathy considerations. The sets of questions are designed for curriculum developers of online courses and are intended as guiding questions the curriculum developer may use as they reflect on the needs of multicultural audiences. Each question listed in Table 1 represents content revealed in the literature review and reflective of the five dimensions of national culture as defined by Hofstede et al. (2005).

The first set of questions relates to dimension one *power distance* and acknowledges the need to create culturally sensitive designs. Cultural considerations of the target audience should be taken into account by the curriculum developer. The second set of design questions highlights key design methods. This is reflective of the differences between *individualism and collectivism* the second of the five dimensions of national culture. A curriculum developer selects from numerous design options when creating group and individual activities in online courses. The third set of design questions focus on *masculinity and femininity* in cultures (Hofstede et al., 2005). As curriculum developers, the need to communicate diversity and respect of cultures is critical. Including a multicultural perspective that addresses specific demands as revealed through a needs assessment is a high priority in the design process. The fourth set of questions corresponds to inclusion of culturally

Table 1. Multicultural design considerations for curriculum developers

Design Considerations	Guiding Questions for Curriculum Developers
Acknowledge Cultures	Did you complete a needs assessment to identify cultural priorities including collectivism and individualism? Did you identify the cultural backgrounds and characteristics of the target audience? Did you include culturally relevant activities as identified in the needs assessment?
Design Methods	Did you clearly describe the course to orient the target audience? Did you create content that is engaging and motivating to the target audience?
Diversity and Respect	Did you include multicultural perspectives in the design of the course? Did you implement new strategies and course materials based on specific cultural needs?
Include Culturally Sensitive Design Aspects	Did you provide options for communication to address multicultural needs such as high and low context? Did you include culturally appropriate Netiquette guidelines? Did you consider course design elements such as navigational control and use of color that meet a multicultural audience?
Empathy Considerations	Did you consider the cultural needs of the audience? Are future trends or past traditions more important? Is immediate gratification or are slow sustained results sought after by the learners? Did you include a plan to address the learners' needs? Are practical considerations taken into account?

sensitive design aspects and addresses Hofstede et al.'s (2005) *uncertainty avoidance* dimension of national culture. The questions focus on high and low context as well as design elements. The fifth set reinforces empathy considerations reflective of *long and short-term orientation* (Hofstede et al., 2005). The questions include cultural perspectives steeped in tradition and future trends. Online curriculum developers need to consider the learner's expectations based on their points of view and provide practical applications in their learning plans and experiences.

CONCLUSION

The availability of resources and reference guides for curriculum developers is limited (Reiser & Dempsey, 2007; Rogers et al., 2007; Weisinger & Trauth, 2002). An extensive review of current literature on the topic of multicultural design for online courses revealed that a comprehensive resource was not readily available to instructional designers. Further, guiding questions that promoted multicultural design aspects were not found in a review of literature. This review of the literature revealed suggestions identified to improve multicultural design practices and prompted the authors to create a list of guiding questions that encompassed the multicultural design elements reveals in the literature.

Additionally, research should be done specifically related to the needs of curriculum developers who design content for multicultural audiences. The need for a multicultural assessment with questions designed to reveal cultural biases and beliefs would benefit both the instructors and learners. Furthermore, the creation of a multicultural design guide deliberately intended for curriculum developers reinforcing design principles would be of interest for future research and practice.

REFERENCES

Alessi, S. M., & Trollip, S. R. (2000). *Multimedia for learning methods and development*. Needham Heights, MA: Allyn & Bacon.

Allen, I. E., & Seaman, J. (2014). Grade change: Tracking online education in the United States. Retrieved on February 6, 2014 from http://www.onlinelearningsurvey.com/ reports/gradechange.pdf

Ancis, J. R. (2001). Cultural competency training at a distance: Challenges and strategies. *Journal of Counseling and Development*, *76*(2), 134–143. doi:10.1002/j.1556-6676.1998.tb02386.x

Beamer, L., & Varner, I. (2001). *Intercultural communication in the workplace*. New York: McGraw Hill.

Davidson-Shivers, G. V., & Rasmussen, K. L. (2006). *Web-based learning: Design, implementation, and evaluation*. Upper Saddle River, NJ: Pearson Merrill Prentice Hall.

Ellsworth, P. C. (1994). Sense, culture, and sensibility. In S. Kitayama & H. R. Markus (Eds.), *Emotion and Culture* (pp. 23–46). Washington, DC: American Psychological Association.

Flowers, D. (2001). Online learning needs in technology education. *Journal of Technology Education*, *13*(1), 20–30.

Hando, A., & Ahern, T. (2012). Hofstede's model of cultural dimensions: A tool for understanding how background culture affects instructional designers. In P. Resta (Ed.), Proceedings of Society for Information Technology & Teacher Education International Conference 2012 (pp. 1162-1170). Chesapeake, VA: AACE.

Hanvey, R. G. (1976). An attainable global perspective. [Electronic version]. American Forum for Global Education. Retrieved on January 3, 2014 from http://www.globaled.org/an_att_glob_persp_04_11_29.pdf

Hofstede, G., Hofstede, G. J., & Minkow, M. (2005). *Cultures and organizations. Software of the mind* (2nd ed.). New York: McGraw-Hill.

Imada, T., & Ellsworth, P. C. (2011). Proud Americans and lucky Japanese: Cultural differences in appraisal and corresponding emotion. *American Psychological Association, 11*(2), 329-345.

Kim, D., Pan, Y., & Park, H. S. (1998). High-versus low-context culture: A comparison of Chinese, Korean, and American cultures. *Psychology and Marketing*, *15*(6), 507–521. doi:10.1002/(SICI)1520-6793(199809)15:6<507::AID-MAR2>3.0.CO;2-A

King, E. B., Gulick, L. M. V., & Avery, D. R. (2010). The divide between diversity training and diversity education: Integrating best practices. *Journal of Management Development*, *18*(3), 291–319.

Korat (2001). Cultural pedagogy and bridges to literacy: Home and kindergarten. Early Childhood Education Journal, 28(4), 225-230.

Male, G., & Patterson, C. (2011). Enhancing the quality of e-learning through mobile technology: A socio-cultural and technology perspective towards quality e-learning applications. *Campus-Wide Information Systems*, *28*(5), 331–344. doi:10.1108/10650741111181607

Morse, K. (2003). Does one size fit all? Exploring asynchronous learning in a multicultural environment. *Journal of Asynchronous Learning Networks*, *7*(1), 37–55.

Nisbett, R. E., Peng, K., Choi, I., & Norenzayan, A. (2001). Culture and systems of thought: Holistic vs. analytic cognition. *Psychological Review*, *108*(2), 291–310. doi:10.1037/0033-295X.108.2.291 PMID:11381831

Oosthuizen, T. (2004). In marketing across cultures: Are you enlightening the world or are you speaking in tongues? Massachusetts Institute of Technology, 20(2), 61-72.

Perkins, R. A. (2008). Challenges and questions concerning "Culturally-sensitive design". *TechTrends*, *52*(6), 19–21. doi:10.1007/s11528-008-0212-3

Preece, J. (2004). Etiquette online: From nice to necessary. *Communications of the ACM*, *47*(4), 56–61. doi:10.1145/975817.975845

Rasmussen, K. L., Nichols, J. C., & Ferguson, F. (2003). It's a new world: Multiculturalism in a virtual environment. *Journal of Workplace Learning*, *23*, 173–194.

Reiser, R. A., & Dempsey, J. V. (2007). *Trends and issues in instructional design and technology*. Upper Saddle River, NJ: Pearson Prentice Hall.

Rogers, P. C., Graham, C. R., & Mayes, C. T. (2007). Cultural competence and instructional design: Exploration research into the delivery of online instruction cross-culturally. *Association for Educational Communications and Technology*, *55*, 197–217.

Rossett, A., & Sheldon, K. (2001). *Beyond the podium: Delivering training and performance to a digital world*. San Francisco, CA: Jossey-Bass/Pfeiffer.

Shea, V. (1994). *The core rules of Netiquette*. Retrieved on January 3, 2014 from http://www.albion.com/netiquette/corerules.html

Tedre, M., Kamppuri, M., & Kommers, P. (2006). *An approach to global netiquette research. Conference proceedings of the IADIS International Conference on Web Based Communities 2006, San Sebastian, Spain*. Retrieved January 3, 2014 from http://www.iadis.net/dl/ Search_list_open.asp?code=2625

Usunier, J. C., & Roulin, N. (2010). The influence of high-and low-context communication styles on the design, content, and language of business-to-business websites. *Journal of Business Communication*, *47*(2), 189–227. doi:10.1177/0021943610364526

Vatrapu, R. K. (2008). Cultural considerations in computer supported collaborative learning. *Research and Practice in Technology Enhanced Learning*, *3*(2), 159–201. doi:10.1142/S1793206808000501

Walsham, G. (2002). Cross-cultural software production and use: A structural analysis. *Management Information Systems Quarterly*, *26*(4), 359–380. doi:10.2307/4132313

Weisinger, J. Y., & Trauth, E. M. (2002). Situating culture in the global information sector. *Information Technology & People*, *15*(4), 306–320. doi:10.1108/09593840210453106

Yang, H. (1993). *Communication patterns of individualistic and collective cultures: A value based comparison.* Paper presented at the Annual Meeting of the Speech Communication Association, Miami, FL. Retrieved January 3, 2014 from http://www.ccis-calgary.ab.ca/uploads/CDIS/Diversity_Resource_Centre/Communication_comparison_of_coll_vs_individ.pdf

This work was previously published in the International Journal of Online Pedagogy and Course Design (IJOPCD), 4(4); edited by Chia-Wen Tsai and Pei-Di Shen, pages 31-43, copyright year 2014 by IGI Publishing (an imprint of IGI Global).

Chapter 74
Intercultural Communication and Sustainable Leadership:
The Case of a Joint Master Course

Nelly Kostoulas-Makrakis
University of Crete, Greece

ABSTRACT

The environmental, economic, and social crises we are increasingly confronted with locally and globally, including climate change, ozone depletion, biodiversity loss, and also economic and social issues, such as poverty, social inequalities, violation of human rights, gender inequalities, loss of indigenous knowledge, etc. call for changes in the ways we think, work, and act. In this context, a course dealing with intercultural communication and sustainable leadership that is part of a M.Sc. programme on ICT in Education for Sustainable Development has been developed and is studied in this chapter. The course puts emphasis on the most urgent and critical social, environmental, and economic challenges facing the world and explores how leaders from education, business, government and civil society are responding to global/local sustainability challenges. In particular, it elaborates on the nature of sustainability leadership and how it can contribute to transformational change. It does this by locating sustainability within the leadership literature and presenting a model of sustainability leadership that integrates three complementary types of leadership, namely: distributed; entrepreneurial and transformational. The course also examines the importance of sustainable leadership practices within organisations (e.g. schools, business, NGOs, public) and assess the potential benefits if institutions are more actively engaged in sustainable leadership practices. It explores how intercultural communication can contribute to positive change for sustainability and discusses that new theoretical frameworks are needed to better understand effective transformational leadership. It also elaborates how cultural orientations and intercultural communication competence affect the full range leadership framework and transformational leadership dimensions. This course is delivered through a Virtual Learning Management System (VLMS) based on Moodle open LMS.

DOI: 10.4018/978-1-4666-8246-7.ch074

ORGANISATIONAL BACKGROUND

Education at all levels, but especially higher education bears its own responsibility for these crises, as through the education system all sorts of professionals and leaders who take decisions at all levels in public and private sectors, are educated. Corcoran and Wals (2004) observe that "[t]he scope and range of the negative impacts of university educated people on the natural systems that sustain Earth are unprecedented" (p. 3). All these have highlighted the important role leaders across all societal sectors can play and the urgency to develop a cadre of leaders equipped with the skills and competences to move society towards a more sustainable direction. This raises the question: what does this mean for those in leadership positions? The term of sustainable leadership represents a shift to capture and merge contemporary unsustainable leadership with the urgent global pressure for sustainable development through education. Unlike earlier descriptions of leadership which emphasised personal characteristics and capacities, sustainable leadership is often represented as a concept and a strategy with foundational principles drawn from sustainable development conceptions (Hargreaves & Fink, 2003, 2004; Fullan, 2005). Academics can lead efforts to develop transformative intellectuals and sustainable leadership ready to confront the critical issues and foster opportunities for sustainable development.

While many nations around the world have embraced the need for education to achieve sustainability, only limited progress has been made on any level. Some of the more prevalent challenges are: a lack of or inadequately trained professionals to provide inspired ESD; disciplinary boundaries between subject areas persist as well as lack of educational leadership to support transformative pedagogies to address sustainability. Our state of the art reviews on Master degree programmes in the field of ESD showed that the great majority (Makrakis & Kostoulas-Makrakis, 2012a):

- Focused on the environmental pillar of sustainable development, neglecting the other three pillars (social, cultural and economic);
- Did not exploit the potential of ICTs in addressing sustainability issues, especially Web 2 technologies and use of open education resources (learning objects) available in the Web; and
- Employed techno-centric approaches, meaning that curriculum is developed by experts without the end-users inputs.

There was thus need of Master programmes that are participatory, holistic, interdisciplinary and contextual, making use of ICTs both as learning pedagogies and means of delivering at a distance or through a blended mode. The course on "Intercultural Communication and Sustainable Leadership" is one of the 12 courses offered in a joint M.Sc. programme on ICT in Education for Sustainable Development. It is an interdisciplinary program that focuses on developing competency and skill on Education for Sustainable Development enabled through ICTs. The program presents a range of theoretical and practical concepts and contexts of education for sustainable development enabled through ICTs and draws from a wide range of teaching/learning methodologies. The overriding aims of the joint M.Sc. programme are:

- To enhance knowledge for informed decision and policy-making on education for sustainable development issues;
- To enhance critical, analytical and integrative skills for developing ICT-enabled ESD curricula and training programmes; and
- To produce professional experts on ICT-enabled ESD having the capacity to become reflective practitioners and agents of change, locally as well as globally.

In particular, the "Intercultural Communication and Sustainable Leadership" course explores an interesting confluence of two current topics: intercultural communication and ESD leadership. Students in this course engage in a critical assessment of intercultural communication theories and applications with the explicit goal of addressing issues of sustainable leadership. The course examines key factors in green and distributed leadership models and strategies and draws attention to the importance of transformational leadership in connection to intercultural communication competence. Emphasis is given on issues of culture and power, the relationship of language (both verbal and non-verbal) and culture, the relationship between culture and strategies of negotiation, as well as differing perspectives of conflict and ways of managing intercultural conflict.

Through experience, action and critical reflection (Elliott, 2010; Tilbury, 2011), students are to collaboratively explore: 1) social entrepreneurship as leadership that facilitates societal transformation; 2) the role of ICT in facilitating leadership and transformational ESD; 3) the attributes of effective sustainable leadership and 4) the choice of communication strategies needed within different cultural contexts and how intercultural communication affects transformational leadership. The overriding goal of this course is to equip participants with the skills and knowledge to function as transformative educators and ESD leaders. The specific course objectives are as follows:

- To explore and gain understanding of cultural self-awareness, other culture awareness, and the interactive dynamics between the two in the context of sustainable leadership.
- To understand how communication processes differ among cultures; identify the challenges from these differences and learn ways to creatively address them.
- To acquire knowledge, skills and attitudes that increase intercultural competence for shared, distributed and transformative leadership.

By the completion of the course students will be able to:

- Know about different verbal and nonverbal communication behaviors and their implications for sustainable leadership.
- Compare and contrast verbal and nonverbal communication styles and patterns of various cultures and their impact on sustainable leadership.
- Describe and critically assess own cultural heritage/identities and how these influence their communication and sustainability thinking.
- Identify, describe and explain how the cultural, microcultural, environmental, perceptual, and socio-relational contexts affect intercultural communication and sustainable leadership.
- Identify intercultural ethical principles/standards and apply them to intercultural communication cases and sustainable leadership.
- Explain how theories related to intercultural communication can influence sustainable leadership.
- Describe the components of intercultural competence and its impact on distributed and transformative leadership.
- Distinguish and discuss whether a distributed leadership model may be an appropriate alternate frame of sustainable leadership.
- Describe how shared leadership is developed within a school or a local authority to support ESD.
- Discuss the relationship between transformational leadership and the intercultural communication competence frame.
- Define and discuss “green leadership” at the individual, organisational, entrepreneurial and political level.

SETTING THE STAGE

Who is Involved in the Design and Development of the M.Sc. Programme?

The UNESCO Chair of ICT in Education for Sustainable Development (http://www.edc.uoc.gr/unescochair/) established at the University of Crete in cooperation with the RCE Crete (http://www.edc.uoc.gr/unescochair/rcecrete/) took the initiative to form a consortium of seven European Universities with considerable experiences in the fields of ICT and ESD to propose a project entitled "ICT-enabled Education for Sustainable Development" to the European Commission for funding. This project aimed to develop a joint Master degree (deployed on an advanced virtual platform) in ICT in ESD offered in English. This project was approved by the European Commission and was financially supported (Project Number: 510212-LLP-1-2010-1-GR-ERASMUS-EVC and agreement number 2010-3494/001-001). In the course of its design and development, a participatory design was adopted that included prospective students, curriculum designers, ESD experts, technologists, instructional designers, Web designers, etc.

Challenges Identified

The challenges identified in the process of design and development of the M.Sc. course can be categorised in five key domains: 1) the curriculum philosophy to be adopted; 2) the virtual learning and course delivery platform; 3) sustainable leadership discourse challenges; 4) the instructional design and teaching methodology adopted and 5) the overcoming of various barriers for the implementation of a joint Masters program. Some key challenges reflecting the above domains were:

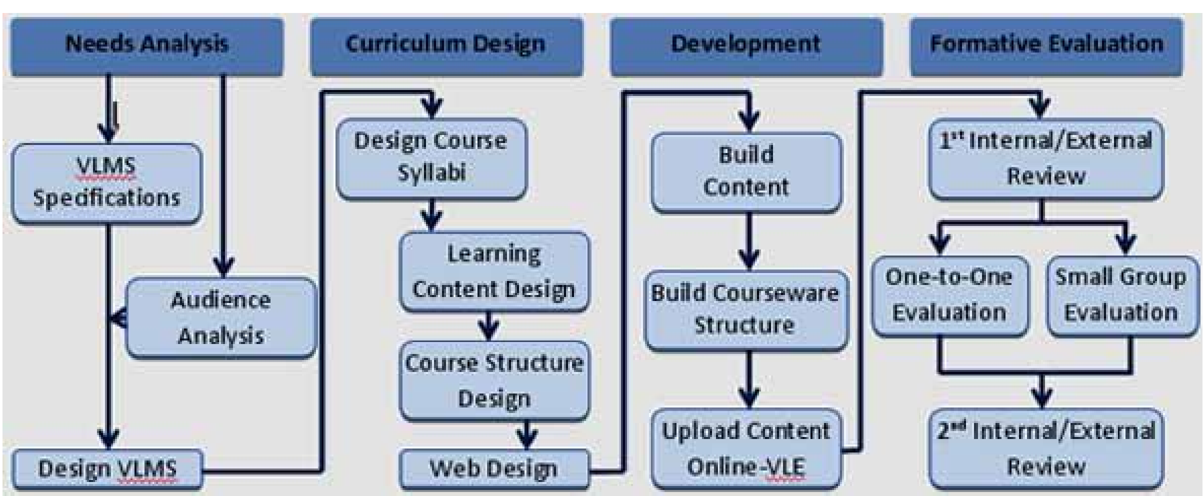
- New theoretical frameworks are needed to better understand effective sustainable leadership in different cultural domains.
- Social institutions need to generate innovative ideas and solutions on institutional change and mechanisms and processes for advancing sustainable leadership, taking into account current and future sustainability problems.
- There is a lack of or inadequately trained professionals to provide inspired sustainable leadership.
- Disciplinary boundaries between subject areas persist as well as lack of educational leadership to support transformative pedagogies to address sustainability.
- There is need to review and renew curriculum and teaching methods to support learning that articulates with, and critically engages with new forms of knowledge, inter-disciplinarity, and hands-on and minds-on learning.
- Curriculum innovations and methodologies for meaningful teaching and learning in a changing knowledge environment are needed.
- The current environmental, social and economic crises highlight the urgency to develop sustainable leaders.
- Systemic, holistic thinking and understanding of current and future sustainability challenges are imperative.
- There is need to rethink the dominated model of "doing business as usual" and consider the role to play in building more sustainable futures.

CASE DESCRIPTION

Methodology

This Masters programme was designed and interpreted in a four-stage process**:** 1) design of course syllabi; 2) learning content design; 3) course structure design and 4) Web design. These processes provided the foundation for the course modules development exemplified in the development phase. A critical decision was made for the structure of the course curriculum which merged vertical and horizontal modes of course curriculum design. The vertical integration ensures continuity and structures the content in sequence from core to more complex and to specified streams. This provides a clear picture to learning, as students are able to understand how the content is developed and organised in the course. The vertical integration also assumes that the discrete courses may combine content from two or more subject domains. The horizontal integration brings about more breadth of curricular contents of different disciplinary areas and knowledge domains, especially through an interdisciplinary approach within the course areas. In this sense, transformative learning cut across all the four competences (learning to know, learning to do, learning to live together, learning to be) as formulated by UNESCO (1996) as well as across the fifth competence that was added later on that of learning to transform oneself and society (cf. Black 1999). Horizontally, the courses were built conceptually upon five main themes: Sustainability Theory; Educational Research; ESD pedagogy; Educational Policy and Leadership; and Information & Communication Technology (ICT). The emphases were on: 1) inter/cross-disciplinary content by merging concepts from the main themes and 2) multidisciplinary content by integrating multiple teaching methods and learning technologies. In this context, ICTs and ESD form the integrating "backbone" across all course contents. The design of the online curriculum components departed from the students' needs that were contingent on the needs analysis processes. As seen in Figure 1, this model consists of five design phases– needs analysis, curriculum design, development, formative evaluation and implementation– each of which has its own design processes. These phases, although, placed sequentially, in practice, they are considered to function interactively (Makrakis & Kostoulas-Makrakis, 2012a).

Figure 1. A model for designing course design and development



Needs Analysis

This first phase, *Needs Analysis*, was concerned with gathering, analyzing, and summarizing information necessary to build the Virtual Learning Management System (VLMS). This phase was consisted of three design processes: VLMS specifications; audience analysis and VLMS design. The VLMS specifications process provided various design activities involved such as enrolment, maintenance of student records, academic profiles, scheduling of units, etc. Audience analysis process concerned analyzing audience characteristics, such as age, cultural and educational background, knowledge related to topic, ICT literacy and access to technology. In our case, based on comparative analysis of various LMS platforms, Moodle 2.0 was adopted as the basic LMS platform upon which we designed our VLMS. Moodle is one of the most user-friendly and flexible open source courseware products available. It has excellent documentation, strong support for security and administration, and is evolving towards Instructional Management Systems/Shareable Content Object Reference Model (IMS/SCORM) standards with platform (Apache, PHP, and MySQL). The key to Moodle is that it is developed with both pedagogy and technology in mind. Moodle can also be supported by Mahara, which was found to be suitable as an e-portfolio.

In the process the VLMS design a semi-structured questionnaire was delivered to a purposeful sample (N=37) of prospective students to elicit various types of information such as learning styles and profiles, previous experiences with e-learning tools, learning needs, ICT literacy, technology use etc. Small group discussions were also carried out to enable people to talk and share ideas and experiences. The information gleaned from the needs analysis helped us to define educational goals, which were stated as specific learning outcomes in the phase of curriculum design and development. In other words, this phase functioned as the foundation on which we developed course syllabi and course modules. In general, prospective students to this joint Master degree have a rather good ICT literacy, able to handle online tools with minimal guidance. All of them used productive tools (e.g. presentation software) and especially communication tools such as e-mail and discussion forums, facebook and blogs. On such uses they can be classified as very skilled. Very few were identified to have some experience with Learning Management Systems such as Moodle (classified as weak skilled). Although the great majority had no experience in online courses, it seemed that they could handle such a mode of instruction without problems. All the informants were from the participating institutions, so there was not any indication concerning the profile of non-EU prospective students, especially from less economically developed countries. This was of particular importance, as due to the lack of good networking infrastructures this might affect the access and use of the online tools integrated into the Virtual Learning Environments. Validation methods were used before, during and after developing a VLMS. The first was carried out during the user needs analysis, which provided the source for identifying the main categories for presenting the use and functionality of the VLMS as a platform for organising and delivering the Master Degree programme. Validation during the process was concerned with the specifications in designing the Virtual Learning Management System. Finally, validation after assessment was applied after designing the VLMS. All these processes were carried out using the design team as testers. Involvement of prospective students was applied during the integration of course syllabi and course modules into the VLMS. The validation process was also expert-based involving four experts of which the three of them were involved in the design of the VLMS. The final validation was applied when the content modules were integrated, involving a number of prospective users, experts and prospective e-tutors.

Curriculum Analysis, Design, and Development

Curriculum analysis and design was guided through a model that departs from Habermas (1971) theory on knowledge-constitutive interests and communicative theories based on three human interests. A technical interest is an interest to control, predict and manage the environment deeply-rooted on modes of inquiry, curriculum and pedagogy in the "empirical-analytic" or positivist sciences. Practical interest rooted in the interpretive-hermeneutic sciences is an interest of mutual and self-understanding. Finally, the emancipatory interest is an interest of critical self-reflection, leading to empowerment, praxis and emancipation. The praxis model of curriculum theory and practice makes an explicit commitment to true emancipatory potential of merging technology and knowledge. Each of the three knowledge-constitutive interests is expressed in a particular scientific or scholarly paradigm, and directly or indirectly affects curriculum design, perceived education roles, teaching methods and pedagogy (Table 1).

In a transmissive virtual classroom model, driven by a technical interest, the focus is on linear pedagogies and pre-specified curriculum goals and content, which may lead both educators and learners to overlook the dynamic learning online interactions enabled by ICTs. The e-tutor is placed at the center of the learning process and is expected to transmit to students a prescribed subject (curriculum as product). Virtual lecturing and demonstration are the primary instructional methods. It is a virtual classroom in which students are to approach their learning working independently. They are also expected to neglect their personal interests, experiences and needs. The perceived role of education is that of replication of existing social, cultural and economic structures.

In contrast, the transactive virtual classroom driven by a practical interest focuses on flexibility, negotiation, active sharing and learning (curriculum as process). In other words, the questions of "what to teach?," "what to learn?" and even "how to learn?" are not predetermined but are open to intersubjective treatment. In this sense, the curriculum "is not simply a set of plans to be implemented, but rather is constituted through an active process in which planning, acting and evaluating are all reciprocally related and integrated into the process" (Grundy 1987, p. 115). In such a virtual model of online education, the e-tutor's role is one of a guide whose primary task lies in motivating and engaging students in the learning process. To accomplish this, the e-tutor creates problem-solving opportunities for students that are often based upon student experience. The perceived role of education as Sterling (2001) sets out what could/should be:

Table 1. Habermas' three knowledge interests and their effects

Type of Knowledge/ Human Interest	Perceived Role of Education	Virtual Teaching & Learning	Curriculum Perspectives	Pedagogy
Technical (prediction; causality; instrumentality)	Reproduction/ socialization/ Vocationalization roles	Transmissive Lecturing	Product oriented	Behavioral/ cognitive Linear
Practical (Understanding; intersubjective)	Liberal role	Transactive	Process oriented	Constructivism
Emancipatory (critical reflection)	Tranformative role	Transformative	Praxis oriented	Critical pedagogy

- To replicate society, culture and citizenship – a socialisation function
- To train for employment – a vocational function
- To develop the individual – a liberal humanist function
- To encourage a fairer society and a better world – a transformative function

The last role is seen by Sterling (2001) as central to achieve a more sustainable educational system. The first two roles mirror ideologies adherent to curriculum as product, the third, curriculum as process and the fourth curriculum as praxis. In a transformative virtual classroom model, driven by emancipatory interest the focus is placed on empowerment, critical consciousness and reflection (praxis). Students can transform their frames of reference through critical reflection of their assumed assumptions concerning interpretations, beliefs and habits of mind or points of view (e.g. Mezirow, 2000).

A critical decision was made for the structure of the course curriculum. It was structured by merging vertical and horizontal modes of course curriculum design. The vertical integration represented continuity and structured the content in sequence from core to more complex and special. This provided a clear picture to learning, as students are able to understand how the knowledge is developed and organised in the course. In addition, it can help students to learn concepts and principles, to develop cognitive skills, and to develop attitudes and values that will be important to them in the working world. The horizontal integration brings about more breadth of curricular contents of different disciplinary areas and knowledge domains. Horizontally, the courses were built conceptually upon five main themes: Sustainability Theory; Educational Research; ESD pedagogy; Educational Policy and Leadership; and Information & Communication Technology (ICT). The emphases were on: 1) cross-disciplinary content by merging concepts from the main themes and 2) multidisciplinary by integrating multiple teaching methods and learning technologies. In this context, ICTs and ESD form the integrating "backbone" across all course contents.

The study programme consists of three main parts: 1) core or foundational courses; 2) optional courses and 3) written thesis. In the first part, students are required to take the required courses which are designed to help them develop a broad understanding of ICT- enabled education for sustainable development as well as to prepare them for more specialized courses. In the second part, students can choose three out of six courses taking into consideration their personal, academic and specialized orientations. This part of the programme gives students the opportunity to learn skills in areas such as reorienting formal education for sustainability, curriculum design for sustainability education, educational planning and policy for sustainability as well as climate change education. The third part is devoted to the implementation and completion of the M.Sc. Thesis (Table 2).

The Master's programme consists of 12 courses, of which nine must be taken and is designed for a period of four semesters (two years) for full time students and a maximum of 10 semesters (five years) for part-time students offered through a virtual learning environment platform. The academic year is divided into two semesters of 14 weeks each, giving in total 60 ECTS credits (the European Credit Transfer System). These ECTS credits cover the relative amount of study related performances in which the workload of one year amounts to 1500 real hours. This workload includes synchronous and/or asynchronous modes of communication, case studies, self-study, assignments etc. To graduate, the student must acquire 120 ECTS credits: 90 credits (9 courses) from course work, and 30 credits from thesis work (Table 3).

Table 2. Course allocation to semesters

		Type	Course Code/Title	ECTS		Type	Course Code/Title	ECTS
Year 1	Semester 1	R	Sustainability Theory, Systems Thinking and Transformative Change	10	Semester 2	R	Appropriate Technology, Active Citizenship and Education for Sustainable Development	10
		R	Approaches to Educational Research for Sustainable Development	10		R	Action Research and Participatory Action Research for Sustainable Development	10
		R	ESD Pedagogy and ICT	10		R	ICT, Instructional/Learning Design and Education for Sustainable Development	10
				30				30
Year 2	Semester 3	E	Elective 1		Semester 4	R	Dissertation	30
		E	Elective 2	10				
		E	Elective 3	10				
				30				30
Part-time study is also possible. The modular nature of the courses and the mode of delivery (e-learning) allow the students to complete the program at their own pace. It is expected that part time students will complete the programme up to five years.								

Infrastructure and Instructional Design Analysis

The International MSc on ICT in ESD programme is designed to be delivered online through the V-campus Virtual Learning Environment (VLE) which is a Moodle-based Learning Management System. The content or curriculum integrates reflective and problem-based learning and provides tools and services that allow for virtual collaboration and virtual peer mentoring amongst learners and e-tutors. Student-to-instructor and student-to-student communication is highly interactive. Learners engage in a series of online activities within the thematic area of ICT in ESD through the use of various virtual learning tools. Students are presented with opportunities for self-paced learning, group learning, reflective learning and participatory learning.

Each course of the proposed MSc has been allocated 10 ECTS credits, which equates to 250 hours of work for the learner. Learner activities and workload have been divided into four areas: (1) directed learning online, (2) dynamic interaction online, (3) assessment, and (4) independent learning. Given that courses are 14 weeks long, then an average learner will be engaged in '*Directed Learning Online'*, which involves reviewing pre-designed online content by themselves for up to 2.5 hours per week; in '*Dynamic Interaction Online'* or 'live' interaction with their peers and/or the e-tutor for about 1.5 hour per week; and in preparation for '*Assessment*' by themselves or with peers for 7 hours per week. An additional 7 hours per week is allowed for '*Independent Learning'* or reading beyond the course. The Table 4 below provides detailed information on students' workload in a course of the programme.

Each course such as the one on "Intercultural Communication and Sustainable Leadership" consists of a number of modules. More specifically, this course consists of seven modules:

1. Sustainability challenges and leadership responses.
2. Sustainable leadership for transformative change.
3. Sustainable leadership and intercultural communication.

*Table 3. List of programme courses**

A/A	Course Type	Course Code	Course Title	Teaching Hours per Week**			ECTS
				Directed Learning Online	Dynamic Interaction Online	Laboratory	
1	Required		Sustainability Theory, Systems Thinking and Transformative Change	2.5	1.5	0	10
2	Required		Approaches to Educational Research for Sustainable Development	2.5	1.5	0	10
3	Required		ESD Pedagogy and ICT	2.5	1.5	0	10
4	Required		Appropriate Technology, Active Citizenship and Education for Sustainable Development	2.5	1.5	0	10
5	Required		Action Research and Participatory Action Research for Sustainable Development	2.5	1.5	0	10
6	Required		ICT, Instructional/Learning Design and Education for Sustainable Development	2.5	1.5	0	10
7	Elective		Educational Policy and Planning for Sustainable Schooling	2.5	1.5	0	10
8	Elective		ICT, Climate Change and Geo-spatial Tools	2.5	1.5	0	10
9	Elective		Bio-cultural Diversity and Education for Sustainable Development	2.5	1.5	0	10
10	Elective		e-Learning, Virtual Worlds and Education for Sustainable Development	2.5	1.5	0	10
11	Elective		Teaching to Live Sustainably through the Earth Charter	2.5	1.5	0	10
12	Elective		Intercultural Communication and Sustainable Leadership	2.5	1.5	0	10
13	Required		Thesis	N/A	N/A	0	30

*Due to the fact the course will be delivered online, the table has been amended to refer to teaching hours instead of teaching periods.
**All modules are fully compliant with the ECTS system and include 250 hours of coursework for students.
Duration (in min.) of a teaching period: N/A
Teaching Weeks per semester: 14

4. Distributed leadership as sustainable leadership.
5. Social entrepreneurship as sustainable leadership.
6. Transformational leadership as sustainable leadership.
7. Developing and implementing a sustainable leadership plan enabled by ICTs.

These modules are divided into units, and their content and related activities will reflect on how sustainable leadership should be driven in the three sectors (governance, civil society and private sector) across different cultures. Learning content was based on an instructional design process for curriculum development which involved a systematic approach to establishing modules goals and objectives, selecting educational strategies to meet goals and objectives, the use of media and technology as well as designing learning activities for the online environment. Course structure process was based on breaking-up the course content into manageable and meaningful modules and units, taking into consideration the weekly topics designed in the course syllabus. An example of a course modules template is provided in Figure 2.

Table 4. ECTS credit workload breakdown for a Course

N	Workload Type	Description	Examples	Workload
1	Directed Learning Online	Time required by learners to read or to view 'static' (permanent) online content. This content introduces the key concepts and contexts for the course; maximum time allowable 2.5 hours per week.	Time required to read or view: (a) reading/ s[1], (b) online presentations[2] (in Powerpoint or Pressie), (c) podcasts[3], (d) online Videos[4], (e) online Simulations	36 hours (or approx. 2.5 hrs each week for 14 weeks)
2	Dynamic Online Interaction	Time required by learners to interact, either individually or in groups, in online activities, that do **NOT** directly contribute to assessment. The online interaction gives learners opportunities to discuss, critique and query their understanding of the key concepts introduced each week.	Time required to interact in: (a) tutorial with peers/ e-Tutor in online classroom or forums, (b) discussion groups in Moodle, (c) microblogs (i.e. Twitter), (d) social networking (i.e. Facebook).	20 hours (or approx. 1.5 hr each week for 14 weeks)
3	Assessment	Time required by learners to complete the continuous assessments and/ or summative assessments.	1. Time required to interact in online activities that directly contribute to the completion of assessment, such as: (a) group interaction in Wikis, (b) weekly submissions of Online reflective journals/ diaries, (c) individual submission of weekly blogs/ video blogs 2. Time required to complete off-line activities that directly contribute to completion of assignment such as completion of essays/ multimedia artefacts/ e-portfolios etc. 3. Time required to interact within a teaching, clinical, community or other work-based setting that is necessary in the completion of participatory multimedia artefacts, e-portfolio or other forms of assessment.	100 hours (or approx. 7 hrs each week for 14 weeks)
4	Independent Learning	Time required by learners to read additional publications within the field (engagement in reading beyond the core content outlined in 1 above).	Time required by learners to search for and read (or view) additional resources: (a) Journal articles/ key texts in specific discipline, (b) online videos/ Podcasts of theorists within the field.	100 hours (or approx. 7 hrs each week for 14 weeks)
			TOTAL	**256 Hours**

[1] Note: Core Readings (such as a journal article or book chapter) will take no longer than 60-90 minutes to read each week.
[2] Note: Powerpoint Presentations will be recorded with a voice-over. Presentations will be no longer than 15 minutes in length; longer presentations will be split into two or three parts.
[3] Note: Podcasts will each be 3-5 minutes in length.
[4] Note: Online Videos will each be no longer than 15 minutes in length.

The units for the course "Intercultural Communication and Sustainable Leadership" have been developed as follows:

Unit 1.1: The "business as usual case" for responding to sustainability
Unit 1.2: Leadership perspectives, practices and types
Unit 1.3: Deconstructing dominant concepts of leadership
Unit 1.4: Alternative conceptions of leadership
Unit 2.1: Change and transformation: The leadership mission
Unit 2.2: The hallmarks of sustainable leadership
Unit 2.3: Viewing the world through a sustainable leadership lens

Figure 2. The template of the course modules design

Course	[TITLE]
Module 1	[TITLE]
Key Concepts	
Overview	
Aim	
Learning Outcomes	At the end of this module learners will be able to:
Units	
Readings	
Activities	Overview
	Explanation
Module 2	

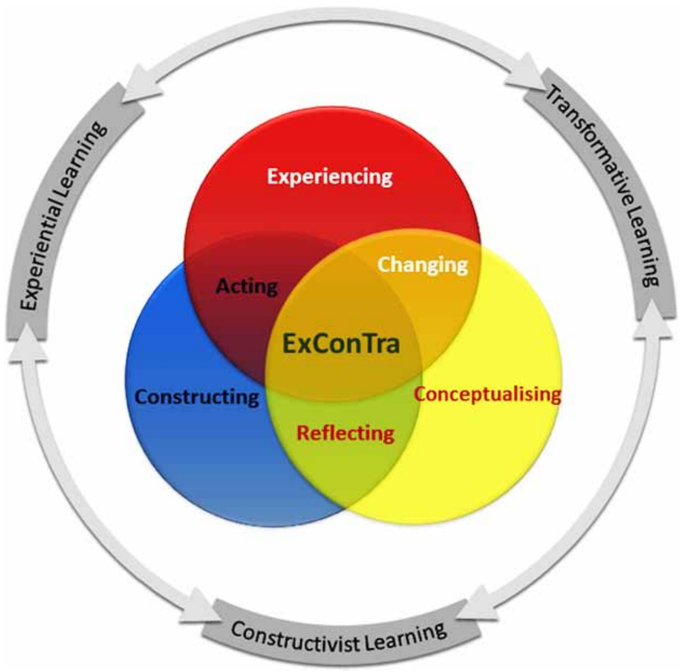
Unit 2.4: Competences and models of sustainable leadership
Unit 3.1: The communication competence frame in sustainable leadership
Unit 3.2: Sustainable leadership in different cultures
Unit 3.3: Behaviour changes via marketing, role models, champions, education and advocacy
Unit 4.1: Distributed leadership: the why, what, and how
Unit 4.2: The impact of distributed leadership on sustainability
Unit 4.3: Implementing a distributed leadership perspective
Unit 5.1: Social entrepreneurial leadership: the why, what, and how
Unit 5.2: The impact of social entrepreneurial leadership on sustainability
Unit 5.3: Implementing a social entrepreneurial leadership perspective
Unit 6.1: Social transformational leadership: the why, what, and how
Unit 6.2: The impact of transformational leadership on sustainability
Unit 6.3: Implementing a transformational leadership perspective
Unit 7.1: Models for developing a strategic plan for sustainability
Unit 7.2: Strategic planning and implementation as a system approach

In trying to bring together the main principles of the constructivist and tranformative learning theories, assuming that experiential learning is crossing the two (e.g. Kolb & Kolb, 2005; Makrakis & Kostoulas-Makrakis, 2012b) have conceptualised a construct abbreviated as ExConTra, that corresponds to Experiential learning, Constructivist learning and Transformative learning depicted in Figure 3. This model provided guidance for developing and implementing the M.Sc. course curriculum.

Examples of how ExConTra learning paradigm can be implemented in online course design include the following:

- Using Web-based authoring tools and scripting languages to develop learner-centred and self-instructional modules.
- Providing Web-based resources using hypermedia and multimedia links to support

Figure 3. The ExConTra learning model



students' experiential, constructivist and transformative learning activities.

- Providing links to online databases, experts, virtual laboratories and knowledge repositories dealing with sustainable development issues.
- Providing Web-based distributed learning activities that allow learners to brainstorm ideas, negotiate, reflect, peer critique, debate, construct knowledge, and develop action competences.
- Providing synchronous and asynchronous communication tools that help the knowledge construction process through self/group critical reflection.
- Incorporating learning principles and strategies that include active learning, collaboration, and cooperation.
- Engaging students in the application of knowledge through: inquiry-based learning; problem-based learning; higher order thinking; inter/cross disciplinary learning; and authentic learning.

CHALLENGES PAST AND PRESENT FACING THE ORGANIZATION

It is essential that universities make considerable innovative efforts: 1) to improve their own "sustainability profile" by developing "learning environments" conducive to ESD supported by ICTs and 2) to develop new open and flexible postgraduate programmes that respond to the increased needs of those who want to play a key role in moving forward the issue of ESD. Recalling the challenges identified in the process of design and development of the international joint M.Sc. program presented in an earlier section in this chapter, the following assumptions can be made. First, this program is expected to contribute in tackling the identified lack of or inadequately trained professionals in the field of ESD and sustainable leadership. Second, as the course curriculum design was driven by interdisciplinary approaches, the courses developed merge concepts from various other subjects and in this way it contributes to narrowing the disciplinary boundaries. This has also affected the teaching and learning methods adopted to support learning that articulates with, and critically engages with new forms of knowledge, inter-disciplinarity, hands-on and minds-on learning. However, the challenge to bring all the initial partner universities into the exploitation of the joint M.Sc. program faced various obstacles that mostly relate to internal administrative concerns. Indeed, one of the main concerns revealed in a EUA (2006) review on Joint Masters degrees was the often weak anchoring of Joint Masters programs within their network institutions. This is explained by the fact that such programmes are mostly initiated and linked to committed individuals, while the institution as an "outsider" has often provided difficulties to endorse the programme. Another important finding in that review was the incompatibility of the national mandate of Quality Assurance agencies with the transnational nature of joint degrees.

However, an increasing number of institutions endorse joint degrees bringing together institutions and scholars from all continents working and developing various pedagogical and technological tools that will be adapted in different social, economic and cultural contexts. Offering a joint programme and academic degree should have significant advantages both for partner institutions, the European Higher education Area and internationally. It promotes virtual student and staff mobility which add value to a new dimension of mobility that is envisaged to give rise to scientific and pedagogical development, intercultural understanding and knowledge sharing. It brings together a European and international team of researchers, experts and educators. Another challenge concerned the qualifications of the staff to be involved in teaching courses offered online. Indeed, with a growing number of courses and degrees offered through the Internet, there is a considerable interest in preparing instructors to teach online.

SOLUTIONS AND RECOMMENDATIONS

In terms of solutions, a major effort was exerted in systematizing and organizing curricular contents in order to ensure that the curricular components were aligned with the learning activities, the curriculum objectives and competencies to promote. There were also efforts to bring consensus with respect to various organisational and administrative issues, including coordination of courses and the re-allocation of students from the coordinating institution to the partner institutions where they are attending courses.

Beyond the academic qualifications, staff either as course coordinators or e-tutors must be certified and/or having experience in teaching online. In particular, course coordinators should preferably come from the partners' institutions and be highly qualified in the field of course coordinating and be experienced in online teaching methodologies. To tackle the issue of qualified staff an e-tutors toolkit was developed that was implemented with the initial participation of more than 35 prospective e-tutors nominated by the partner universities. The e-tutors toolkit is a self-development manual based on ICTeESD materials/tools and Open Education Resources supported by facilitators to assist participants make the shift from face-to-face forms of teaching and learning to online learning. The e-tutors' training carried out in a period of three months online reflected the philosophy adopted in the ICT-enabled ESD program. In particular, the e-tutors' course focused closely to the competencies required by participants in their roles as online tutors. An integrated approach was employed that merged theoretical and practical aspects of online pedagogy taught via individual and group tasks. At the end, 60 percent of those

Figure 4. The e-tutors Toolkit

started succeeded to fulfil the requirements for certification. (see Figure 4)

FUTURE DIRECTIONS INCLUDING RESEARCH

As the M.Sc. programme will be implemented in the coming academic year, it remains to see the international response to this new subject offered in post-graduate education. Higher Education has been identified globally as a critical agent in furthering sustainable development in society; particularly towards strengthening transformative practices associated with intercultural communication and sustainable development leadership. It is important to integrate and further elaborate the tryptich of transformational-transactional-transmissive leadership across cultures and in line with the three Habermasian human interests. As the notion of leadership and its dimensions in the context of sustainability has been raised more recently, it seems interesting to address the contribution of leadership activities to sustainable development in a more comprehensive way. It would be of particular interest to assess business as usual (technical) and distributed leadership (practical) approaches to leadership, and their critical approaches– perhaps what can be term transformational approaches- a typology in line with Habermasian critical theory.

CONCLUSION

The international joint M.Sc. programme and its courses are delivered online through the V-campus Virtual Learning Environment (VLE) which is a Moodle-based Learning Management System (http://iceeed.v-campusedc.uoc.gr). The content/curriculum integrates reflective/problem-based learning and provides tools and services that allow for virtual collaboration and virtual peer mentoring amongst learners and e-tutors. Student-to-instructor and student-to-student communication is highly interactive. Learners engage in a series of online activities within the thematic area of ICT-enabled ESD through the use of various virtual learning tools and open education resources. Students are presented with opportunities for self-paced learning, group learning, reflective learning and participatory learning.

Using a participatory curriculum development approach ensures that all the groups and individuals who have a real interest in the program are actively involved in some way in the project during various stages. In this way, prospective students, instructional designers, content experts, critical readers and prospective e-tutors were involved in the course curriculum development. Through this approach contextualised teaching and learning becomes more feasible, as these people bring their experiences that are context dependent, and contribute with different forms and sources of expertise. Such an approach is also conducive to the 'process' and 'praxis' curriculum approach that is characterized by the recognition of empowerment, emancipation, knowledge construction, meaning making, and negotiation. The program of study (curriculum) developed focused on a learning paradigm that merges three theories of learning, namely: experiential learning, constructivist learning and transformative learning (ExConTra). This learning paradigm allows both learners and facilitators to take advantage of ICT tools and the World Wide Web on making connections and making meaning in the learning process. The ExConTra learning paradigm is also based on an interdisciplinary approach addressing the four pillars (environment, society, culture and economy) of sustainable development and makes use of an online course design methodology that uses four phases: needs analysis, curriculum design, development and formative evaluation. The programme makes use of ICTs in three ways: a) providing opportunities to target groups for reflective practice; b) using open source ICT tools and ESD-related learning objects available in the Web; and c) using ICTs to develop interactive, interdisciplinary and cross-disciplinary ESD learning activities.

ACKNOWLEDGMENT

The publication of this thematic issue has been supported by the ICTeESD European Commission Programme (ERASMUS Multilateral Programme Virtual Campus Project No. 510212-LLP-1-2010-1-GR-ERASMUS-EVC). This publication reflects the views only of the author, and the Commission cannot be held responsible for any use which may be made of the information contained therein.

REFERENCES

Black, M. (1999). *Basic education: A vision for the 21st century*.(Summary report of the ninth Innocenti global semina, UNICEF International Child Development Centre 25 October – 3 November 1998). Florence, Italy: UNICEF.

Corcoran, P. B., & Wals, A. E. J. (Eds.). (2004). *Higher education and the challenge of sustainability: Problematics, promise and practice*. Dordrecht, The Netherlands: Kluwer. doi:10.1007/0-306-48515-X

Elliott, J. (2010). Insights to transformative learning through education for sustainable development. *Learning and Teaching in Higher Education*, *5*, 96–113.

EUA. (2006). Guidelines for quality enhancement in European joint Master programmes. Brussels, Belgium: EUA. Retrieved June 20, 2013 from http://www.eua.be/eua/jsp/en/upload/EMNEM_report.1147364824803.pdf

Fullan, M. (2005). *Leadership & sustainability: System thinkers in action*. Thousands Oak, CA: Corwin Press.

Grundy, S. (1987). *Curriculum: Product or praxis*. New York: The Falmer Press.

Habermas, J. (1971). *Knowledge and human interests* (J. J. Shapiro, Trans.). London: Heinemann.

Hargreaves, A., & Fink, D. (2003). reprint). Sustaining leadership. *Phi Delta Kappan*, *84*(9), 693–700.

Hargreaves, A., & Fink, D. (2004). The seven principles of sustainable leadership. *Educational Leadership*, *61*(7), 8–13.

Kolb, A. Y., & Kolb, D. A. (2005). Learning styles and learning spaces: Enhancing experiential learning in higher education. *Academy of Management Learning & Education*, *4*(2), 193–212. doi:10.5465/AMLE.2005.17268566

Makrakis, V., & Kostoulas-Makrakis, N. (2012a). Course curricular design and development of the M.Sc. programme in the field of ICT in education for sustainable development. *Journal of Teacher Education for Sustainability*, *14*(2), 5–40. doi:10.2478/v10099-012-0007-7

Makrakis, V., & Kostoulas-Makrakis, N. (2012b). The challenges of ICTs to online climate change education for sustainable development: The ExConTra Learning Paradigm. In S. A. Anwar (Ed.), *Proceedings of the 5th Conference on eLearning Excellence in the Middle East - Sustainable Innovation in Education* (pp.594-605). Hamdan Bin Mohammed e-University, Dubai, UAE.

Mezirow, J. (2000). Learning to think like an adult: Core concepts of transformation theory. In J. Mezirow (Ed.), *Learning as transformation: Critical perspectives on a theory in progress* (pp. 3–34). San Francisco, CA: Jossey-Bass.

Sterling, S. (2001). *Sustainable education– Revisioning learning and change (Schumacher Society Briefing no. 6)*. Dartington, UK: Green Books.

Tilbury, D. (2011). *Education for sustainable development. An expert review of processes and learning*. Paris: UNESCO.

UNESCO. (1996). *Learning: The treasure within (Report to UNESCO of the International Commission on Education for the Twentieth Century)*. Paris: UNESCO.

This work was previously published in a Handbook of Research on Pedagogical Innovations for Sustainable Development edited by Ken D. Thomas and Helen E. Muga, pages 700-716, copyright year 2014 by Information Science Reference (an imprint of IGI Global).

Chapter 75
Improve Collaboration Skills Using Cyber-Enabled Learning Environment

Yujian Fu
Alabama A&M University, USA

ABSTRACT

Collaborative learning methods have been widely applied in online learning environments to increase the effectiveness of the STEM programs. However, simply grouping students and assigning them projects and homework does not guarantee that they will get effective learning outcomes and improve their collaboration skills. This chapter shows that students can improve their learning outcomes and non-technical skills (e.g. collaboration and communication skills) through the cyber-enabled learning environment. The data was collected mainly from software engineering and object-oriented design classes of both graduates and undergraduates. The authors apply a blended version of education techniques by taking advantage of online environment and classroom teaching. Based on the study, the authors show that students can improve their collaboration and communication skills as well as other learning outcomes through the blended version of learning environment.

INTRODUCTION

Collaborative learning methods have been widely applied in online learning environment to increase the effectiveness of STEM programs. However, purely application of the online learning environment may not work well for students to improve both technical and non-technical skills (such as collaboration and communication skills). First, simply grouping students and assigning projects and homework do not guarantee that they will get effective learning outcome. Second, existing instructor-centered learning environment in many online courses does not offer sufficient scope for students to work collaboratively. To prepare students for their future information technology careers, it is necessary to foster collaboration and communication skills that are needed in the industry.

In addition, it is widely noticed that software engineering professionals working in industry are generally unsatisfied with the level of real-world

DOI: 10.4018/978-1-4666-8246-7.ch075

preparedness possessed by recent university graduates entering the workforce (Cummings & Betsy, 2007; Callahan & Pedigo, 2002). Their frustration is understandable – in order for these graduates to be productive in an industrial setting, organizations that hire them must supplement their university education with extensive on-the-job training and preparation that provide them with the skills and knowledge they lack (Conn, 2002). The root of the problem seems to lie in the way software engineering is typically taught: theories and concepts are presented in a series of lectures, and students are required to complete a small, toy project in an attempt to put this newfound knowledge into practice. Thus, the student graduated has little demonstrated capability in solving problems of large scale systems or dealing with critical issues and is lack of adequate skills of collaboration, communication in the teamwork environment.

Having observed similar situations in Alabama A&M University in the past years, we have developed a framework using the blackboard learning system to encourage students to engage with online activities. This framework is intentionally designed to support student online activity so that they could actively interact with teaching content and collaborate and communicate with others. Another feature of this methodology is the development of reusable learning objects. A learning object is a learning unit that contains an objective, a learning activity and assessment, which represent a set of reusable and self-contained digital resources. The baseline data collection in software engineering course at Alabama A&M University started in Spring 2008. The framework has been applied and validated since 2010 and has been improved in 2012. The measurement of the method was done in several ways – a pre-test and post-semester survey, a student interview, an alumni survey. The data was analyzed based on the satisfaction rate regarding to the course objectives. The survey questions are grouped by four categories regarding to the course objectives and program goals: background (including majors, minors, working experience), programming skills, project topics (information systems, embedded systems, security, government project, industrial project), and difficulty level (ranking from 1 to 5). In this chapter, we focus our analysis of the questions that are related to collaboration and communication skills.

In order to provide a meaningful context for students to learn and work collaboratively, this study is conducted in the software engineering and object oriented programming courses. We updated the current technology-based learning strategy as the background theory that supports this framework. Technology based teaching strategies utilizing Internet technology could provide remarkable educational opportunities for the 21st century learners. In our study, the upgraded technology-based learning (UTBL) includes communication devices other than just Internet based teaching. The communication devices used in this framework are robots, mobile devices (such as Android tablets, iPhone), social media and networks. These devices can be used for demo, example and project implementation, group discussion and peer communication during and after classroom time. Through synthesizing cyber enabled learning environment with technology-based teaching, the framework can dramatically motivate students and improve their learning outcomes.

THE DEFINITION OF COLLABORATION AND TEAMWORK

One of the main characteristics of our graduates considered by industry is the capability to work in team. Teamwork is not a new term and has been aware of by educators and employers for decades. In our study, we have considered the following capabilities and skills in teamwork: collaboration, communication, self-management, and leadership. Due to the limited space, in this chapter, we will focus on describing two skills – collaboration and communication.

In the dictionary, *collaboration* is defined as a style of working with each other to conduct a task and to achieve shared goals. In Wikipedia, it is defined as "a recursive process where two or more people or organizations work together to realize the shared goals." In education, *collaboration* means "two or more co-equal individual voluntarily brings their knowledge and experience together by interacting toward a common goal in the best interest of students for the betterment of their education success. Students achieve team building and communication skills meeting many curricular standards. Students have the ability to practice real-world communication experiences. Students gain leadership through collaboration and empowers peer to peer learning" (Wikipedia).

It is widely accepted that graduates should not only be technically competent but also be skilled in communication and teamwork. They should have certain social skills and be equipped with global awareness, self-managed and self-learning skills, which are important in their life time. However it is much less clear how these "soft skills" could be best developed in their undergraduate and even graduate studies. McLoughlin and Luca (2000) suggested that pedagogy needs to change from transmissive, didactic approaches to transformative, student-centered approaches. In this study, the framework that is developed focuses on student's role instead of instructor's role. To achieve this goal, we implemented the framework in a context of project-based unit involving individual and group study format under an online learning environment.

This framework improves student achievement in two folds. First, it is a technology driven strategy. The power of digital instruction has been widely noticed. For example, digital instruction supports personalized learning through various vehicles. As instructions are required to align with college- and career-ready standards, digital learning can become increasingly student-centered and market-driven, individually tailored to provide the variety of paths and paces students need to achieve ambitious goals, and informed by adaptable technology and assessment data. The potential of digital instruction is enormous: In its next generation, it will likely become increasingly emotionally connective for students and provide them and their teachers with enhanced diagnostics and instructional roadmaps. These improvements will enable the consistent instructional differentiation and high standards for students' learning advancement that today typifies only the most excellent teachers and schools, while saving teachers' time so they could engage in other aspects of teaching.

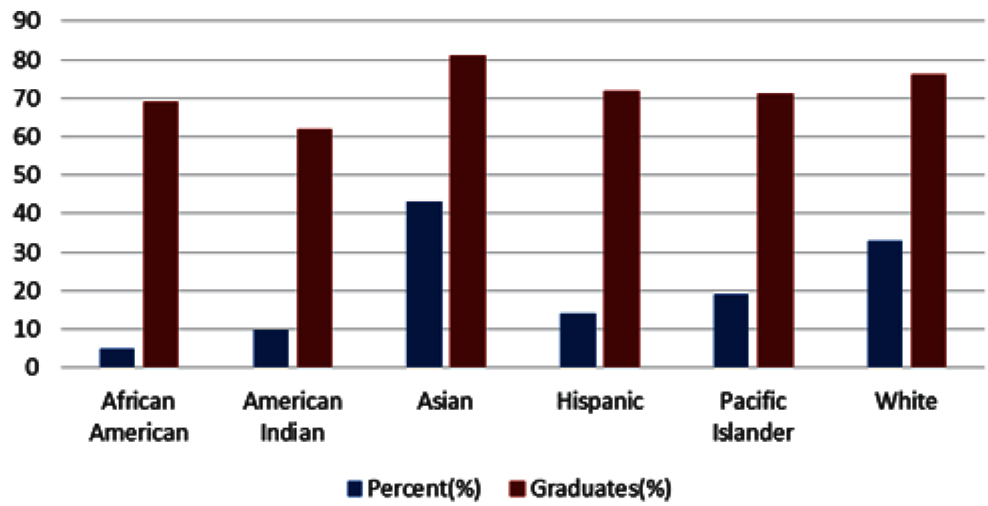
The second benefit comes in the integrated approach's capacity to let institutions reach more students with excellent teachers who could ensure that students achieve their ambitious, personally fulfilling goals. This level of growth is essential for closing achievement gaps and helping average students leap ahead to higher standards. In the future, when technology makes the basics of learning available to all students globally, complex aspects of excellent teaching will become even more important: guiding students' selection of ambitious and engaging work, fostering student motivation, addressing the myriad learning barriers, and cultivating higher-order thinking.

BACKGROUND AND RATIONALE

Our country's success in the increasingly technology-driven and globalized economy will depend on how we prepare today's learners and students for tomorrow's job markets, for personal fulfillment and for civic engagement in an interconnected world.

For this reason, it is important to set clear, ambitious goals for institutional education to generate high student growth and develop students' higher-order thinking skills. But goals alone will not set our students up for success. Students' learning needs are shaped by family supports and personal characteristics, such as past achieve-

Figure 1. Graduation and college-ready rates: Data retrieved from ACT (2013)



ment, self-motivation, learning preferences, time management, and emotional stability. Even the best one-size-fits-all teaching methods do not meet the diverse needs that teachers encounter in classrooms. Our nation's educational challenge, then, is to maintain ambitious goals for all while helping each student find a path to meet them.

There is a moral and economic imperative to change the way instructors teach and students learn in the United States. All children graduated from high school should be ready for college and career, possessing the deeper learning skills they need in order to compete in today's rapidly changing economy. These skills include not only mastery of core content but also the ability to think critically, solve complex problems, work collaboratively, communicate effectively, be self-directed, and incorporate feedback (Alliance, 2011). Too many low-income students are still not developing the skills they need to succeed in modern life. Nationwide, only 72 percent of students earn a high school diploma. In the class of 2011, more than 1 million students dropped out before graduation. Among minority students, only 58 percent of Hispanic, 57 percent of African American, and 54 percent of American Indian and Alaska Native students in the United States graduate with a regular diploma, compared to 77 percent of white students and 83 percent of Asian Americans (Editorial, 2010).

Similarly, in Figure 1, data collected from ACT (2013) explicitly shows that college readiness rates for most of races are around or lower than 50%. Specifically, African-American students have 5% college-readiness rate and 68% graduate rate. These numbers are astonishing to today's educators, especially for college education. It is highly desired for our researcher to find an efficient way to motivate students and encourage them to pursue and accomplish the college study and to prepare for the future workforce.

The rise of digital learning presents a unique opportunity to meet the aforementioned challenge. It has unprecedented potential to help underprepared students achieve ambitious goals by enabling personalized paths to learning success. Even in the digital age, the vast majority of U.S. students will probably attend brick-and-mortar schools. Many parents need to have their children stay at school while they work, because our schools act as connective fabric for the communities. As a result, most students will experience digital learning as part of blended learning: a combination of digital instruction and in-person teaching.

In this chapter, we explain how the proposed learning framework can succeed by bringing interesting projects with the best available technology to students under the guidance of instructor, motivating students and improving their collaboration and communication skills. When the instructors use the high quality project-based learning under cyber enabled learning environment, they can realize the great potential to dramatically improve student learning outcomes and non-technology skills.

DIMENSIONS OF TEAMWORK EDUCATION

This section discusses the key dimensions of teamwork education in the development, implementation and assessment of project-based, team-oriented framework in the cyber enabled learning environment. The dimensions of teamwork education include project-based learning (PBL), technology based learning (TBL), participants, content, project, and assessment.

Project Based Learning (PBL)

The selected study is carried on in two courses: software engineering and object oriented programming and design. Software engineering class aims at conveying the fundamental concepts, design methodologies, validation and verification techniques for a software life cycle. Object oriented programming and design class aims at the advanced level of object oriented programming concepts, such as inheritance, method call, polymorphism and their relationship with design concepts. Both classes are concept oriented with a lot of design notations; students need to master and apply the design approaches to the real world applications. At the very beginning year of teaching both classes at Alabama A&M University, we found two dilemmas from students:

- **Group A:** Students struggle with the understanding of concepts. This situation will hinder the students to have further capability of applying the concepts.
- **Group B:** Students have hard time to implement and apply the design methodology to concrete problems, which usually are just some toy systems with minimum design. This situation happens to those students who even have a better understanding of notations and concepts and have demonstrated a very good grade in the quizzes and homework.

The author collected some student data with the consideration of age and background to make sure these students are at the similar level. The data includes the courses students registered, their current GPA, their final course grade, their background knowledge regarding to the software engineering, and the grades of some related courses. After analyzing the data, we have the following findings:

- In Group A, about 11% students maintain good GPA (above 3.0) and good grade in other courses;
- In Group B about 69% students maintain good GPA (above 3.0) and good grade in other courses.

To understand this situation, a simple survey with interview is offered to students in both classes. From student response, we have the following findings:

- Students are more interested in some new applications and realistic problems instead of the questions given in the classes.
- Students are looking for the connection between the design concepts and applications but have hard time to link them together.

Some student comments are "I feel it is interesting, but after a while, it is getting boring…," and "there are too many concepts, and I don't have time to study… I do not have notes…" From the data analysis and survey findings, we identified a key issue for student learning–motivation. Students need to be interested in the topic. Regarding to this issues, we started implementing project-based learning with cyber enabled environment in both classes to help students keep up and maintain their interests.

Project-based learning could improve and broaden the competence of computer science students. Through this learning approach, students could

- Understand the role of theoretical and real-world discipline-specific knowledge in a multi-disciplinary, collaborative, and project-centered platform;
- Recognize the relationship of the software engineering concepts to the enterprise context and the key role of this context in computer science decision;
- Learn how to work in a team manner and lead multiple roles to design, develop, manage, and maintain high quality large scale software intensive systems, effectively and economically.

Technology Based Learning Strategy

Internet is the most fluent technology in this century. It is one of the most popular applications in human history. Of course, several other technologies such as networking and protocol (WAN and LAN techniques), memory, Web page design, are the key supporting technologies for the development and booming of Internet. Besides Internet, mobile applications and robotics are all the latest emerging technology that currently flew into the classroom. Accordingly, today's technology based teaching is not limited to Internet. There are other new emerging technologies that have effects on the traditional teaching strategies. The definition of technology based learning (TBL) is changing from installing digital technology in classroom teaching to ad hoc multiple techniques and to a new cyber learning environment. One of the key ideas behind the new era of teaching is to motivate students and improve the teaching qualities of educators and instructors.

First and foremost, our technology-based learning as the education strategy includes various electronic technologies, such as Internet, intranets, satellite broadcasts, audio and video tape, video and audio conferencing, Internet conferencing, chat rooms, e-bulletin boards, Webcasts, computer-based instruction, and CD-ROM (ASTD, 2005). TBL also encompasses related terms, such as online learning and Web-based technology that occur via the Internet, and computer-based learning that is restricted to learning using computers. E-learning is synonymous with TBL and has largely replaced it in scholarship and industry as an alternative term. Therefore, this chapter uses these terms interchangeably. Distance learning sometimes is also referred as technology-delivered learning. However, it is worth to note that there is a difference between distance learning and TBL. TBL includes methodologies where instructors and learners are in the same room and instruction is computer-based, but there is no *distance* involved. On the other hand, TBL is more narrowly defined in that it does not include text-based learning and courses are conducted via written correspondence that would be covered by either distance learning or technology-delivered learning. Furthermore, technology-enhanced learning describes a methodology in which technology plays a subordinate role and serves to enrich a traditional face-to-face classroom. On earth, both TBL and digital learning aim at improving students' learning outcome through increasing their motivation and curiosity.

Participant

The students are required to self-group themselves based on willingness without instructor's interaction at the beginning of class. For the senior design class, this could be an easy process, because students are mostly acquainted with each other. Students have the choices to select one term project from the list given in the Blackboard. At the same time, students of the same group that have no interest in any of project in the list can propose a new project by their own. The proposal will be evaluated and approved by the instructor. By doing so, we want to ensure that the project students are working on is the one that are most interesting to them.

Content

The ultimate goal of the framework is to improve students' learning outcome through cyber enable learning environment with the context of project based learning and team oriented platform. Through this type of learning, students will understand

- The fundamental concepts and design methodologies regarding to the context;
- How to apply design methodologies on real world systems;
- How information technology and collaboration skills could support their teamwork and help them achieve the learning outcomes.

Project

The projects students working on are multi-disciplinary that require knowledge of software system design, programming language, system configuration and/or computer science theories. The students in a group are required to analyze the project, assign tasks and roles to team members, and setup timelines of the project. The project requires necessary documentations that contain design models, analysis, implementation, and validation through the software life cycle. During the project period, students will learn

- Software design and development methodologies and object oriented programming skills;
- Problem solving skills for both predictable issues and unexpected issues;
- Communication skills through face-to-face teamwork and multimedia social networking in the cyber learning environment;
- Collaboration skills through team meeting and multimedia social networking in the cyber learning environment;
- Using online materials provided in Internet and Blackboard learning systems;
- Leadership skills through collaborations and management.

Assessment

It is hard to evaluate non-technical skills using traditional assessment methods. In addition, teamwork in a digital learning environment is posing new assessment challenges. Current studies of university courses in which technology is a key component tend to focus on the technology part – specifically, on media selection and media effects. Neither of these issues addresses the individual learner (Walther, 1997). In software engineering education, project-based learning under the cyber enabled learning environment focus on determining how to design and build assessment within the perspective of cognitive and situated learning theory. If traditional assessment methods have limited value in evaluating a collaborative, multidisciplinary, geographically distributed team of students, they are ineffective in the measuring of student knowledge and collaboration skills.

All the aforementioned dimensions encompass various concepts, theories, strategies, and tactics that pertain to the motivation to learn

(Keller, 1987a). They represent the major idea of the integration approach, which is the synthesis of PBL, TBL with the cyber enabled learning environment. They also provide the basis for the feature of this integration approach, which is the systematic design process that assists instructors in creating motivational tactics that match student characteristics and needs (Keller, 1987b).

As mentioned before, it is important for educators to prepare our college graduates with more skills than just knowledge. The proposed framework carries the following features – self-organized, simple, and easy-to-implement. In the following sections, we will discuss our framework upon the above dimensions.

DESIGN FRAMEWORK PROCESS

The overall idea of the framework is to increase student satisfaction to the content of both technology and nontechnology outcomes. Satisfaction of learners refers to the positive feelings about one's accomplishments and learning experiences. It means that students receive recognition and evidence of success that support their intrinsic feelings of satisfaction and they believe they have been treated fairly. This study is to show that students will demonstrate a high level of satisfaction through the learning process using this framework.

The framework contains a six-phase design process for the development of motivational systems in the work and learning settings (Figure 2). The first two phases – design & development and distribution – are the foundation of the tower, which include the basic components of the process and indicate the further evaluation and overall analysis of the process. These two phases produce information about the status quo and provide the basis for analyzing gaps and their causes. The middle two phases are engagement and implementation. These two phases focus on students' understanding of instructions. In other words, students should know what they need to do through the process of engagement. Implementation is the key component to apply the approach. This is the step to observe results. The last two phases are analysis and evaluation. Based on previous phases, the project's data is collected and analyzed, learning objectives are assessed, and future improvement is identified. These steps are more critical and analytical for the purpose of selecting solutions that best fit time, resources, and other constraining factors in the situation.

Design and Development

In our approach, it is best to work on specifically defined problems. Design starts with problem domain analysis. The domain will specify scope of the application. The content concentration will specify the concept inventory and related problems. At this initial phase, students should note the key concepts to learn and understand the problems to solve. The time frame and assignments are also necessary to be clarified in this phase. The development of problems and design of teaching strategies are well defined in this phase. The use of cyber enabled learning environment should also be clarified. Often, people will try to deal with other issues of how to improve motivation by adopting a global solution, such as a new set of curriculum materials or an entirely new approach to teaching. This approach may be successful for a while, but after the novelty wears off, the old motivational problems tend to re-emerge.

After choosing a specific problem to solve, the primary task in the design & development phase is to brainstorm possible solutions. At this point, all potential solutions should be listed without considering their presumed feasibility. The goal, as in any brainstorming process, is to produce as many ideas as possible. In addition, students need to define the ideal solution without constraints. Each problem and ideal solution

Figure 2. The design process

might be constructed from several specific suggestions utilizing the facilities of cyber enabled learning environment in various degrees. We also encourage students and instructors to use mobile and digital facilities if they have. At this stage, we do not worry about cost, organizational policies, or other constraints that might inhibit the discovery of an ideal solution.

Once the most feasible tactics are chosen and documented properly, the instructor needs to help students integrate them into the framework as an organizational structure with proper grading points. This step upgrades the previous step from encouraging restraintless envision to an ideal and possible solution. At this time, a best possible solution needs to be created by combining ideas and applying several selection criteria pertaining to expense, policy, acceptability, and proportionality.

Distribution

Design & Development provide support for all further activities. At this stage, learners will have a nutrition foundation that is full of digital and technical surroundings. The distributions mainly focus on the dissemination of the bipartite documents to all learners through two ways – digital and traditional ways. Digital distribution involves all possible synchronous and asynchronous methods, broadcasting style and multimedia style vehicles. For example, to distribute documents that do not need feedback, broadcast would be the most efficient way. To distribute documents that need to collect data, synchronous and asynchronous are necessary. In addition, in this phase, students can follow the document and employ the application. Other activities in this phase include documentation plan preparation, media development, developmental reviews, and implementation. As with any effective system development activity, it is important to have motivational tactics and strategies well integrated with other components. For example, tactics such as case studies at the beginning of a class can be a total waste of time if they do not meet specific needs of the audience.

These design & development and distribution phases are comprehensive, interleaving and time-consuming due to two limitations. First, it requires the motivational designer to have quite a bit of knowledge of the different factors represented by the three categories. Second, in reality, various situations where serious challenges always occur and unexpected cases appear frequently are hardly to handle. In some cases, it is highly critical to maximize the effectiveness and performance of a lesson or a course. The full six-phase can be the best approach to follow. But, in many situations these conditions are not met. With teachers or instructional designers, who have little or no formal knowledge of motivational concepts and principles, it would be good to have a simpler model. Such a model has been created and tested in several cyber-related learning environments.

Engagement

It is a challenge issue to engage students in the systematic design process. Two main factors are necessary to consider – level of students and degree of engagement. Engagement activities are varied with the class. Freshmen may be dramatically different from junior and seniors. Sophomore may be different from freshmen. Engagement is a typical issue and highly relevant to student motivations. Degree of engagement is related with the class, student motivation, and learning approach. In this framework, we use this as a separate phase because of our experience. We found that engagement of students can increase student curiosity and motivation, which will results in high quality of product. Otherwise, it is completely opposite. There are two difficulties in determining the degree of engagement since it is a fully subjective topic. First, there is no baseline for engagement. It is hard to find the symptom of non-engagement at the initial or on-going stage of the project. Second, there is no measurement for the degree of engagement. Right now, no research work has been published to evaluate and assess student engagement in an activity.

There are two main styles of integrations – classroom integration and cyber enabled engagement. In the digital learning era, how to engage students through current advanced technology remains a challenge. During lectures, materials and supplements are available online, shifting instructor-centered learning to student-centered learning. This requires students to be more reliable and sustainable during the learning process. Thus the engagement is between students and computers, students and learning environment. The question raised is how to design a cyber enabled learning environment that is interactive with and interesting to students. Many researchers have done some work to solve this problem. For example, WReSTT (Clarke et al., 2012) and its updated version WReSTT-CyLE are Web-based repository and cyber enabled learning environment to teach software testing.

"Students want to engage in technology, especially if it's socially based, whether it's with teachers, students, other schools, or experts around the world," says Julie Evans, CEO of Project Tomorrow. "But they want social interaction that is school-oriented, about serious topics and not the personal 'dramas' of Facebook." (Susan, 2011)

Implementation

After any systematic design process, the framework needs to be applied by the learning systems that involve students and instructors with multiple roles and responsibilities. In this case, motivation is resolved in the framework and combined with the instructors' development design from the beginning phase. Students are able to identify system characteristics and/or gaps which lead to their objectives. In this phase, there are two difficulties in determining the degree and nature of a problem. From our experience, the first and typical problem is that the applications students have chosen could not be realized, at least from the learner's side; and in some cases, the instructor is not aware of this situation. From the pedagogy point of view this is due to the insufficient documents of instruction. From the psychology point of view, this is due to the immature of learners' psycho-experience. The pre-seeing of this situation and tactically handling it is important for the framework to continue function. Students who do not have and cannot get the skills required to perform satisfactorily will not be able to learn quickly thus cannot succeed to a satisfactory degree. They will develop low expectations for success, or even feelings of helplessness, and will be demotivated as evidenced by lowered levels of effort and performance.

Analysis

As with any systematic approach, the integration framework needs a process of analysis by collecting necessary data and information regarding to the project goal and objectives. The purpose of analysis lies in two aspects – for the assessment of the project, and for the resolution of the problems occurred during project execution.

There are several scientific methods that can be used to analyze the data once the project is evaluated. Without analysis, the evaluation results are meaningless. Usually, analysis is a little difficult and ad hoc. The method changes with the problems and domains. In addition, the problem lies in the nature of the project and is relevant to the project characteristics. Objectively, it is the data that carries the efficiency of content, domain, class, time, numbers of population, and ethnicity. Subjectively, it is varied with motivation, curiosity, maturity, performance and other psychology factors. It follows a curvilinear relationship with objective factors and subjective factors. As objective factors increase, subjective factors decrease to an optimal point. When one analyzes the data of a problem, it is desirable to include as many factors as possible in order to reduce the bias.

Comparable problems occur in other categories of the framework and require tactics to modify learner results into a more productive range. In conducting motivational analysis, it is important to identify the nature of technology gaps in these terms, and to realize that the problems might be different by subgroups or by individuals. It is also important to identify the presence of any positive factors.

Evaluation

Any approach needs a scientific evaluation to assess the results and effectiveness. There are two main groups of evaluation – summative and formative evaluation. This proposed framework has been used by the author in the past five years. A large amount of data has been collected including statistical data, surveys and assessment results. In the following section, we will present some non-technology activities that are implemented at Alabama A&M University using the proposed framework.

APPLICATION OF FRAMEWORK

Our application of the framework is implemented in the software engineering and object-oriented programming classes of Alabama A&M University starting 2008. The application of the framework does not have a comprehensive tool that includes all cyber learning environments. Thus, we utilized the existing available resources: Blackboard + Email + Yahoo Messenger/Google Talk. The Blackboard is updated with several integrated features to facilitate instructors to use. For example, students are automatically enrolled in the courses that are assigned to the instructor in the Blackboard. The Blackboard has included assessment process for quizzes, exam, homework and reports. In addition, it can realize social communications by using grouping and creating discussion forum.

The only weak point for Blackboard is video conference. Blackboard could support multimedia, such as video and audio. However, if the file size is getting bigger, it will be hard for learners to download the video. In addition, you cannot create videos using tools provided in Blackboard. The instructor has to find other ways to solve this problem. In the followings, we will describe how to implement the framework in our courses.

Step 1: Design and Development

Our approach was implemented in two classes at both undergraduate and graduate level. For the design & development, the difference is mainly in the courses, but not in the classification of students. The Software engineering courses offered at Alabama A&M University mainly focuses on software process, project management, design model, quality assurance. Object oriented programming & design course is offered to both undergraduates and graduates. The author implemented this approach at the graduate level course, which covers the principles of object oriented design and programming languages, object oriented design methodology (UML), advanced modeling and analysis.

We chose the application problems in the software intensive systems that include four categories – information systems (GUI design), mobile systems (iPhone, Android apps), robotics systems, and networking. In each category, one to three projects is carefully designed with short description of user requirement. The covered knowledge units are slightly different from category to category. The common knowledge for students is programming, software design and development. The projects aim at improving students' problem solving skills through sequence steps in a software development cycle.

Step 2: Distribution

All projects are distributed in three levels of documents – problem domain selection, project topics regarding to categories, and self-designed projects. The students are instructed to read through the documents in a top-down way from first level to third level. For each problem domain, a short description and sample project areas are listed. Several links of the existing student class projects are referred. After the first level of reading, students get the main ideas of each domain and they could connect them with their own background knowledge and skills. The tasks given to students are to evaluate themselves and find out their interest. After the first level of reading, most students can go through level 2 and select proper topics. To increase collaboration, the topic selection process must be done through a group discussion. The final topic will be reported online by the group coordinator.

Through this study, we found that the group discussion reduced a lot of collaboration problems that might occur later. Certainly, it cannot reduce all of problems, but we found that it completely reduce the problems regarding to project topics and domain areas, which we had in the first year.

Step 3: Engagement

Engagement, defined as "student-faculty interaction, peer-to-peer collaboration and active learning..." (Chen, Gonyea, & Kuh, 2008), has been positively related to the quality of the learning experience. Social learning or learning as part of a group is an important way to help students gain experience in collaboration and develop important skills of critical thinking, self-reflection, and co-construction of knowledge. Email has been a popular way for people to communicate. It has been used as one of the main communication techniques in author's classes. In this study, we adopted three ways of engagement: discussion board, social media, and announcement.

To encourage a broad discussion with participants and learners, the instructor created groups of discussion forums in Blackboard. Students can share information with colleagues and discuss some questions regarding to class contents and projects. The data collected from 2009 does not show a fully involvement of discussion forum in Blackboard. Since 2010, firmware is utilized and added to the class teaching. Several robotics and high level robots are bought and designed for student project. Some group members had problems with software and environment setup. Through the board discussion, some successful stories were shared to help other students with similar problems.

Collaboration can be done in a specified group or within or outside of the class. Cyber enabled learning environment encourages students to share various types of information with their classmates, increases peer discussion and communication, and helps students in learning of the context in multiple aspects. Synchronous discussion is a key method of student collaboration and communication because of its efficiency in sharing ideas. Students are also encouraged to use social media to communicate, such as Google Talk, Yahoo Messenger, Twitter and Facebook. We expect students to provide the log file and archive for the class record.

Announcement provides a unidirectional way of communication. Only instructor is allowed to create and send announcements to students through Blackboard. The information passed will motivate students to participate in activities and get involved in projects. For example, once a local industrial conference info was passed to students and some students attended the conference, participated in discussions, presented their projects, and built network connections. One student came from the conference commented "it is a great experience… He (she talked to a person in the conference) is very interested in my project …" Because of this experience, she had been diligently working on her robot project during the remaining four weeks and solved one hard problem by herself.

Table 1. Number of students participated in the study

	Control Group	Study Group	Number of Projects
Spring 2008	9	10	2
Fall 2008		9	3
Spring 2009	10	11	3
Fall 2009		10	3
Spring 2010	14	11	3
Fall 2010		10	3
Spring 2011	17	12	4
Fall 2011		7	3
Spring 2012	13	9	3
Fall 2012		5	2
Spring 2013	21		0

Step 4: Implementation

As discussed in the first step, this approach was implemented in two classes at both undergraduate and graduate level. Software engineering topics are offered for both graduates and undergraduates and object oriented programming & design is offer for graduates. During the implementation, to reduce the bias, we implemented one class as study group and another class as control group. The class content, homework, quizzes and exams are all the same. The participated student number is shown in Table 1.

Among all projects, robotics projects are the most favorite and were selected by 87% of students. Other projects are purely information system design.

Step 5: Analysis and Assessment

Data was gathered from two classes from Spring 2008 to Spring 2013. The collaborative work has

Table 2. Distribution of student grading results (control group)

Questions	A	B	C	Below C
Definition	75%	15%	10%	0%
Programming concepts	55%	35%	5%	5%
Design concepts	25%	50%	15%	10%
Programming skills	30%	40%	20%	10%
UML syntax	30%	50%	15%	5%
Design model	28%	44%	23%	5%
Result analysis	12%	21%	43%	24%

demonstrated more efficient learning results in the concepts, such as UML diagrams, system design model, and analysis. However, it shows that students of study group are not good at understanding and mastering of definitions and terminologies. In contrast, the control group students are good at definition and concepts, but lack of the skills of system design. Students learning outcome is evaluated by homework, exams, and quizzes. We categorize the questions into several groups: definition, programming concepts, design concepts, programming skills, UML syntax, design model, and result analysis. The grading results of control group and study group are listed in Table 2 and Table 3, respectively

There is a slight difference in student grades between the control group and study group (shown in Tables 2 & 3). A factor could be that study group implemented collaborative team project and students in this group are evaluated by the items that do not reflect their behavior and contributions to the project. Regarding to this issue, we increased assessment for the collaboration evaluation.

Collaboration skills are evaluated based on learning outcomes and some other non-score features. The group projects were assigned a cumulative grade based on the collaborative group process (a series of documents), the final product (group paper, project demo and project presentation), and peer-and-self evaluations of the collaborative work.

Through the above assessment process of collaborative work, we saw some differences among students in the same project. After carefully analyzing the data and assessment results, we found that students who are involved in the group project but do not contribute well will have poor peer evaluations and perform poorly in the exam and quizzes. These groups of students are the main factor to lower the outcome of project-based learning.

Table 3. Distribution of student grading results (study group)

Questions	A	B	C	Below C
Definition	85%	10%	5%	0%
Programming concepts	45%	35%	10%	10%
Design concepts	45%	35%	15%	5%
Programming skills	35%	35%	20%	10%
UML syntax	35%	50%	10%	5%
Design model	35%	45%	15%	5%
Result analysis	21%	32%	43%	4%

In the end of semester survey, many students responded that they like this class. For example, one student commented "the project (robot) is very interesting, and it really helps me to understand programming concepts and software design model." Regarding to group project and collaboration skills, some students commented "Group project is fun, I like group discussion and meetings, a lot of ideas come (during meeting). … Leading a group is not simple but tricky, (I) like work with people."

Cyber enable learning environment provides a suitable platform for students to learn and study class content in digital style. Some student commented that "online discussion is good and helpful for our project. Information in blackboard is really helpful and saves us a lot of time." A student who disliked team work at the beginning of the semester commented "online learning helps the teamwork, with this I can get a lot of my work done (faster), now, I like work in a team."

Discussion

In Alabama A&M University, we have implemented this framework and found that cyber enabled learning environment combined with project based learning strategy can improve student collaboration skills, motivate student as well as improve their learning outcomes. Our data may be different from other institutions. However, because of the large amount of minority students (African American students) in Alabama A&M University, we believe our survey results are representatives of other institutions that have similar student populations.

Students were excited for every step of their improvement. In 2009, some students gave the following evaluations for this class: "I like the videos (in the blackboard), it helps me a lot, esp. when I missed some lectures." and "(Materials in blackboard) is helpful for our group discussion, whenever we have some issues, just go to the blackboard, either send message to discussion forum, or send an email to professor, or look at lectures and supplements. It helps our collaboration and team work."

In 2011, robotics project is introduced in this framework. More than 50% students chose the robot project. Before the end of the semester, two students have told the instructor that they got internships from a company after they presented their robot project during the interview. Some students commented "(using blackboard for class teaching is) very good for me, the project (robot) is very interesting, love it!"

CONCLUSION

It is the digital era now and it is the time to adopt cyber enabled learning environment technique to support student learning and improve student skills. Cyber enabled learning environment not only supports gaining knowledge, but is also an important platform for improving the non-technological skills. The world is shifting from hard copy documents to electronic versions. It is the time to make our classroom green – paperless. However, without well thought-out design of classes and context, skill training cannot be achieved in a passive electronic platform. A well design of teaching framework can widely extend the benefit of cyber enabled learning environment. Project-based learning framework presented in this chapter provides a solid foundation for student-centered learning. In addition, this framework can be easily extend to other courses in STEM areas especially for the courses that require more credit hours, because this framework focuses on improving student learning and student engagement in a collaborative, crosscutting process and can be implemented effectively.

REFERENCES

ACT. (2013). *The condition of college & career readiness*. ACT, Inc.

Alliance. (2011). *A time for deeper learning: Preparing students for a changing world.* Alliance for Excellent Education.

Ark, T. (2012). Blended learning can improve working conditions, teaching & learning. *Getting Smart*. Retrieved from http://gettingsmart.com/blog/2012/06/blended-learning-can-improve-working-conditions-teaching-learning/

ASTD. (2005). *ASTD's e-learning glossary*. Learning Circuits.

Callahan, D., & Pedigo, B. (2002). Educating experienced IT professionals by addressing industry's needs. *IEEE Software*, *19*(5), 57–62. doi:10.1109/MS.2002.1032855

Chen, P., Gonyea, R., & Kuh, G. (2008). Learning at a distance: Engaged or not?. *Innovate, 4*(3).

Clarke, P. J., Pava, J., Davis, D., Hernandez, F., & King, T. M. (2012). Using WReSTT in SE courses: An empirical study. In *Proceedings of the 43rd ACM Technical Symposium on Computer Science Education* (pp. 307–312). ACM.

Conn, R. (2002). Developing software engineers at the C-130J software factory. *IEEE Software*, *19*(5), 25–29. doi:10.1109/MS.2002.1032849

Cummings, B. (2007). *Real world careers: Why college is not the only path to becoming rich*. Business Plus.

Editorial. (2010). Graduating by the number: Putting data to work for student success, special issue. *Education Week, 29*(34).

Keller, J. M. (1987a). Strategies for stimulating the motivation to learn. *Performance & Instruction*, *26*(8), 1–7. doi:10.1002/pfi.4160260802

Keller, J. M. (1987b). The systematic process of motivational design. *Performance & Instruction*, *26*(9), 1–8. doi:10.1002/pfi.4160260902

McLester, S. (2011). Building a blended learning program. *District Administration*. Retrieved from http://www.districtadministration.com/article/building-blended-learning-program

McLoughlin, C., Baird, J., Pigdon, K., & Wooley, M. (2000). Fostering teacher inquiry and reflective learning processes through technology enhanced scaffolding in a multimedia environment. In *Proceedings of World Conference on Educational Multimedia, Hypermedia and Telecommunications* (pp. 185–190). Academic Press.

McLoughlin, C., & Luca, J. (2000). Developing professional skills and competencies in tertiary learners through on-line assessment and peer support. In *Proceedings of World Conference on Educational Multimedia, Hypermedia and Telecommunications* (pp. 668–673). Academic Press.

Staker, H. (2011). The rise of K-12 blended learning. *District Administration*. Retrieved from http://www.districtadministration.com/article/building-blended-learning-program

Visser, L. (1998). *The development of motivational communication in distance education support*. (Unpublished doctoral dissertation). Educational Technology Department, The University of Twente, Twente, The Netherlands.

Walther, J. B. (1997). Group and interpersonal effects in international computer-mediated collaboration. *Human Communication Research*, *23*(3), 342–369. doi:10.1111/j.1468-2958.1997.tb00400.x

KEY TERMS AND DEFINITIONS

Cyber Enabled Learning: A teaching environment, where information technology is used as the infrastructure.

Collaboration Skills: Skills that require players to work together to achieve certain goals.

Project Based Learning: A learning approach that involves students to solve a complicated problem.

STEM Programs: Science, Technology, engineering, and mathematics programs.

Technology Based Learning Strategy: Using technology to assist students to achieve their learning objectives.

This work was previously published in Overcoming Challenges in Software Engineering Education edited by Liguo Yu, pages 443-459, copyright year 2014 by Engineering Science Reference (an imprint of IGI Global).

Chapter 76
Artful Learning:
Holistic Curriculum Development for Mind, Body, Heart, and Spirit

Randee Lipson Lawrence
National Louis University, USA

ABSTRACT

This chapter begins with a critique of traditional models of curriculum development as overly rigid, fragmented, and disconnected from the true nature of the learner. Holistic learning is described as engaging the mind, body, heart, and spirit of the learner in relationship to the learning environment. Holistic learning is earth-centered, participatory, and inclusive of the cultural context of the learners. These various learning domains and their relationship to curriculum are discussed, including the application of learning from indigenous communities. Several examples of arts-based and creative learning activities are offered along with holistic ways of developing learning objectives and assessing learning.

INTRODUCTION

The typical curriculum in adult and higher education is based on the acquisition of knowledge, primarily fostering the rational or analytic abilities of the learners to the exclusion of other ways of knowing. Traditional schooling privileges propositional or cognitive epistemologies. We are taught by listening to lectures, reading scholarly writing and engaging in rational discourse. While these ways of learning are valid, they draw on only a part of our human potential, as we are whole, thinking, feeling and sensing human beings. To be fully human, according to Greene (1995) requires accessing our imagination and seeing beyond what is, to what could be. The role of imagination "is to awaken, to disclose the ordinarily unseen, unheard and unexpected." (p. 28). The intent of this chapter is to describe a holistic, spiritual and imaginal approach to developing curriculum that engages all of who we are.

Integrating affective, somatic and spiritual dimensions along with the cognitive into our curriculum through artistic expression (visual art, drama, music, storytelling and poetry) engages multiple intelligences (Gardner, 2006) freeing learners to fully participate in the learning process and to explore meaningful relationships between the subject and the self, and the self with others, which often leads to lasting change or transforma-

DOI: 10.4018/978-1-4666-8246-7.ch076

tion. Students who are willing to risk stepping out of their comfort zone to embrace these alternative ways of learning tend to discover that they have reawakened an aspect themselves that was there all along but had been dormant. Intentionally inviting creative expression into class activities and assignments makes space for holistic learning to occur.

In 1926, Eduard Lindeman wrote: "*Education is life* – not merely preparation for an unknown kind of future living. Consequently all static concepts of education which relegate the learning process to the period of youth are abandoned. The whole of life is learning, therefore education can have no endings." (Lindeman, 1926, pp. 4-5). If as Lindeman passionately declared, the whole of life is learning, then we must consider the ways in which learning occurs as an integrated whole.

Understanding Holistic Education

Miller (2007) sees holistic education as incorporating the principles of balance, inclusion and connection. It maintains a balance of individual and collaborative learning, the content and pedagogy of the curriculum, factual knowledge and imagination, rational and intuitive knowledge and quantitative and qualitative assessment. Miller is not suggesting we get rid of our traditional rational curriculum but that we balance it with the intuitive, the embodied and the spiritual. Inclusion does not see the curriculum as something that is given to the student but rather something that is created with the learner. Connection focuses on relationships between the different ways of knowing, relationships between the learner and the larger community, relationships with the earth and the learner's relationship with his or her soul. Miller (2006, p. 3) also describes "timeless learning" which is much more than learning facts. It is a type of deep powerful learning that touches our soul. It is embodied, connected, integrated, soulful, participatory, mysterious and unexplainable. Miller believes this learning can also be transformative as it "can lead to profound change in the individual" (p. 8)

In 1990, eighty international holistic educators gathered at a conference in Chicago and drafted the statement *Education 2000: A Holistic Perspective*. This vision statement was created as a critique of public education at that time. Holistic education was seen as including the following components and purposes (Flake, 1993):

- Deepening relationships to self, family, community, the planet and the cosmos.
- Balancing learning for economic gain with learning necessary for responsible action.
- Respecting individuality by eliminating uniform assessment.
- Focusing on experiential learning.
- Honoring multiple ways of knowing including the spiritual domain.
- De-emphasizing the role of teacher as technician
- Promoting freedom of inquiry and expression
- Teaching for participatory democracy and social justice.
- Educating for global citizenship.
- Promoting earth literacy. Recognizing the interdependence of all beings.
- Nourishing the health of the spirit

According to Collister (2010, p. 52) "Holistic education is not a curriculum or methodology. It is a set of assumptions that recognizes that humans seek meaning, not just facts or skills." Holistic learning activities are embodied, experiential and make use of aesthetic activities that engage the senses.

Heron (1996, p. 104) advances a "holistic epistemology" which incorporates four kinds of knowledge including experiential (through direct encounter), presentational (intuitive and imaginal), propositional (theoretical and conceptual) and practical. "In my view those modes of knowing are grounded in each other and emerge from each other." (Heron, 1996, p. 105)

Myles Horton (1990) believed that education was by nature holistic but our formal educational systems with their emphasis on discrete disciplines has compartmentalized it..

Instead of thinking that you put the pieces together that will add up to a whole, I think you have to start with the premise that they're already all together and you try to keep them from destroying life by segmenting it, overorganizing it and dehumanizing it. (p. 130)

The Case for a Holistic Curriculum

It's a beautiful sunny day in May and I'm sitting on the lawn behind my high school eating lunch. In just three weeks I will be graduating. I don't realize how much my life is about to change. Today, however am I completely focused in the moment. I walk away from the noisy crowd of students to sit alone by a creek. I lie down on the grass and close my eyes, feeling the warmth of the sun and the gentle breezes. I listen to the flow of the stream and the chirping of birds. Suddenly I experience a sensation of connectedness to everything around me, a complete feeling of wellbeing, what some would call a spiritual moment. I write:

The world is mine today
the sun, the sky, the river,
and the trees
all a part of me. . . .
i listen to the chirping of the birds
and the flowing of the river and i
no longer need words to feel complete.

This sensation of wholeness, of being one with the universe was completely paradoxical to what I'd experienced in school with its focus on discrete disciplines, mandated curricula, standardized and non-standardized testing. Even today, educational programs are out of balance. Miller (2006, 2007) in his argument for a holistic way of learning describes the fragmentation of our society. We pollute our earth because we see ourselves as separate from nature. Busy lifestyles often cut us off from community and even our own families. We disconnect our heads from our hearts and our bodies. Our educational systems are fragmented by dividing knowledge into discreet units and lesson plans. We overemphasize the rational and cognitive and focus primarily on mastering technique to the exclusion of the imaginal, intuitive and communal forms of knowing. Miller (2007) calls for a holistic curriculum that "attempts to bring education into alignment with the fundamental realities of nature." (p. 3) He goes on to say that "the rational mind, which focuses on analysis, cannot fully grasp the wholeness of existence." (p. 20) He advocates the cultivation of our intuitive sensibilities to support a more holistic way of learning.

Holistic education can also be viewed from a critical perspective. Traditional education sometimes perpetuates racism and sexism, what Freire (1970) called the *Pedagogy of the Oppressed*. Holistic models which honor multiple voices and multiple cultural perspectives can disrupt this cycle.

Cranton (2008) believes that our traditional systems of education with their institutional requirements for behavioral objectives, structured syllabi and grading policies "stifles, oppresses and suffocates the soul." (p. 127) She does turn this rather depressing imagery around as she believes the "soul is resilient" (p. 125) and meaningful teaching can emerge through the inclusion of creative and arts-based teaching practices.

Collister (2010) dedicates his book *A Journey in Search of Wholeness and Meaning*, to those who have been marginalized by mainstream education. He uses the word marginalization to include anyone who has experienced a disconnection with the dominant ideology and advocates for an earth-based, holistic education that is practiced in Eastern and indigenous cultural traditions. Slattery (2006) also noted that "Curriculum development programs in the past have tended to ignore issues of race, gender and ethnicity because curriculum was seen as something that reflected an objectively knowable structure that existed 'out there' ….simply waiting to be discovered and memorized." (p. 178) He advocates a post-modern philosophy of curriculum development that disrupts master narratives of "disembodied learning, homogenized curriculum guides and disconnected objective goals" (p. 178). There is no such thing as a one size fits all curriculum. Even a curriculum that uses creative educational strategies cannot be assumed to fit all learners at all times. The cultural orientation of the learners as well as their individual learning styles needs to be considered.

A Sense of Place and Space

A holistic curriculum does not only address what type of education takes place; it is also concerned with the where of education. The physical environment plays a large role in the learning experience. Interior buildings without natural light or with harsh fluorescent lighting can have a negative effect on the quality of the experience. Extremes of hot or cold distract the learners and often diminish their experience.

Furthermore, holistic education considers the individual in relationship to the world in which he or she resides. Therefore, as Collister, (2010, p. 75) proclaims:

It is impossible to separate the person from their environment . . . One cannot consider the individual without considering the relationships that the individual has with the earth. and ultimately the affect those relationships have on the balance and harmony of the universe.

Holistic learning includes a variety of learning activities including those that are experiential and embodied. Therefore it is important to have moveable furniture and enough space to move chairs and tables into a variety of configurations or even off to the side into order to allow room for movement. Some holistic learning activities work best outside of the classroom where field trips or observing nature serve to enhance the learning process. The growing emphasis on service learning, for example places learners outside of the classroom walls and into the community.

Circle Consciousness

In the 1980's I taught non-credit courses for a local community college. The classes were held evenings in various high school buildings. The first thing I did was to rearrange the chairs from rows facing a teacher's desk at the front to the room to a circle. I wanted my classes to be interactive and it is difficult for students to talk to one another if they are looking at the backs of each other's heads.

Christina Baldwin (1994) teaches a form of circle consciousness as a way of creating shared community in organizations. The circle is actually an ancient tradition where people gathered around fires to keep warm and share stories. Baldwin's circles are founded upon shared leadership, mutual responsibility and spirituality. In holistic classrooms students often sit in a circle. The teacher sits around the circle with the students, not separate or apart. Sherman Stanage, one of my doctoral professors for example would sit on the circle, but always off center to the front of the room to signify that he was a co-learner with the students. The idea of the circle goes beyond the physical arrangement of furniture however. In a circle, all voices are equally valid and everyone contributes to the whole. The space inside the circle is open for shared knowledge to enter and change form as all ideas are considered. In my classes, I introduce Baldwin's concept of "holding up the rim" (1994, p. 234). We hold up the rim for each other when someone is struggling or needs help from the community.

Regnier (1992) cited in Slattery (2006, p. 218) discussed applications for the "sacred circle" which come from Canadian Native traditions. The sacred circle includes the "physical, emotional, spiritual, and intellectual dimensions of personal development. Through this model, students are encouraged to view themselves as a whole person who can become self-determining."

Brookfield (1995) uses the example of the circle as a taken for granted assumption of good democratic teaching. Critically reflecting on this assumption, we realize that the circle can actually be oppressive for some students who feel vulnerable and exposed in this environment. It may also go against certain cultural norms for some students such as the Columbian student I had, who was self-conscious about his English. He was quite uncomfortable in the circle. Similarly, Palmer (2004) cautions that some circles may be unsafe. A community of trust needs to be established where disclosure is invited but not mandated.

While physical circles may not be appropriate for all groups at all times, the circle, as a symbol of a perfect whole with no beginning and no end can be seen as a metaphor for a holistic curriculum that honors the whole person and all learning domains. A holistic curriculum is neither fixed nor static. It is a dynamic space that is open to change and being changed over and over again. The participants in the circle are responsible for the well being of the whole.

Synergistic Wholes

A common understanding of the word "synergy" is the whole is greater than the sum of its parts. Therefore it seems quite paradoxical to break up a discussion of holistic educational curriculum into its component parts. This text however is linear so in order to understand the parts, this section will discuss each component individually. The reader is then invited to tear out each section and braid them together like strands of DNA. As cognitive learning is already privileged in mainstream education, it will not be the focus of this discussion. Spiritual, affective and embodied knowledge will be discussed as well as lessons from indigenous traditions from Native America and Africa which both include Earth-based dimensions.

Encountering the Sacred

It is my second trip to New Mexico and I am visiting a small shrine in the Sangre de Cristo Mountains northeast of Santa Fe called " El Santuario de Chimayo." The church, which was built in 1814, is known as "Lourdes of America" and is a place where people come for miracle healings. I am not Catholic and quite skeptical that the blind can suddenly have their sight restored or that people in wheelchairs leave on foot from this sacred place. Nonetheless, it is a beautiful old building in lovely rural mountain town so I decide to visit. I am immediately taken by the architecture of the beautiful adobe church and begin taking lots of photos. As soon as I enter the building however, I feel something shift in me. I feel a deep sense of reverence and awe. My whole body is tingling and I am close to tears. I did not expect to have this reaction. As I take in the candles and religious artifacts, I instinctively put my camera away. Though photos are allowed it feels wrong, almost sacrilegious. I walk slowly through the building continuing to feel this profound sense of awe. The depth of my response surprises me. I knew this was a sacred place but did not know it would feel sacred to me in this way.

The sacred or spirituality in teaching takes on many forms and is described in many ways including presence, inspiration, and awe, and is practiced through ritual, meditation and connections with the unconscious. O'Sullivan (2005, p. 76) declared, "If humans are going to survive on this planet, we need new connections to each other and to the natural world." He believes that we are in need of radical transformation and that education must be reformed into order for this to happen. He further explains that transformation comes about "as a result of depth encounters with the sacred." (p. 69)

Presence: Senge, Scharmer, Jaworski and Flowers (2004) discuss organizational change through presence or the art of being present. Influenced by the Buddhist concept of non-attachment they talk about "letting go and letting come" p. 98. In order for new energy and new learning to occur we must let go of our assumptions about what we think we know and surrender control of the outcome. This act of "presencing" (p. 104) opens a door to the mysterious and unexpected.

Kornelsen (2006) explored teaching with presence that he describes as a teacher allowing the students to see him or herself as an authentic human being by sharing personal stories and not hiding behind a façade. Being present is also about learning to live with ambiguity and chaos without the need to control it. In our classes, we use the mantra "trust the process." The students gradually accept that it is okay not to know everything at once and that if they practice patience the process will unfold. Hart (2000, p. 147) describes trust as "faith in nonrational postreflective ways of knowing" that "builds a bridge between the known and the unknown and then allows us to temporarily cross into this other world where inspiration exists." Kornelsen (2006) suggests that the teacher must also trust the process. In a holistic classroom this may mean letting go of a pre-planned agenda and being spontaneous in order to allow for more meaningful or inspirational learning to occur.

Inspiration: Hart (2000, p. 33) describes inspiration as "the poet in the process of learning, the prophet beholding the voice of God, the artist hearing the Muse, and the 'ordinary' person becoming only for a moment, extraordinary." Inspiration often comes unexpectedly where one feels a deep sense of connectedness to self and the transcendent other such as in my experience at the Sanctuaro. There is a heightened awareness or a shift in consciousness where one is more open to learning from unexpected sources. This is an embodied, spiritual experience that cannot adequately be expressed in words. According to Kates (2005, p. 201) "The soul speaks to us through intuition and inspiration." Hart (2000) suggests that inspiration may be an opening in our conscious awareness to knowledge that existed all along but had been hidden from us.

Holistic educators can engender inspirational learning by giving space and attention to what Tisdell (2003) called "shimmering moments" or ahas when the learners suddenly make connections to the content in deep and meaningful ways. According to Hart (2000, p. 49) "An inspiration comes to fruition when it is embodied." This often happens through creative and artistic process such as painting, poetry, or music that taps into extrarational ways of knowing. These inspirational learning activities are discussed in detail later in this chapter.

A.W.E: Educator and theologian Matthew Fox (2006) believes our educational systems are in crisis and even more so, our existence as a species is endangered. He advocates a form of pedagogy called Ancestral Wisdom Education or teaching with awe. "Awe opens the door in our souls, our hearts and minds. Awe is bigger than we are-like the sacred is bigger than we are and so it pulls us out of ourselves, it touches on transcendence." (p. 51) Fox believes there is much to learn from the wisdom of our ancestors, in particular their stories of overcoming racial, gender and religious oppression. He suggests that perhaps starting with developing curriculum is the wrong approach. We need to first get to know our learners, motivate them and then develop curriculum later. We need to reinvent education by teaching compassion, justice and sustainability and *refiring* passion and awe through ceremony, celebration and ritual.

The word "awesome" is so overused these days as to be rendered meaningless. What if we were to reclaim the word awesome and provide education that is truly awe inspiring and filled with mystery? "We can plan the curriculum, study the course, pursue the best teacher or the most suitable college, but often our most profound engagement with knowledge is mystery" (Snowber, 2005, p. 218)

Miller (2005) believes that the spiritual element must be attended to in a holistic curriculum. While progressive and humanistic approaches to education attempt to be holistic, according to Miller they lack this spiritual connection. In the same volume, Kates (2005) talks about creativity in the classroom as soul work. "We express our soul's knowing through aesthetic processes: writing, painting, music, dance and other expressive arts." (p. 198)

Spiritual Practices

It is possible to bring spiritual practices into the curriculum without labeling them as such. Tolliver and Tisdell (2006) suggest designing learning activities that foster openness and authenticity and engage multiple ways of knowing. Ritual and symbol are ways of engaging the spirit. This section looks at meditation, centering and dreamwork as ways to bring spirit into the holistic classroom.

Meditation: Some educators (Nozawa, 2005; Denton, 2005; Miller, 2000; Fox, 2006; Tisdell, 2000) use meditation in their classroom as a holistic and spiritual practice. Meditation is a way of slowing down and bringing awareness into the present moment. This practice can be especially useful with learners who come to class after a stressful day of work or family responsibilities. It helps them to settle in and gradually let go of the day's events. Nozawa (2005, p. 226) describes meditation as "a radical openness in which the individual does not try to control what is happening." "Through meditation we can bring more attention to the experience of our being interconnected with the whole." (p. 224) While meditation is traditionally seen as sitting quietly with eyes closed it can also be experienced through walking, body movement and through certain forms of artwork. One of my colleagues turns off the lights and has a candle burning when his students enter the classroom. He plays quiet flute music as they get settled and transition into the classroom environment. (C. Mealman, personal conversation, August 2013).

Centering: Lawrence and Dirkx (2010) described centering as a process of helping students leave behind the busyness of their lives and bring their focus into the classroom. Guided meditation or visualization is one form of centering. Other forms include looking at a piece of art, listening to music or reading poetry and then reflecting on the meaning it has for the students. Centering activities are holistic because they engage the learners' heart, body, mind and especially their spirit. They create a bridge between the learner and the learning activities so they are usually connected to the course content. For example, in a class on transformative learning I might bring in a film clip from Alice in Wonderland where Alice who has shrunk to three inches tall encounters the caterpillar. This leads to a discussion of the kinds of disorientation people often feel during transformative moments.

Centering is especially effective in online classes where learners don't have the benefit of a shared physical environment to help them focus. I post the images or poems and ask for their impressions. Sometime the students are asked to bring something to the centering process. For example they might post lyrics to a song or describe or post images of a particular artifact that is meaningful to them.

Dreamwork and the Unconscious: Holistic learning includes learning that comes from unexpected sources including our unconscious. Unconscious knowledge often surfaces in symbolic ways through our dreams. Dreamwork however is rarely considered in educational curriculums because dreams are not taken seriously or seen as meaningful or because teachers do not feel qualified to work with dreams (Miller, 2000). Dreams are a way of bringing our unconscious knowledge to the surface so we can take a look at it. As dreams are expressed in symbol and metaphor the knowledge is not immediately obvious. "As the mind explores the symbol it is lead to ideas that lie beyond the grasp of reason." (Jung, 1964, p. 4) Delving into the meaning of dreams in groups can help us look deeper into the meaning of messages embedded in our dreams and use them for learning.

In indigenous cultures dreams are considered an important source of knowledge that may not be able to be accessed in other ways. "Denying the spiritual and psychological importance of dreaming, and not honoring its place in the educative process, leads to stunting an elemental process of human learning." (Cajete, 1994, p. 144)

Lawrence (2009) described dreamwork as a process of working with our intuitive knowledge. In dreams there are no filters or judgments so ideas we might dismiss as silly or irrelevant in our waking life have a chance to break through. If we pay attention to this knowledge it can be a valuable source of learning. Furthermore, "When we take seriously the responsibility of developing a more conscious relationship with the unconscious dimensions of our being, we enter into a profoundly transformative, life-changing process." (Dirkx, 2006, p. 19)

Pedagogy of the Heart

Emotions exist. No matter how hard we try to keep the curriculum on a strictly intellectual level, students are continually having emotional reactions as they engage with the material. Dirkx (2006) believes that rather than ignore the emotions we can use them as an educational tool as emotions often "give voice to unconscious personal meaning of their learning experiences" (p. 16). He suggests that we can use the language of imagination to understand and work with our emotions. We can also design a curriculum that intentionally engages the affective domain.

A curriculum that is holistic engages the heart of the student. We tend to retain knowledge more readily when it taps into our emotions. Denton (2005) describes a "pedagogy of compassion." She often shares personal stories from her own experience to encourage students to open their hearts. She uses meditation, poetic symbolism, image and metaphor to help students to access their heart center.

As emotions are often difficult to express in words, a variety of artistic process can be woven into a curriculum to engage the affective domain. These processes which will be discussed later in this chapter, include the student as witness such as watching a dramatic performance or looking at artwork as well as experiential activities that involve the students in the creation of art such as painting, drawing, poetry writing or improvisational theatre.

Embodied Learning

As the holistic curriculum engages our heart and spirit, it also engages our body. In most of my formal school experience, my only awareness of my body came from the backaches I got from sitting all day in uncomfortable chairs. However, as Collister (2010, p. 83) reminds us:

"Holistic ways of knowing are embodied. They are rooted in the *experience of Doing*. *Doing* allows a sensual experience rather than an intellectual one." As previously discussed (Lawrence, 2012) bodies hold knowledge and wisdom that may not be part of our conscious awareness. Facilitating embodied activities in the classroom can be a way to surface this knowledge.

Holistic embodied learning often takes place outside of the classroom walls. In the first semester of our doctoral program we take our students through a one day course at Outdoor Wisconsin Leadership School (OWLS). The course consists of a series of physical challenges that promote team building for students who are part of a three year cohort group. In the morning, the activities focus on group decision making and cooperation such as getting adults of various ages, shapes and sizes through the holes of a giant spider web made of ropes without touching the rope. In the afternoon, we climb to a 40 foot high ropes course where there are a number of obstacles that challenge us physically, emotionally and mentally. While we are hooked into harnesses and supported by a belay team, for many, the experience seems fearful and overwhelming. Nevertheless, most complete the course, which culminates in a zip line to the ground. What results is an embodied experience that stays with the students throughout their program. Later when the thought of completing a dissertation seems daunting, they remember their ropes experience, or rather their body remembers it and they realize that this is just another obstacle and they have the wherewithal to do it. As in any embodied experience, the learning is in the processing and reflection on the experience. Howden (2012, p.50) suggests that groups who have participated in this shared experience answer three questions. "What?" (What occurred), "So What?" (What does it mean?) and "Now what?" (How can they connect what they learned to future situations).

Embodied learning can also enter the curriculum in the form of dance or theatre improvisation. Snowber (2012) believes that dance is our "birthright." (p. 53) Babies dance in the womb and small children dance spontaneously all of the time. We learn to suppress this natural urge as we are made to learn sitting down. In bringing dance into educational settings we recover "a visceral language that has the capacity to connect body, mind, heart and soul, and imaginative thinking." (p. 54)

Sometimes just getting up and moving can deepen our conceptual leaning. For example, in one class we were looking at the intersections of privilege and oppression. A racially and ethnically diverse group of students were asked to stand up and take a position on an invisible line across the room. The right side of the room represented privilege and the left side, oppression. As I called out different identifiers such as race, religion, gender, age, sexual orientation, education etc. people moved to different places along the line. Not only could we literally see that everyone was privileged and oppressed in different ways; we felt it in our bodies. A particularly poignant moment was when considering religious privilege and oppression; the one Muslim student in class took a position outside the door. A lively discussion followed that was not soon forgotten.

Lessons from Indigenous Traditions

While western education relies primarily on rational/cognitive ways of knowing, indigenous cultures are more naturally holistic as education is not seen as separate from life.

This section discusses holistic education from traditional African and Native American cultural perspectives.

Learning from Traditional African Education

According to Omolewa (2007) traditional African education "is based on practical common sense, on teachings and experience and is holistic- it cannot be compartmentalized and cannot be separated from the people who are involved in it because essentially it is a way of life." (p. 596) Omolewa goes on to describe how in a holistic learning approach "the learner is liberated from the authoritarianism of the teacher, the curriculum and the institution. The learner, through this approach is free to develop self-discipline, engage in self-directed learning and self-fulfillment." (p. 606) In African traditions, knowledge is connected to the culture of the people, religion, myths and folklore as well as practical experience and is stored in their memories and the memories of ancestors. Africans rely heavily on oral traditions and knowledge is often transmitted through stories, music dance, and ritual. (Omolewa, 2007) For example, many Africans believe in the power of myths to help them understand their history and culture and how things came into being. "Myths serve as a language depicting truths or realities for which history does not provide a full explanation." (p. 599)

The Afrocentric learning paradigm (Asante, 1987) has relevance here. Asante felt the need for teaching Africans in a way that was consistent with African identity and values in order to preserve a culture that was becoming increasingly marginalized. Botswana educator Ntseane (2011) believes that education should be "culturally sensitive" (p. 307) informed by the Afrocentric values of spirituality, a collective worldview and community empowerment. Spirituality for Africans includes the interconnectedness of all things including animals and ancestral spirits. A collective worldview means that knowledge is seen as residing in the community rather than the individual therefore community participation in decision making is crucial. Community empowerment refers to social change, which comes from knowledge sharing through "the myths, stories and proverbs that bind them and others as a people." (Ntseane, 2011, p. 318)

Curriculum developers and educators can learn a lot from these traditions. Omolewa (2007) stresses the importance of starting with "local knowledge" (p. 606) or what the students already know. Connecting new knowledge to current experiential knowledge has traditionally been a part of informal adult education (Horton, 1990) but less so in the formal classroom. Omolewa (2007) also advocates the use of indigenous stories as an educational strategy. Community elders may be invited in as storytellers and educators. Stories may be told in performative ways through music, and dance

Learning from Native Indian Traditions

Many of the characteristics of indigenous wisdom from Native Indians are similar to those of African traditions including interconnectedness with nature and the ancestors, the infusion of spirituality into everything, collectivism as a way of life, the use of ritual and ceremony and the transmission of knowledge through storytelling and the arts. (Collister, 2010; Orr, 2000; Cajete, 1994).

When I first discovered Cajete's (1994) inspirational book *Look to the Mountain: An Ecology of Indigenous Education* I thought he was speaking directly to me. Cajete critiques mainstream American education was being too focused on objectivity as the dominant paradigm to the exclusion of "relational reality" (p. 20) so ingrained in Indian cultures. He describes a holistic, relational educational process that includes "communal relationships, artistic and mythical dimensions, ritual and ceremony, sacred ecology, psychological and spiritual orientations" (p. 20) of an indigenous culture. According to Deloria (1999) this holistic way of learning cannot coexist with more linear forms of thinking.

The Lakota have a saying *Mitakuye Oyasin* that translates to "all my relations." A nature-centered philosophy underlies indigenous education, as living in harmony and balance with all of earth's creatures and nonliving entities is considered crucial. Learning takes place through careful observation of the plant and animal world and applying this knowledge to life. This Earth-centered view of education is echoed by Miller (2000) who recognizes the interdependence of all of life and the need for an ecologically conscious curriculum which focuses on environmental sustainability.

Cajete (1994) believes that education is about learning to become fully human. This is a spiritual journey. "Indigenous education at its innermost core is education about the life and nature of the spirit that moves us. Spirituality evolves from exploring and coming to know and experience the nature of the living energy moving in each of us." (p. 42) Learning also occurs through tapping into the wisdom of ancestors.

Art making is central to indigenous education. In indigenous tradition there is no separation between artists and non-artists as everyone engages in some form of the arts. Art is considered to be "an expression of life. . . Art is a way of seeing, of being, and of becoming." (Cajete, 1994, p.153) The arts are also a part of the ceremonies and rituals that characterize the native people such as the creation of artifacts or talisman used in religious ceremonies, however it is the process of creating art rather than the product that is important. Much learning occurs through the transformation of raw materials into something tangible. The origin of the materials is also important. For example, creating a traditional drum involves making a wooden frame and stretching an animal skin, usually a deer across the frame. The spirits of the animal and the tree that were sacrificed to make the drum are honored.

Cajete (1994) offers 23 axioms for indigenous learning, most of which are applicable to all learning situations. Among these are paying attention to the natural world, learning by doing (experiential learning), examining taken for granted assumptions, incorporating ritual and the arts into the teaching/learning environment and the use of storytelling. Orr (2000) adds educational strategies such as interviewing elders to learn traditional native wisdom, story circles and the use of the talking stick. I've used the talking stick in my classes at times when the topic was particularly sensitive or when certain individuals tended to be dominating class discussions. We sit in a circle without tables in front of us so it is not possible to be distracted by the temptation of wireless Internet. We pass around a stick, stone or some other object and only the person who holds the talking piece is allowed to speak. One chooses to speak or passes to the next person. The result is to slow down the conversation and learn to really listen. It often puts students in a reflective mode "allowing wisdom to approach rather than seeking answers to self-generated questions." (Deloria, 1999, p. 130) Clearly, holistic ways of learning are not new as indigenous cultures have been practicing them for centuries. Today's students at all levels can benefit by these holistic practices.

Creativity, Imagination, and the Mythopoetic

A holistic curriculum depends on creativity and imagination. In this section we look into the world of imagination as well as the mythopoetic.

Imagination

Willis (2008) drawing on Hillman, described the imaginal as imagining oneself in a new role "Imaginistic processes refers to way in which people become aware of images in their psych that carry great meaning for them"(Willis, 2008, p. 247)

Maxine Greene is well known for her work on the role of the arts and imagination in education. Her book *Releasing the Imagination* (1995) with chapter titles such as *Creating Possibilities*, *Imagination, Breakthroughs and the Unexpected, and Social Vision and the Dance of Life,* speaks to the power of creating change through imagining what could be different. According to Greene (p. 14) "teaching and learning are matters of breaking through barriers- of expectation, of boredom, of predefinition." For Greene, imagination is a way to move us from complacency to action, from hopelessness to hope. Through imagination on the part of both the teachers and learners, the curriculum can shift from one of cultural reproduction and knowledge transmission to one that is meaningful and relevant to the learners' needs. The arts are a powerful tool in an imaginative holistic curriculum. Harrell (2011) for example uses provocative images and poetry to explore social issues like racism and poverty with her students.

Mythopoesis

Curriculum theorist Macdonald (1981), drawing on philosopher Paul Ricouer's notion of *mythopoetic imagination* identified this as a third methodology useful in curriculum development along with science (technical /rational) and critical theory (emancipatory). Macdonald defined mytho-poetic imagination as "the use of insight, visualization and imagination . . . It is a search for meaning and a sense of unity and well-being." (p. 134) These ideas are further developed by Leonard and Willis and their colleagues in the book *Pedagogies of the Imagination* (2008). Davison (2008, p. 53) uses the term "productive confusion" suggesting that letting go of the science of predictability and certainty and living in the chaos opens us up to new create possibilities. "

To have wisdom in teaching is also to develop and to transfer an imaginal capacity for social and personal transformation. This is a mythopoetic capacity, a mobilization of mythic energy that sustains and communicates creative judgment, empathetic perception and moral inquiry (Davison, 2008, p. 59)

Dirkx (2008) stresses the value of the mythopoetic perspective in working with students who are often engaged in "self-formation" or "soul work." "Soul work represents a hard, emotional, messy, uncertain, ambiguous, and ill-structured process, with no pat strategies, methods of specific models to guide the way" (p. 66) Mythopoetic imagination offers an alternative to developing curriculum when the learning cannot be quantified or objectified which I would argue is most of our learning.

Prosser (2008) argues for a holistic or mythopoetic way of teaching from a critical theory perspective. Critical pedagogy, which disrupts dominant ideologies of how power is distributed and used, is often described through a political lens, as a rational process. Yet, these power struggles are often highly emotional and need to be addressed through affective and embodied processes. "If critical theory is to reinvigorate and redesign pedagogy, it must consider how the complex person can empower that reform through head, heart and hands." (p. 220)

So what would a mythopoetic curriculum look like? Willis (2008) suggests engaging in expressive processes that help learners to vicariously experience other ways of being through fiction and film and poetry. This is followed by a reflective process because "ruminative time is needed for the mythopoetic process to grow and deepen" (p. 261). The following sections elaborate on some of these expressive processes.

Artful Learning

By now you've discovered that the arts are an essential tool in a holistic curriculum. The arts engage our minds, our bodies, our hearts, our spirits and our imagination. They are an integral part of indigenous traditions. Yet, the arts still remain on the margins of most educational programs (Lawrence, 2005). Art and music are taught as discrete courses and are the first to be cut when budgets are tight. In a holistic curriculum that is multidisciplinary, the arts are infused throughout the coursework. Slattery, (2006, p. 243) described a "postmodern curriculum" where the arts or aesthetic are "the heart and soul of teaching, pedagogy and human growth." Similarly, Fox (2006, p. 112) sees the arts as central to the curriculum for all students. For Fox, it is as much about the student creating art, as it is about what happens to the artist in the process.

Entering into the relationship between colour, canvas, light, and the painter; between clay and the sculptor; between the body and the dancer; . . . all of this is an essential part of an awe-based educational curriculum, one what will culminate in wisdom.

The arts can help us to see, understand and make sense of our own experience (Greene, 1995).

As Jelaluddin Rumi- 13th century mystic poet understood, there are times when words are just not adequate to express what we know.

Out beyond ideas of wrongdoing
and rightdoing there is a field.

I'll meet you there.
When the soul lies down in that grass
the world is too full to talk about.
Ideas, language and even the phrase each other
Doesn't make any sense"

As Collister (2010, p. 79) relates: "The use of aesthetics, recognizes the holarchical nature of all existence, connecting the whole person with their community, their place, the Earth, and the universe through embodiment, spirituality, and cosmology." Davis-Manigaulte, Yorks and Kasl (2006, p. 27) use the term "expressive ways of knowing" to describe holistic learning that taps into the learners' intuition and imagination. They discuss how the use of artwork and ritual in the classroom helps groups to become more cohesive. As students share their creative work and their stories other students are able to make connections to their own experiences that may not have otherwise surfaced.

Many educators are reluctant to use these expressive forms in their classrooms as they feel uncomfortable and unnatural (Lawrence, 2005). For some learners, engaging in art is risky business. They learned at a young age that art was reserved for those with special talents. Davis-Manigaulte, Yorks, and Kasl (2006) stress the importance of the educator participating in the holistic learning activities along with the students. This not only allows the teacher to empathize with the students, it provides opportunities for transformation for both the learner and educator.

Selkrig and Bottrell (2009) developed an arts-based curriculum for pre-service teachers in Australia. They strongly emphasize the need for teachers to "get their hands dirty" (p. 400) and model artmaking for their students. Selkrig and Bottrell also recognized the uneasiness that many of their students initially feel when they are asked to engage in artistic activities. They guide them through some less risky collective projects at the beginning of the program, followed by a reflective session where they acknowledge and confront their discomfort. I've found that sometimes just recognizing that students may be uncomfortable with engaging in art activities and allowing them to voice their feelings breaks down barriers where they become more open to trying these different forms of expression. In the rest of this section, I provide examples of ways in which the arts can be infused into the curriculum including, theatre, poetry, photography, storytelling, fiction and film, and the visual arts.

Theatre

Theatre can enter into the curriculum in many ways including role-playing, improvisation, reader's theatre and popular theatre. Theatre engages multiple learning domains, especially the affective and embodied dimensions or as Elm and Taylor (2010, p. 129) refer to as "gut –level learning." Elm and Taylor experimented with performing plays at management conferences that presented the audience with controversial or ethical issues in business. A discussion of the issues followed. The audience had emotional and visceral reactions to the issues that may not have surfaced if they just read or heard about them through a lecture and they engaged in a lively and productive dialogue.

Cueva (2007) used reader's theatre as part of a cancer education program with Alaska Natives. Participants read written scripts out loud where fictional characters discussed their experiences dealing with cancer. She found that just the act of saying the words out loud were freeing as talking about the illness directly had been a taboo subject in the village.

Meyer (2010) has been working to transform the workplace to a "playspace." She facilitates improvisational activities in the classroom and in the workplace that could include anything from making people aware of where they hold the tension in their bodies to acting out potential solutions to organizational problems. These types of activities engage one's whole self in the learning process, which enhances creativity.

I involve students in exercises from Augusto Boal's *Theatre of the Oppressed* (1992), inviting them to get into their bodies to better understand the concept of oppression. For example, after a series of warm-up activities to get people comfortable with their bodies, I might ask them to think of a time when they were made to feel oppressed, misunderstood or treated poorly by others and then to feel that oppression in their bodies and strike a pose that depicts that moment. As we look around at one another we can see the pain reflected our bodies. This activity often opens up channels to begin to discuss what had been undiscussable. We can also act out alternatives to accepting the oppressive behavior in our bodies, which can be quite liberating. As one might imagine, activities like these may bring up strong emotions. Dirkx (2001, p. 66) views emotions as "messengers of the soul." Emotions connect the self with the outer world and can lead to profound shifts in our awareness by making the unconscious conscious which according to Dirkx can lead to transformative learning.

In a previous publication (Butterwick & Lawrence, 2009) we shared examples of using popular theatre to share stories of uncomfortable situations such as racism and gay bashing. Embodying the stories gave people a language of expression when words were just too painful. Forum theatre (Boal, 1992) is another approach that works well in the curriculum. In forum theatre the audience is referred to as "spect-actors" as there is no separation between actors and audience. The "actors" improvise a scenario that is troubling or problematic and try to work out solutions. At anytime, an audience member can yell "stop" and replace the protagonist (oppressed) and try out different strategies until a resolution is reached.

Poetry

The reading of poetry can be can be an exciting way for learners to engage in and make sense of what they are learning as Wright et al. (2010) discovered. As Sullivan (Lawrence & Sullivan, 2005) suggests, the "reader enters that lived experience and arrives at an understanding that is potentially both visceral and intellectual." The writing of poetry is yet another level of engagement. Sullivan uses poetic expression to help students learn about data gathering in research. She asks students to identity key life experiences and to make a list of "data" in their memory using their five senses. They tap into their visual memory to identify colors, textures and shapes. Their auditory memory surfaces sounds, their tactile memory brings up textures etc. They then take this data and write a poem. I've used a version of this activity in my classes where I also include emotional data. The depth of their poems created in a very short period of time is surprising and delightful. Poetry like other forms of creative writing "decompresses stored emotional experiences in order to make sense of them in new ways" (Kates, 2005, p. 198)

Photography

Photography is gaining popularity as a research technique through photo-voice where the researcher takes photographs as data, or photo-elicitation where research participants are asked to take photos. Photography also has a place in the holistic classroom. As we've heard, "a picture is worth a thousand words." We tell our stories through the subject matter we select. Armstrong (2005) uses a method called "autophotography" which blends photography with autobiography. He has his students take photos of their world and then critically reflect on the meaning of the images to them. The images are in shared in class and the group raises critical questions to help further elicit meaning from the images. Not only is the learning deepened for the individual sharing his or her images, the knowledge is social constructed by the entire group. According to Armstrong (2005, p. 42), "When stories of people's lives are delivered as art they are more powerful (life-changing) for the presenter as much as for the listener."

While some people use photography to document what is, the photograph, as an artifact is never neutral but rather an example of constructed reality. What is emphasized and what is omitted has a lot to say about the reality of the photographer. Parsons (2011) who uses photography as a class activity in teaching for social justice, asks his students to consider how the subject of their photograph constructs their view of the *other*. "The photographer must consider the constructedness of the photographic text *in relation to* the Other. The photographer must confront his or her own colonizing gaze." (p. 86)

The photos we create say a lot about who we are and how we see the world. Lawrence and Cranton (2009) use photography both literally and metaphorically to teach about how we can look at the world or ideas from multiple perspectives. Some examples include taking multiple photos of the same subject from different angles, viewing images from the perspective of a bird, mouse or ant, looking at reflections in water, windows or snow, or creating images to convey particular feelings. One exercise I have found particularly revealing is to ask students to remove the labels of things and only focus on lines or curves or particular shapes. For example, one might look at a park bench from the side and see the arcs and curves. When we normally look at a bench we tell ourselves that it is a bench and we don't really see its properties or how it might be different than other benches. This leads to a discussion of labels and stereotypes that prevent us from seeing the uniqueness of people. I also use photographic techniques in teaching beginning researchers how to be careful observers. We spend time (usually in an outdoor setting) looking at things through multiple lenses, from very close and detailed to further away where the context of the object is revealed. The hands-on, embodied experiential nature of photography often stays with the learner much longer than book learning.

Story

Stories and storytelling are an integral part of a holistic curriculum. I approach the teaching of adult development and learning through life history as my students are all adults who have gone through various developmental stages and learning process. Looking at one's own life experience in relationship to theoretical knowledge makes it real. They also learn from sharing their stories, as classes tend to be diverse in age, race, ethnicity and work experience.

As described above, stories are central to indigenous education and have a prominent place in informal adult education. Horton (1990) believed strongly in the power of adults' experiences. His mission was to show them that their experience had value and could help them in figuring out solutions to problems. As Collister (2010) noted, stories affect the spirit. "They engage our emotions and touch our souls" (p. 78) We tell our stories in many ways, orally, through artwork, poetry, drama and dance. As these ways of learning are discussed individually, I won't elaborate on them here.

Film and Fiction

In addition to telling our own stories, we can learn from the stories of others. Fictional characters depicted in novels and in film often help to draw out our own experiential learning. For example, in a master's class on adult learning I assigned *Dancing on the Edge of the Roof* by Sheila Williams. The main character, Juanita is a 42 year old African American woman living in Columbus, Ohio. She has a dead-end job as a nurse's aid, three adult "deadbeat" children who constantly make demands of her and a series of bad relationships with men. Juanita is also barely literate. One day she finds a box of old romance novels left behind by a patient. She teaches herself to read through these novels and literally runs away from her life, taking the first bus out of town. Throughout the book Juanita is confronted with a series of new and sometimes frightening experiences. All of the students can relate to Juanita's experience, if not from a personal level, they have had students like Juanita.

We can also learn from the experiences of others that may be very different from our own. When I was in the 9th grade I had a social studies teacher who decided to depart from the traditional curriculum that consisted of reading boring texts and spitting out dates and facts on a test. We read Dick Gregory's *Nigger* to learn about racism and Joseph Heller's *Catch 22* to better understand the atrocities of war. The rich discussions that accompanied the readings helped me to connect to the subject in ways the textbooks never could. Social studies shifted from my least favorite to my most favorite subject. Greene (1995, p. 98) echoes my sentiments about this experience:

It is not that I learned anything altogether new; moreover, I was made to see what I had not particularly wanted to see. But once seen, it moved me to summon energies as never before to create meanings, to effect connections, to bring some vital order into existence.

Cranton often uses novels in her classes. She believes that reading about fictional characters can be transformative for the reader as we see ourselves in these characters. "Stories promote transformative learning by help us to see and articulate our values, beliefs and experiences. They help us to question those values and imagine alternatives." (Cranton, 2009, p. 83) As Jarvis (2006) pointed out, reading a novel is not a universal experience for all readers. Meaning making happens as an interaction between the writer and reader so the meanings constructed by each reader may not be the same. This underscores the value of using the novels as part of the curriculum. Group discussion can bring out various meanings and new learning can be co-constructed.

Film, even more so than novels, draw us into the experience of the characters as the director bring us into their world through visualization, music and dialogue. We cannot assume however that merely having our learners view films will lead to learning. One has to be ready and willing to embrace these other worlds and at least consider what they have to say. According to Greene (1995, p. 101) "they [films] render worlds that are entered only when imagination is released and beholders are ready to lend these words their lives."

Related to film and fiction, Beyerbach (2011) invites her students to bring in examples from pop culture media that are disturbing. With the creation of You Tube we are now bombarded with these examples. She uses these media clips to examine how issues of power and oppression are perpetuated.

When selecting novels and films for a class it is important to select material that represents a variety of cultural perspectives. On the one hand it is important to be inclusive so that the stories are reflective of the population of the students. On the other hand we tend to get stuck in our own ethnocentric point of view so being exposed to very different perspectives can often shake us out of our comfort zone, opening us up to new ways of thinking and seeing the world. Inviting the students to choose novels and films helps to broaden the scope even more and is more indicative of participatory education.

Visual Arts

The visual arts engage mind, body, heart and spirit. In a holistic curriculum, one can tap into these various learning domains through both creating and witnessing art. One of my colleagues (C. Mealman, personal conversation, August 2013) likes to bring in paintings related to the subjects he is teaching. For example, in a class on adult development he might bring in a painting depicting women in different life stages. The painting becomes a catalyst for discussion as it provokes emotion and students share connections from prior experience.

Students might also engage in drawing, painting, sculpture or collage. Larsen (2007) gives her students a lump of clay and asks them to work with it with their eyes closed without attempting to create anything in particular. Without the visual connection, the students find that they are less judgmental about their own work and free to just allow themselves to create. Clay is also a playful activity many associate with childhood. Cueva, Kuhnley, and Cueva (2012) used clay in a cancer education program with Alaska natives. They used the clay to create images of cancer and cancer prevention. They also used it to express their immediate emotions. As cancer is a difficult subject to talk about, the clay created an outlet for expression and a catalyst for conversation. While cancer is difficult to talk about, HIV/AIDS is taboo in many communities. Collins (2012) reported on several educators who are using art activities, as a tool to reduce the stigma and prejudice around HIV/AIDS, opening up channels for healthy communication.

The above sections described just a few examples of how the arts can be used in a holistic curriculum. There are many more. See for example Chapter 9 in Hoggan, Simpson and Stuckey (2009). The possibilities are limited only by one's imagination.

Holistic Learning Objectives and Evaluation Strategies

In most institutions of higher learning there are norms and expectations for creating learning objectives, designing activities to meet those objectives and employing assessment tools to measure whether learning has taken place. Many schools are moving toward standardized syllabi and assessment measures regardless of the course content. In a holistic learning curriculum these traditional methods are largely irrelevant. What then is the holistic educator to do? We need new methods of evaluation that depart from behaviorism, competency based education, and one size fits all rubrics.

Kucukaydin and Cranton (2012) suggest that the very nature of adult education as a participatory process goes against the grain of traditional practices of lesson planning and grading policies. They argue that "good teaching" needs to be subversive, that is, resisting the dominant curriculum development processes and involving learners in co-developing the course. They further suggest that when teachers maintain absolute control over the curriculum they reproduce the dominant hegemonic power structures of society.

Objectives

Learning objectives are a fact of life in most institutions. Often objectives are the first items that are developed as part of a course design and must be scrutinized by curriculum committees even before the course becomes a part of the curriculum. Learning need not be quantifiable. Holistic learning objectives are concerned not only with what knowledge the learner will gain as a result of the course but can also be experiential, affective and even spiritual.

In a holistic classroom, learners are often involved in creating objectives for the course. Even when objectives must be created by the instructor to meet institutional requirements, these objectives do not have to be written in stone. I often ask the students to critique the objectives and modify them if necessary and to create new objectives that are relevant to what they want to learn.

Assessment

And what of assessment? A curriculum that is soulful, transformative and participatory is more difficult to assess. It cannot be measured in traditional ways. I have found it is helpful to give students choices in assignments. When students are given choices, completing an assignment is not seen as a necessary requirement to earn a grade but something that has meaning to them. When I was a doctoral student I took a course on critical pedagogy with Phyllis Cunningham. It was an accelerated course that met over a six week period during the summer. The course requirements were to read three books and write a critical review of each. After the first two book reviews I grew tired of writing papers and asked Phyllis if there were an alternative to completing the assignment. She asked me what I would suggest. As I learn best experientially I asked her if she could recommend someone who is an exemplary practitioner of critical pedagogy that I could observe in action. Phyllis introduced me to Susan House, a former welder who was doing workplace education. I was fascinated with Susan's hands-on methods of teaching basic skills to adults. Two decades later I cannot remember the names of the books we read for the course but I'll always remember what I learned from Susan.

I often encourage students to use artistic expression in completing assignments to demonstrate learning. I always offer several options including the option to create their own assignment, as creativity cannot be mandated. Those who are fearful of getting their hands into art materials may choose to read a novel or watch a film and analyze it according to the course content. I find it fascinating that students usually come up with alternatives that I could not think up in my wildest imagination. Students create quilts, jewelry and sculpture. They incorporate, music, dance and performance. For example, my doctoral students were asked to create a visual representation of how they were integrating research with theory and practice. One woman brought "research Barbie" which was a Barbie doll sitting on a lawn chair completely wrapped up in recording tape. She talked about how the doll represented the overwhelming feeling of getting wrapped up in the data while trying to sort it out and make sense. Another student brought in a box of Lincoln Logs. He explained that his way of meaning making was collaborative so he invited members of his cohort group to help construct something out of the Lincoln Logs and to add material of their own. A display formed and began to change shape over the course of the week as individuals added plastic animals, photos and natural artifacts.

The projects the students choose are often grounded in their culture or positionality. An African American student who had spent considerable time in Africa created performance art complete with drums, African artifacts, and call and response. A Polish student wrote a folk song and performed it in her native language. A Palestinian woman wrote a provocative poem about being racially profiled after 911 and a white gay man wrote a poem about the pain of living in two worlds and the conflicts about being in the closet as homophobic men made assumptions that he was one of them. These types of projects help us to hear students' voices in multi-modal ways (Sanford & Mimick, 2012)

Grading

Many teachers are reluctant to assign these creative expressions, as they are not sure how to evaluate them. How do you assign a grade to someone's creative work? I remember submitting some of my poetry as a high school junior in English class. The assignment was returned to me with a grade of B-. My sixteen year-old heart was crushed. I had shared my innermost feelings with a teacher and all they were worth was a B-! The anxiety around earning good grades often gets in the way of students pouring their whole selves into more holistically based assignments. I was advisor to a Master's student working on an independent inquiry project. I encouraged her to think about other ways of expression than writing a traditional research paper. This particular student chose to create a Website. In our advising session she kept asking me what I wanted her to do to get an "A." Finally I told her "you will get you're A. Now let's get down to the business of doing the work."

The removal of the pressure to earn a good grade was freeing to this student and she went on to do exemplary work.

Kucukaydin and Cranton (2012) insist on self-grading for their students as it shifts the power dynamic from the teacher to the learner. It is also freeing for the teacher. Who are we after all to tell as student that their journal, poetry or artwork is good, bad or worth a B-?

Holistic Learning and Criticality

As you can imagine, designing and facilitating holistic learning is not easy. The institutions in which many of us work are constrained by rules, requirements and standards for accountability. Furthermore, many students are so steeped in the hegemonic forces that govern most classrooms that they actively resist participation in curriculum decision making and learning activities that engage their creativity. Holistic education is not synonymous with criticality. Brookfield (2005) describes critical pedagogy as a democratic practice of challenging the dominant ideology, unmaking power relations, contesting hegemony and overcoming alienation. It is possible to teach in holistic and creative ways that are not particularly critical. It is also possible to teach in ways that are critical but not necessarily holistic, however as described by Prosser (2008) above, critical teaching cannot neglect the role of emotions and the body as we are always having affective and visceral responses to serious issues. This chapter described an approach to holistic education that challenged educators and learners to rethink education as a "Pedagogy of Hope" (Freire, 1992). Without hope and the ability to imagine a better world, what do we have left?

CONCLUSION AND FUTURE DIRECTIONS

This chapter looked at holistic models of curriculum that are artful, embodied, experiential, and attend to the heart and spirit of the learner. These methods (or actually non-methods) of developing curriculum can no longer rely on the ubiquitous behavioral objectives, technical rationality and standardized assessments that characterize most universities. To consider the future of curriculum development we must spiral back to the past. We need to look beyond liberal and vocational models of education and consider the needs of the whole learner. We also need to look beyond our North American and European ways of knowing and consider what can be learned from indigenous cultures that have viewed education as a holistic process from the beginning. Given the current situation of climate change and the deterioration of our natural resources we can no longer afford to educate human beings as if they were separate from the Earth.

In learning from the past we must also look back to Lindeman (1926, 1961, p. 7) who said "Authoritative teaching, examinations which preclude original thinking, rigid pedagogical formulae—all of these have no place in adult education." Lindeman believed there was no separation between learning and life. And life itself is holistic.

REFERENCES

Armstrong, K. B. (2005). Autophotography in adult education: Building creative communities for social justice and democratic education. In R. L. Lawrence (Ed.), *Artistic ways of knowing* (pp. 33–44). San Francisco: Jossey Bass. doi:10.1002/ace.187

Asante, M. K. (1987). *The Afrocentric idea*. Philadelphia: Temple University Press.

Baldwin, C. (1994). *Calling the circle*. Newberg, OR: Swan.Raven & Co.

Beyerbach, B. (2011). Social justice education through the arts. In B. Beyerbach & R. D. Davis (Eds.), *Activist art in social justice pedagogy* (pp. 1–14). New York: Peter Lang.

Boal, A. (1992). *Games for actors and non-actors*. London: Routledge.

Brookfield, S. D. (1995). *Becoming a critically reflective teacher*. San Francisco: Jossey Bass.

Brookfield, S. D. (2005). *The power of critical theory: Liberating adult learning and teaching*. San Francisco: Jossey Bass.

Butterwick, S., & Lawrence, R. L. (2009). Creating alternative realities: Arts-based approaches to transformative learning. In J. Mezirow & E. W. Taylor et al. (Eds.), *Transformative learning in practice* (pp. 35–45). San Francisco: Jossey-Bass.

Cajete, G. (1994). *Look to the mountain: An ecology of indigenous education*. Skyland, NC: Kivaki Press.

Collister, R. C. (2010). *A Journey in search of wholeness and meaning*. Bern: Peter Lang.

Cranton, P. (2008). The resilience of soul. In T. Leonard & P. Willis (Eds.), *Pedagogies of the imagination: Mythopoetic curriculum in educational practice* (pp. 125–136). Springer. doi:10.1007/978-1-4020-8350-1_9

Cranton, P. (2009). Transformative learning and social sustainability through fiction. In *Proceedings of the Eight International Transformative Learning Conference*. Hamilton, Bermuda: Academic Press.

Cueva, M. (2007). *Reader's theatre as cancer education: An organic inquiry in Alaska awakening possibilities in a living spiral of understanding*. (Unpublished dissertation). National Louis University, Chicago, IL.

Cueva, M., Kuhnley, R., & Cueva, K. (2012). Enhancing cancer education through the arts: Building connections with Alaska Native people, cultures and communities. *International Journal of Lifelong Education*, *31*(3), 341–357. doi:10.1080/02601370.2012.683615

Davis-Manigaulte. Yorks, & Kasl. (2006). Expressive ways of knowing and transformative learning. In E. W. Taylor (Ed.), Teaching for change: fostering transformative learning in the classroom (pp. 27-36). San Francisco: Jossey Bass.

Davison, A. (2008). Myth in the practice of reason: The production of education and productive confusion. In T. Leonard & P. Willis (Eds.), *Pedagogies of the imagination: Mythopoetic curriculum in educational practice* (pp. 53–64). Springer. doi:10.1007/978-1-4020-8350-1_4

Deloria, V. (1999). *For this land: Writings on religion in America*. New York: Routledge.

Denton, D. (2005). In the flame of the heart: Toward a pedagogy of compassion. In J. P. Miller, S. Karsten, D. Denton, D. Orr, & I. C. Kates (Eds.), *Holistic learning and spirituality in education* (pp. 181–192). New York: SUNY Press.

Dirkx, J. M. (2001). The power of feelings: Emotion, imagination and the construction of meaning in adult learning. In S. B. Merriam (Ed.), *The new update on adult learning theory* (pp. 63–72). San Francisco: Jossey Bass. doi:10.1002/ace.9

Dirkx, J. M. (2006). Engaging emotions in adult learning: A Jungian perspective on emotions and transformative learning. In E. W. Taylor (Ed.), *Teaching for change: Fostering transformative learning in the classroom* (pp. 15–26). San Francisco: Jossey Bass. doi:10.1002/ace.204

Dirkx, J. M. (2008). Care of the self: Mythopoetic dimensions of professional preparation and development. In T. Leonard & P. Willis (Eds.), *Pedagogies of the imagination: Mythopoetic curriculum in educational practice* (pp. 65–82). Springer. doi:10.1007/978-1-4020-8350-1_5

Elm, D. R., & Taylor, S. S. (2010). Representing wholeness: Learning via theatrical productions. *Journal of Management Inquiry*, *19*(2), 127–136. doi:10.1177/1056492609360407

Flake, C. L. (1993). *Holistic education: Principles, perspectives and practices*. Brandon, VT: Holistic Education Press.

Fox, M. (2006). *The A.W.E. project: Reinventing education, reinventing the human*. Kelowna, Canada: CopperHouse.

Freire, P. (1970). *Pedagogy of the oppressed*. New York: Continuum.

Freire, P. (1992). *Pedagogy of hope*. New York: Continuum.

Gardner, H. (2006). *Multiple intelligences: New horizons*. New York: Basic Books.

Greene, M. (1995). *Releasing the imagination*. San Francisco: Jossey Bass.

Harrell, M. (2011). Enlivening the curriculum through imagination. In B. Beyerbach & R. D. Davis (Eds.), *Activist art in social justice pedagogy* (pp. 62–69). New York: Peter Lang.

Hart, T. (2000). Inspiration as transpersonal knowing. In T. Hart, P. Nelson, & K. Puhakka (Eds.), *Transpersonal knowing* (pp. 31–54). New York: SUNY Press.

Heron, J. (1996). *Co-operative inquiry*. Thousand Oaks, CA: Sage.

Hoggan, C., Simpson, S., & Stuckey, H. (Eds.). (2009). *Creative expression in transformative learning*. Malabar, FL: Krieger.

Horton, M. (1990). *The long haul*. New York: Doubleday.

Howden, E. (2012). Outdoor experiential education: Learning through the body. In R. L. Lawrence (Ed.), *Bodies of knowledge: Embodied learning in adult education* (pp. 43–52). San Francisco: Jossey Bass. doi:10.1002/ace.20015

Jarvis, C. (2006). Using fiction for transformation. In E. W. Taylor (Ed.), *Teaching for change: Fostering transformative learning in the classroom* (pp. 69–78). San Francisco: Jossey Bass.

Jung, C. G. (1964). Approaching the unconscious. In C. G. Jung (Ed.), *Man and his symbols*. New York: Dell Publishing Company.

Kates, I. C. (2005). The creative journey: Personal creativity as soul work. In J. P. Miller, S. Karsten, D. Denton, D. Orr, & I. C. Kates (Eds.), *Holistic learning and spirituality in education* (pp. 193–206). New York: SUNY Press.

Kornelsen, L. (2006). Teaching with presence. In P. Cranton (Ed.), *Authenticity in teaching* (pp. 73–82). San Francisco: Jossey Bass.

Kucukaydin, I., & Cranton, P. (2012). Participatory learning in formal adult education contexts. *International Journal of Adult Vocational Education and Technology*, *3*(1), 1–13. doi:10.4018/javet.2012010101

Larsen, E. (2007). Creative art processes and transformative learning in adult classrooms. In *Proceedings of the Seventh International Transformative Learning Conference*. Albuquerque, NM: Academic Press.

Lawrence, R. L. (Ed.). (2005). *Artistic ways of knowing: Expanding opportunities for teaching and learning*. San Francisco: Jossey-Bass.

Lawrence, R. L. (2009). The other side of the mirror: Intuitive knowing, visual imagery and transformative learning. In C. Hoggan, S. Simpson, & H. Stuckey (Eds.), *Creative expression in transformative learning* (pp. 129–143). Malabar, FL: Krieger Publishing Company.

Lawrence, R. L. (Ed.). (2012). *Bodies of knowledge: Embodied learning in adult education*. San Francisco: Jossey-Bass.

Lawrence, R. L., & Cranton, P. (2009). What you see depends upon how you look: A photographic journey of transformative learning. *Journal of Transformative Education*, *7*(4), 312–331. doi:10.1177/1541344610392378

Lawrence, R. L., & Dirkx, J. M. (2010). Teaching with soul: Toward a spiritually responsive transformative pedagogy. In *Proceedings of the 29th Annual Midwest Research to Practice Conference*. East Lansing, MI: Academic Press.

Lawrence, R. L., & Sullivan, A. M. (2005). Poetic justice: Poetry and photography in graduate adult education research. In *Proceedings of the 24th Annual Midwest Research-to-Practice Conference in Adult, Continuing and Community Education*. Milwaukee, WI: Academic Press.

Leonard, T., & Willis, P. (Eds.). (2008). *Pedagogies of the imagination: Mythopoetic curriculum in educational practice*. Berlin: Springer. doi:10.1007/978-1-4020-8350-1

Lindeman, E. C. (1926). *The meaning of adult education*. New York: New Republic.

Macdonald, J. B. (1981). Theory-practice and the hermeneutic circle. *The Journal of Curriculum Theorizing*, *3*(2), 130–138.

Meyer, P. (2010). *From workplace to playspace: Innovating learning and changing through dynamic engagement*. San Francisco: Jossey Bass.

Miller, J. P. (2000). *Education and the soul: Toward a spiritual curriculum*. New York: SUNY Press.

Miller, J. P. (2005). Conclusion: Seeking wholeness. In J. P. Miller, S. Karsten, D. Denton, D. Orr, & I. C. Kates (Eds.), *Holistic learning and spirituality in education* (pp. 233–236). New York: SUNY Press.

Miller, J. P. (2006). *Educating for wisdom and compassion*. Thousand Oaks, CA: Sage.

Miller, J. P. (2007). *The holistic curriculum* (2nd ed.). Toronto: University of Toronto Press.

Nozawa, A. (2005). Flowing together in the rainbow: Experiences from two workshops on art making and meditation. In J. P. Miller, S. Karsten, D. Denton, D. Orr, & I. C. Kates (Eds.), *Holistic learning and spirituality in education* (pp. 223–232). New York: SUNY Press.

Ntseane, P. G. (2011). Culturally sensitive transformative learning: Incorporating the Afrocentric paradigm and African feminism. *Adult Education Quarterly*, *61*(4), 307–323. doi:10.1177/0741713610389781

O'Sullivan, E. (2005). Emancipatory hope: Transformative learning and the strange attractors. In J. P. Miller, S. Karsten, D. Denton, D. Orr, & I. C. Kates (Eds.), *Holistic learning and spirituality in education* (pp. 69–78). New York: SUNY Press.

Omolewa, M. (2007). Traditional African modes of education: Their relevance in the modern world. *International Review of Education*, *53*, 593–612. doi:10.1007/s11159-007-9060-1

Orr, J. A. (2000). Learning from native adult education. In L. English & M. Gillen (Eds.), *Addressing the spiritual dimensions of adult learning* (pp. 59–66). San Francisco: Jossey Bass.

Palmer, P. J. (2004). *A hidden wholeness: The Journey toward an undivided life*. San Francisco: Jossey Bass.

Parsons, D. (2011). Photography and social justice: Preservice teachers and the ocularized urban other. In B. Beyerback & R. D. Davis (Eds.), *Activist art in social justice pedagogy* (pp. 70–87). New York: Peter Lang.

Prosser, B. (2008). Critical pedagogy and the mythopoetic: A case study from Adelaide's northern urban fringe. In T. Leonard & P. Willis (Eds.), *Pedagogies of the imagination: Mythopoetic curriculum in educational practice* (pp. 203–222). Springer. doi:10.1007/978-1-4020-8350-1_15

Sandford, K., & Mimick, K. (2012). Embodied learning through story and drama: Shifting values in university settings. In D. E. Clover & K. Sandford (Eds.), *Lifelong learning, the arts and community cultural engagement in the contemporary university*. Manchester, UK: Manchester University Press.

Selkrig, M., & Bottrell, C. (2009). Transformative learning for pre-service teachers: When too much art education is barely enough. *The International Journal of Learning*, *16*(1), 395–408.

Senge, P., Scharmer, C. O., Jaworski, J., & Flowers, B. S. (2004). *Presence: Exploring profound change in people, organizations and society*. New York: Ransom House, Inc.

Slattery, P. (2006). *Curriculum development in the postmodern era* (2nd ed.). New York: Routledge.

Snowber, C. (2005). The eros of teaching. In J. P. Miller, S. Karsten, D. Denton, D. Orr, & I. C. Kates (Eds.), *Holistic learning and spirituality in education* (pp. 215–222). New York: SUNY Press.

Snowber, C. (2012). Dance as a way of knowing. In R. L. Lawrence (Ed.), *Bodies of knowledge: Embodied learning in adult education* (pp. 53–60). San Francisco: Jossey Bass.

Tisdell, E. J. (2000). Spirituality and emancipatory adult education in women adult educators for social change. *Adult Education Quarterly*, *50*(4), 308–335. doi:10.1177/074171360005000404

Tisdell, E. J. (2003). *Exploring spirituality and culture in adult and higher education*. San Francisco: Jossey Bass.

Tolliver, D. E., & Tisdell, E. J. (2006). Engaging spirituality in the transformative higher education classroom. In E. W. Taylor (Ed.), *Teaching for change: Fostering transformative learning in the classroom* (pp. 37–48). San Francisco: Jossey Bass. doi:10.1002/ace.206

Willis, P. (2008). Getting a feel for the work: Mythopoetic pedagogy for adult educators through phenomenological evocation. In T. Leonard & P. Willis (Eds.), *Pedagogies of the imagination: Mythopoetic curriculum in educational practice* (pp. 245–264). Springer. doi:10.1007/978-1-4020-8350-1_18

Wright, R. R., Coryell, J., Martinez, M., Harmon, J., Henkin, R., & Keehn, S. (2010). Rhyme, response and reflection: An investigation of the possibilities for critical transformative learning through adult poetry reading. *Journal of Transformative Education*, *8*(2), 103–123. doi:10.1177/1541344611406737

KEY TERMS AND DEFINITIONS

Arts-Based Curriculum: A curriculum that infuses the arts into mainstream courses at all levels.

A.W. E.: Matthew Fox's (2006) acronym for ancestral wisdom education, an approach to education reform that honors the teachings of the ancestors, nurtures wisdom rather than knowledge and educates through compassion, creativity and critical consciousness.

Centering: A process of letting go of outside distractions and bring the total self into focus. Examples of centering activities include: meditation, guided visualization and reflection on various art forms.

Earth-Centered Education: Educational curriculum that recognizes human beings in relationship to the Earth, not separate from it.

Holistic Epistemology: John Heron's (1996) description of four kinds of interrelated knowledge that are outcomes of co-operative inquiry including; experiential, presentational, propositional and practical knowledge.

Indigenous Wisdom: Organic or local knowledge that comes from direct experience in one's environment as opposed to learning in formal education.

Mythopoetic Curriculum: A curriculum that relies on imaginal knowing "linked to the way humans imagine the real world. Imaginal knowing moves the heart, holds the imagination, finds the fit between self-stories, public myths, and the content of cultural knowledge." (Leonard and Willis, 2008).

This work was previously published in Andragogical and Pedagogical Methods for Curriculum and Program Development edited by Victor C. X. Wang and Valerie C. Bryan, pages 299-322, copyright year 2014 by Information Science Reference (an imprint of IGI Global).

Section 6
Emerging Trends

This section highlights research potential within the field of Curriculum Design and Classroom Management while exploring uncharted areas of study for the advancement of the discipline. Introducing this section are chapters that set the stage for future research directions and topical suggestions for continued debate, centering on the new venues and forums for discussion. A pair of chapters on the usability and effectiveness research makes up the middle of the section of the final 10 chapters, and the book concludes with a look ahead into the future of the Curriculum Design and Classroom Management field, with "Trends of Blended Learning in K-12 Schools: Challenges and Possibilities." In all, this text will serve as a vital resource to practitioners and academics interested in the best practices and applications of the burgeoning field of Curriculum Design and Classroom Management.

Chapter 77
Preparing to Teach with Flipped Classroom in Teacher Preparation Programs

Beverly B. Ray
Idaho State University, USA

Angiline Powell
University of Memphis, USA

ABSTRACT

The chapter outlines best practices in the use of Flipped Classroom to promote active and meaningful learning in higher education, specifically preservice teacher preparation courses. The theoretical foundation supporting the use of Flipped Classroom is reviewed as well as issues related to its use. Recommendations as to how to integrate Flipped Classroom are examined as well. Linkage to the goals of teacher preparation programs are made to assure the reader's understanding of the recommendations that follow.

INTRODUCTION

Assuring the classroom success of the teachers we prepare is the central goal of all teacher educators. Criticism of the ways teacher educators prepare preservice teachers comes from policy makers, business leaders, and K-12 educators as well as students. The criticism of preservice teachers' effective use of technology is also of particular concern since preservice teachers may experience difficulties translating course work into effective technology practice (Watson, Blakeley, & Abbot, 1998). This disconnect between course work and the development of effective technology practice often occurs when preservice teachers do not fully understand the principles of teaching and learning with technology, many of which are hard to "integrate" without first-hand experience. Often we fail to prepare preservice teachers for classroom success using technology and other authentic methods of learning, such as inquiry and problem-based learning (Darling-Hammond & Bransford; 2005; Kagan, 1992). This is particularly problematic in a time when many K12 educators face tremendous pressure to adapt their teaching to

DOI: 10.4018/978-1-4666-8246-7.ch077

online or blended learning environments (Dexter & Riedel, 2003; Niess, 2005).

The result of this technology disconnect, compounded by other pivotal challenges faced by novice teachers, can be seen in the research documenting high attrition rates during the teacher induction years (Darling-Hammond, 2003; Moore Johnson, & The Project on the Next Generation of Teachers, 2004; Shen, 2003). As preservice teacher educators, we strive to model authentic and meaningful learning strategies for our students. In fact, modeling ways of teaching with technology is important in helping preservice learners figure out how best to use technology to support learning (Chickering & Ehrmann, 1996; Rogers, 2004). Consequently, we believe that use of Flipped Classroom is an effective use of technology that shows great promise (Bergmann, & Sams, 2012, Brunsell, & Horejsi, 2013) for teacher preparation and should be used within teacher preparation programs.

Flipped Classroom is a reversal of traditional modes of classroom based teaching and homework. Outside of class students access online videos or instructional DVDs. In class, students focus on understanding and applying content from previously viewed videos. This is done via group or individual problem solving activities, discussions, and/or other learner centered activities that promote critical thinking and reasoning (Garrison & Kanuka, 2004; Lage, Platt, & Treglia, 2000; So & Brush, 2008; Strayer, 2012). The teacher's role is to guide and facilitate that understanding (Butrymowicz, 2012). Since we want to bridge the technological divide with our students we propose using Flipped Classrooms in order to help preservice learners develop the knowledge, skills, and dispositions needed to succeed as technological users and innovators. While Flipped Classroom is most associated with the use of online resources (i.e., videos), it can be used without Internet access assuming videos are loaded onto DVDs or other storage devices that do not require internet access. Viewing videos on DVD addresses some of the equity issues associated with the "digital divide" and ongoing concerns related to reliable internet access for many learners (Valadez & Duran, 2007).

THEORETICAL FOUNDATION

The theoretical foundation supporting the use of Flipped Classroom in teacher preparation programs is grounded in an understanding of the social and intellectual learning environment. In this environment learners actively engage knowledge in ways that act as catalysts for deep and meaningful learning (Noddings, 2005; Piaget & Inhelder, 1969). Flipped Classroom is also grounded in a consideration and respect for individual and diverse learning needs. Using Flipped Classroom allows teacher educators to motivate and guide learners to specific understanding even as they model use of an innovative method of teaching with technology that will prove meaningful and appropriate for their future practice.

Constructivism and Flipped Classroom

Constructivists contend learning is an intellectual process in which the learner forms or constructs new knowledge by combining new ideas with those acquired during previous learning experiences (Schunk, 2011). The depth of what is understood is affected by previous knowledge and interests (Bruner, 1993; Piaget & Inhelder, 1969). The use of Flipped Classroom in teacher preparation programs provides a modern instructional model for how to engage learners' natural curiosity, increasing their interests in teaching and effectively building new conceptual constructs using technology. By using Flipped Classroom, preservice learners see, hear, and experience something new or unique via out of class video study. Linking the new learning experience from the Flipped Classroom videos to previous knowledge or understanding, learners can then use class time to interpret that new experience based on what is already known, supporting the essence of constructivism.

Flipped Classroom supports another tenet of constructivism, that the learner is responsible for their own learning. As the learner views the video portion of a flipped lesson, they can continuously assess their understanding of concepts. While in the classroom, the learner further engages or interacts with those same concepts and receives the opportunity to demonstrate understanding as well as to clarify misconceptions.

Social Cognition and Flipped Classroom

Social Cognitive theory is grounded in a process of immediate feedback on work, as well as just-in-time support from teachers and peers. It is also grounded in an understanding that learners can learn by observing, including observing modeled behaviors. Bandura also noted the need for learners to demonstrate understanding and to share that understanding with others. For example, some teachers have adopted use of peer instruction and the jigsaw method of learning as a result of Bandura's recommendations (Bandura, 1977). Because learners can view the videos together, work in teams in or out of class, and learn through teaching one another via peer tutoring, social learning theory can be used to validate use of Flipped Classroom in teacher preparation programs.

RESEARCH SUPPORTING THE USE OF FLIPPED CLASSROOM

Even though many of the claims made about the efficacy of Flipped Classroom as learning tools are not yet fully research supported, an emergent research base suggests that mindful use of Flipped Classroom can support authentic and other meaningful learning experiences, content learning, motivation to learn, and some positive socialization skills, such as cooperation within real or virtual groups (Baker, 2000; Collins, de Boer, & van der Veen, 2001; Gannod, Burge & Helmick, 2008; Lage, Platt, & Treglia, 2000; Strayer 2012). Flipped Classroom possesses the potential to promote learning across all age and academic levels (Flumerfelt & Green, 2013). In order to support preservice teachers and their effective use of technology in the classroom, we propose integration of this effective technology is an essential component of teacher preparation course work. A number of researchers noted that the likelihood of transfer into K-12 practice increases when preservice students see technology modeled and practiced in preparation classes when compared to students whose exposure occurs within a stand-alone technology methods course (Halpin, 1999; Niess, 2005; Snider, 2003; Topp, 1995; Zimmerman, 1989).

SUGGESTIONS FOR USING FLIPPED CLASSROOM

At present, few teacher educators are using Flipped Classroom. In fact, many may never use Flipped Classroom, preferring a continued reliance on more familiar, teacher-directed methods of instruction (Cuban, 1986; Eggen & Kauchak, 2007; Rogers, 2004). Yet learning theory and a small, emergent research base support the effectiveness of Flipped Classroom along with other student centered technology methods (Chickering & Ehrmann, 1996; Schunk, 2011). By addressing issues related to the use of Flipped Classroom, our intent is to inspire readers to see its potential and to offer insight to assure success when using Flipped Classroom as a learner centered instructional tool.

To assist those efforts, we examine the challenges faced by those seeking to integrate the use of Flipped Classroom into traditional teacher preparation programs. In this section challenges are identified and addressed to provide the reader with an action plan for the successful integration of Flipped Classroom into teacher preparation courses.

Planning for Instruction

Early attempts at Flipped Classroom were built on a traditional lecture model which may not work for all preservice learners (Kumar, 2010; Lowry, 1999). However, it is possible to use a more constructivist approach that more fully integrates the examination of problems and issues from practice. For example, instead of simply having students view and take self-directed notes from a pre-recorded lecture, teacher educators should include learner-centered tasks to complete before, during, and after viewing an interactive lecture. This approach should be used when viewing a video demonstrating how to effectively apply a particular skill, such as deep questioning or, perhaps, a specific behavior management skill that the learner first sees modeled via video before practicing in class or in a clinical setting. In these ways and others we move beyond a limited lecture based approach to learning to one that is more fully supported by learning theory.

Additionally, a focused and contextual approach to teacher preparation requires the use of interactive and problem-based methods, such as role plays/simulations, integrated writing assignments, inquiry, reflection, discussion, and clinical activities that allow learners to actively participate in the learning process beyond simply viewing assigned videos (Kumar, 2010; Schunk, 2011). The purpose of such diverse activities is to allow preservice learners to construct and apply new or refined understandings based on content and pedagogical knowledge along with highly effective learning strategies (VanSledright, 2002). In teacher preparation programs, strategically selected or produced videos can serve as exemplars, or models, for discussion of what is meant by effective teaching. Use of Flipped Classroom serves as a catalyst for this kind of learning environment and is conducive to a constructivist and problem-based learning environment (Strayer, 2012). In order to maximize the effectiveness of the Flipped experience, it is critical that teacher educators guide and continually assess the process for preservice students before, during, and after viewing out of class videos. Doing so assures the foundation of new knowledge is based on a correct understanding of the concepts or other information contained within assigned videos.

Subject Matter Concerns

Many teacher education pedagogy and content and standards can be addressed through the use of Flipped Classroom, but it is particularly effective in allowing students to observe and explore complex topics interactively, including moral issues that cannot be easily accomplished using more traditional (i.e., passive) methods of instruction. Preservice students need to examine and understand the complexities of the profession and the tensions and conflicts that come into play as teachers, children, parents, and other educational stakeholders interact with one another (Noddings, 2005). This global understanding of education includes issues of diversity and social justice, classroom management, assessment, and other critical attributes of the profession. Additionally, preservice students need to understand the responsibilities of the profession and how those responsibilities are reflected across the profession. Because education is often grounded in social issues, teacher educators should prepare to examine those issues from multiple personal and historical perspectives. Video can capture and document these kind of events bringing with it opportunities for authentic and meaningful discussion of these kinds of issues. When using videos such as these, teacher educators should also prepare to implement many of the same strategies used when teaching about current and controversial issues (Engle & Ochoa, 1988; Hess, 2009). For example, when using problem-based learning, encourage preservice learners to break away from the video at identified points to consider and reflect on issues of practice. When doing so it is important to include time in class to richly debrief, reflect upon, and make connections between what was experienced and learned during the video experience and in class discussion to instructional objectives and program standards (Larson & Keiper, 2011).

Assuring Learner Success

Addressing the purpose for the use of Flipped Classroom at the beginning of the course (or before implementing a Flipped lesson) provides a foundation that pays dividends in the form of participant buy-in, a necessary disposition for the most effective use of the Flipped Classroom (Coulter & Ray, 2009; Holbrook, & Dupont, 2010). However, even when provided explanations of the organization of the course, the purpose of the videos, and the requirement for appropriate technology, some preservice students may not fully appreciate the importance of the videos to their academic success. Others will experience frustration with the videos that may impact their learning. In fact, because of limited time, interest, access to technology or other factors, some may attempt to circumvent the content of the videos and attempt to acquire the information in other ways rather than from viewing the assigned videos (Coulter & Ray, 2009). Others may never attempt to view assigned videos assuming that their contents will be made apparent during class discussions and/or lecture sessions. Therefore, to avoid re-teaching the contents of the videos we suggest instructors set aside time at the beginning of the course to discuss the importance of the video's contents to successful completion of the class. Coulter and Ray (2009) suggested having students sign a statement acknowledging their responsibilities when accessing and viewing the assigned videos as one way to address this type of concern.

Aligning Learning across the Flipped Classroom Experience

Both the face-to-face in class sessions and the videos must align so that one transitions into and coherently supports the other. Without this clear alignment of learning students may struggle to see how assigned videos relate to the learning goals of the course (Ginns & Ellis, 2007). When the out of class video and face-to-face portions of the learning experience are not carefully aligned, research demonstrates that technology, including video, can become a barrier for learning as students choose whether and to what extent to invest in the learning goals of the classroom (Buerck, Malstrom & Peppers, 2003; Coulter & Ray, 2009; Elen & Clarebout, 2001).

Adapting Constructivist Instructional Strategies to Flipped Classroom

Teacher educators play a pivotal role as guides, facilitators, and discussants when Flipped Classroom is used as instructional tools. Their role often is to combat or prevent the emergence of misconceptions among learners by using highly focused and contextual approaches to learning (VanSledright, 2002). As guides, facilitators, and discussants, they can use a variety of student centered instructional approaches, including the strategies discussed here.

Engaged Inquiry: Use of Flipped Classroom can promote key attributes of inquiry learning, including problem solving and discovery learning (Larson & Keiper, 2011). In particular, Flipped Classroom can promote student-directed investigations into the issues and problems that confront educators and practice. Flipped Classroom allows learners to think like the very professionals working to resolve these issues. As they think like professionals engaged in solving the issue presented in assigned videos, they engage in a process of questioning, analyzing, drawing conclusions, and making recommendations and/or taking action within their own emerging practice that mirrors the real world process followed by educators and others involved in solving real life teaching and learning issues (Gallagher, Shers, Stepien & Workman, 1995). In this manner, Flipped Classroom can function as a method of engaged inquiry even as its use acts as a catalyst for awareness, self-efficacy and agency, including the confidence, will, and ability to try out new skills or propose solutions to solve real classroom problems.

Problem-Based Learning: Problem-based learning (PBL) originated in the medical field and spread to many other areas, including education. It is aligned with both cognitivism and constructivism where emphasis is placed on learners and how they learn. When implementing PBL in the classroom there are three major components a) problem-driven learning, b) self-directed learning, and c) collaborative learning. This problem driven learning approach becomes authentic when it is student initiated and student driven by real-world needs occurring within their emerging practice. The self-directed nature of this learning changes the traditional teacher lead lecture into one where the instructor first models the problem solving strategies for students, for example within a video, and then asks students to apply that model to their own reasoning and critical thinking about issues from practice. In this way PBL is indicative of the process followed by adaptive expert teachers in the field. Like many other constructivist-supported methods, collaboration within PBL is characterized by students working in small groups to increase and deepen content knowledge (Hung, 2011).

Discussion and Debate: Flipped Classroom also can promote reflection and dialogue on many levels, including intrapersonal reflection as the learner seeks to draw pedagogical, ethical, moral or other conclusions based on the contents of the video portion of the Flipped experience. The evidence provided during the process combined with study of related content, peer-to-peer discussion, and/or whole group discussion draws the learner's attention to key teacher education content and learning goals. Opportunities for multiple types of discussions are useful for learning, particularly "when the objective is to acquire greater conceptual understanding or multiple sides of a topic" (Schunk, 2011, p. 271).

Flipped Classroom also allows for the use of debate as learners view background information via videos before presenting issues from practice, including controversial and/or moral dilemmas, all of which are useful topics for classroom debate. While debates require more preparation than discussion sessions, the format of Flipped Classroom provides ample content-rich source materials for use in setting up a debate session. Specifically, videos provided by online sites, such as Edutopia (See a sampling of useful teacher education videos from Edutopia in Appendix A, Table 1), can work well when used as a catalyst for debate or discussion.

Reflective Learning: With guidance from teacher educators and associated curriculum and assessments, Flipped Classroom can support the creation of an environment of thoughtful learning wherein the learner must take into account not only new but multiple perspectives, including current educational perspectives and subject matter and pedagogical knowledge along with his or her own moral framework. Teacher educators can use Flipped Classroom to encourage preservice students to reflect in action and to reflect on actions, including the actions of others, once an assigned video is viewed. In this way, Flipped Classroom can promote or reinforce within willing learners a disposition to reflect on and take action (i.e., requiring the disposition and qualities of efficacy and agency) to improve their practice, key attributes and competencies that are not easily taught using traditional or commonly used instructional practices (e.g., lecture, assigned readings, or other assessments that rely on closed-ended questions, etc.).

Cooperative Learning: Cooperative strategies have a long history in education, including teacher preparation (Marzano, Pikering, & Pollock, 2001). Using Flipped Classroom, teacher educators can model and promote positive interdependence among learners who must view videos together and/or discuss them first in small groups, helping group members to identify key points as they hone interpersonal communication skills, before moving into larger or whole group discussion of video topics. Flipped Classroom can also promote individual accountability within groups if, for example, a series of videos are assigned individually to group members to view and then share with their assigned group. For example, a jigsaw approach to viewing and sharing contents can make individual students responsible for their own learning even as they assume responsibility for the learning of others in their group. It also allows them to learn how to integrate technology into the Jigsaw approach and then draw conclusions about the effectiveness of that approach.

Assessing Learning

Use of Flipped Classroom results in many of the same assessment concerns any teacher educator has when using traditional or constructivist instructional strategies. For example, teacher educators should plan ways to allow students to demonstrate learning via either performance-based or product-based rubrics and assessments that include opportunities for rich classroom discussions, time to debrief an activity, and use of written reflective products (such as a KWL or an interactive notebook), that allow students to not only demonstrate understanding that goes beyond simple recall of facts, but also document higher order thinking, including dispositional items (Larson & Keiper, 2011; Stiggins, Arter, Chappuis, & Chappuis, 2007).

The use of Flipped Classroom to promote learning does not happen without effort. Introducing preservice teachers and other learners to the Flipped Classroom learning process is no different than introducing them to any other means of learning. Flipped Classroom must align with specific standards or course objectives if its use is to have a chance of promoting targeted learning goals. Methods of assessing learning when using Flipped Classroom can be perceived as complicated by those unfamiliar with the format or the use of video as an instructional tool, but in fact follow many of the principles of what we know about how people learn (Bransford & Schwartz, 1999). As with any knowledge, skill, or disposition that the learner must acquire, learning using Flipped Classroom must align with specific goals (See the alignment chart linking selected Edutopia videos to CAEP Teacher Preparation Standards provided in Appendix A, Table 1). Furthermore, purposeful steps must be taken to encourage learners to develop the habit of engaging in an activity such as this if it is ever to become generalized beyond a single teacher preparation course as a reliable method of learning.

Varied assessments are useful as well. The actual process of accessing the video viewing experience or assessing time on task with each video should remain secondary goals, but could be assessed if deemed a critical part of the learning goals for the course (Larson & Keiper, 2011). While a variety of assessment strategies are recommended, a few examples are provided to guide the reader's own thinking:

Example One

A set of basic questions we might have students consider for any assigned video could include the following questions:

- What do I know already about the concepts addressed in this video?
- What do I need to find out while watching this video?
- What is one important idea or concept that I have learned from the video already?

- What key piece of information do I want to be sure is addressed during our upcoming in class discussion of this video?
- What did I learn from viewing this video?
- How can I apply that knowledge to further my understanding of this topic?

In answering this basic set of questions, pre-service students are challenged to consider their previous knowledge of the topic and to plan what they should do with the knowledge acquired from the assigned video (Redfield & Rousseau, 1981). These questions can be addressed in writing via the use of interactive journal entries (Teachers' Curriculum Institute, 2013) and/or by filling out an instructor provided advanced organizer (Ausubel, 1968), such as a modified KWL organizer based on spiraled questions, such as those presented above (Hershberger, Zembal-Saul, & Starr, 2006; Ogle, 1998).

Example Two

Promoting reflection and meta-reflection are critical attributes of any teacher education program (Schon, 1983). Metacognition, or thinking about thinking (Ellis, 2001), serves as a "critical revisiting of the learning process" (Georghiades, 2004, p. 171). Metacognition occurs when a learner is aware of or understands how they learn and are aware that they are in the process of learning (Mayer, 2011). Use of approaches that support the examination of the beliefs that emerge from practice or from thinking about practice promote the development of more flexible and intentional approaches to effective teaching and learning (Sockman & Sharma, 2008). What follows is a basic set of meta-reflective questions that pre-service students could use to assist their thinking about the importance of assigned videos:

- As you watched the video, how did you decide what information was important?
- What have you learned about (the assigned topic) from this video?
- How did you decide what information in the video was not important?
- What connections have you made between the video's contents and your practice (or topics examined in class)?
- What statements in the video did you agree with or like?
- What statements, if any, in the video did you disagree with or dislike?
- What statements concern you or contradicted your previous understanding?
- Which information in the video is more important than other parts?
- Where within your emerging teaching practice can you use what you learned from the video?
- Is there another way you could use that same information to support learning?

Like the first example, questions such as these could be used as writing prompts for an interactive journal. Or they could be used to guide small group or whole group classroom discussion.

SUGGESTIONS FOR SUCCESSFULLY USING AND CREATING VISUAL MEDIA

Scaffolding Learning

Given what we know about effective media instruction, learning using visual media should be scaffolded by the teacher educator in order to assure that the intended learning occurs (Hall, Stark, Hilgers, & Chang, 2004; Kline, Stewart, & Murphy, 2006). Use of a viewing guide containing information about what the learner should do or look for while viewing the assigned video (pre, interim, and post viewing) is critical to scaffolding the experience and promoting meaningful learning. Ideally, viewing guides should prepare the learner not only for the contents of the video, but also notify them of what information or reflections they should bring with them into the classroom setting (e.g. discussion topics) and how that information is important to the goals of the individual lesson, lecture, and/or the goals of the course. Students should also know how much time they are expected to spend viewing and reflecting on each assigned videos. A sample viewing guide is provided in Appendix B.

Selecting and Creating Visual Media for Use with Flipped Classroom

A fundamental principal of Flipped Classroom is that learners view and learn from a single or small set of visual media. Often this visual media takes the form of teacher created videos or videocasts. Other times teachers elect to use carefully selected videos or video segments from reliable online (or off-line) education providers. Whether or not videos are written and produced by the teacher educator, it remains necessary that the learner know how to derive meaning and/or interpret the contents of the videos viewed. Success in this regard requires an understanding of how visual media (including film, television, news broadcasts, web and videocasts, etc.) functions as a tool for learning (Sharp et al., 1995). Because it is a medium infrequently used in preservice learning, it also requires a basic understanding of how to interact with and derive understanding from visual messages (i.e., media literacy). However, since most videos function using a culturally familiar narrative device, it is often possible for preservice learners to transfer an understanding of how to learn from other narrative devices (i.e., oral lecture and/or written textbook passages) to the visual medium used within Flipped Classroom. Despite this common narrative experience, transfer of that skill is not always automatic even for those who are technologically advanced. Assumptions in this regard may lead to frustration and/or misunderstandings about what is important within each video assigned, as many learners are more familiar with *passive seeing* rather than active watching, analyzing, and decoding of visual media.

Selecting and Aligning Videos to Course Goals

When selecting a video for use by preservice teachers, the teacher educator begins by determining whether the video is accurate and produced by a reliable and expert source. Beyond those two critical steps, teacher educators should also consider issues of video length and clarity. Traditional teacher preparation classes can range from 50 minutes to nearly three hours. Though it is rare to lecture the entire time teacher educators might be tempted to record or assign verbatim a lengthy video lecture and have the class view this video at home as a part of their homework assignment. However, this is not the most effective way of using video for learning. Instead, shorter videos, each with a specific topic or concept addressed (Strasburger, Wilson, & Jordan, 2009) should be selected—or scripted and then recorded.

Scripting and Creating Your Own Videos

Written transcripts are helpful for several important reasons. First, a transcript is helpful in locating and reviewing information. Additionally, providing a transcript is not only an critical component for universal design, but it also is time effective for the instructor when the goal is the production of quality videos. Second, the only access for video viewing for some preservice students continues to be campus computer labs, and audio can disturb other students. Recording extemporaneously versus recording using a guiding transcript or reading from a transcript when voicing over slides or other images promotes rehearsal and mindful consideration of the most important concepts which leads to more effective instruction. Speaking without written prompts can require multiple attempts at recording before achieving a cohesive narrative, thus consuming valuable instructional time. In addition, scripted presentations tend to be better organized and contain fewer verbal fillers (i.e., "ums" or "ahs") (Coulter & Ray, 2009).

A number of options are available for creating videos, but when the instructor's time and motivation to continue using Flipped Classroom are considerations, we recommend using the simplest method available. For example, voicing over *PowerPoint*™ presentations using the narration feature within the software remains a viable option for the novice Flipped Classroom user. Since most teacher educators are familiar with *PowerPoint*™ it will not require excessive amounts of time or technical support. Additionally, the use of *PowerPoint*™ enables the incorporation of previous written guiding notes and concepts of universal design (Center for Universal Design, 2008) to meet the needs of the learners. Finally, any computer with *PowerPoint*™ software and a high-speed internet connection can be used to create and publish simple videos. A next step in achieving mastery of Flipped Classroom might involve translating files into streaming video and placing them on a server that can be accessed by preservice students. Besides easier access, this can be a better option since *PowerPoint* videocasts (files), once created and published as streaming video, cannot be altered by any person other than the producer or copyright holder. The downside to this method is that some universities still have limited server space and are reluctant to allocate space for extensive publication of videos. However, given the number of free or inexpensive cloud hosting services now available, teacher educators can choose to host their video off campus on a third party site, such as *YouTube*. *YouTube* channels can be password protected, invitation only sites or they can be set for public viewing. Either choice gives instructors control over access to what for many may be proprietary videos (Coulter & Ray, 2009).

Another step towards mastery of video production might involve use of *Animoto*, *iMovie*, *GoAnimate,* and/or *Slide Rocket* to create videos for use. Also, many universities provide and support instructors and students' use of *Tegrity* or other lecture capture software programs that can be used to make video recordings for student use. In additional to producing basic video, programs such as *Tegrity* allow viewers to search within a video, bookmark selected scenes, and insert typed note at key points in a video recording. Many of these programs also allow viewers to send messages to peers or the instructor from exact points of interest in a video, thus providing concrete opportunities for clarification of misunderstanding, questioning, discussion, reflection, and collaborative learning.

Other practical suggestions to assure continued use of Flipped Classroom include reducing the size of video files to facilitate faster downloads, saving files using multiple versions or file types, and burning the videos to DVD for those requiring alternative viewing methods (Coulter & Ray, 2009). This kind of a flexible approach to access is particularly useful for students using older computers and/or located in areas with poor quality Internet access.

INSTRUCTOR AND LEARNER MOTIVATION TO USE FLIPPED CLASSROOM

Willingness to try or use new technology is directly related to preservice teachers' perceptions of technology (Albion, 2001; Becker, 2000; Ertmer, 2005; Niederhauser & Lindstrom, 2007; Palak & Walls, 2009; Rogers, 2004). There are several research-based findings concerning preservice teachers and their use and perceptions of technology. Anxiety *with* and resistance *to* technology can result without proper support (Becker, 2000; Ertmer, 2005; Budin, 1999). Teachers fear that using technology comes at a sacrifice from content. Resistance to change has a serious impact on willingness to try new technologies (Rogers, 2004). Heinich (2011) reported traditional educational delivery persists in many classrooms because some teachers structure instruction based on their needs rather than that of their learners. More problematic is that instruction based on teachers' needs can become entrenched during the preservice years (Niederhauser & Lindstrom, 2007). Consequently, willingness, or intent to use technology, is an important consideration in educational settings because some evidence suggests that teachers' personalities and resistance to change can present barriers to the adoption of technology interventions (Fabry & Higgs, 1997; Lehman, 1994; Overbay, Patterson, & Grable, 2009).

After an extensive review of the literature on teacher change, Ertmer and Ottenbreit-Leftwich (2010) argued that in spite of the rapid expansion of technology for learning within educational settings, many teachers persist in not using technological tools and/or not using them appropriately (i.e., in ways that will increase student achievement). However, Reiser and Dempsey (2012) offer an explanation for this behavior that is important to consider. That is, that while teachers are expected to be technology adopters and implementers, they are not often introduced to technology in ways that support successful adoption. There is a need for active discussion centered on bridging the gap between current implementation and desired optimal implementation. Because technology such as Flipped Classroom enables teachers to "package learning opportunities in an increasing number of alternative ways so as to best meet the varying needs of different students" (Buzzetto-More & Sweat-Guy, 2007, p. 5), the role and intentions of the teacher are key. Consequently, Flipped Classroom may have the capacity to change preservice teachers' intentions regarding the use of technology for learning. Therefore, issues related to teachers' attitudes and intentions toward the use of Flipped Classroom in education are important to address within teacher preparation programs. Research in this regard is needed.

Limitations of Flipped Classroom

Despite the on-going hype and high expectations for learning associated with Flipped Classroom, we still do not know whether it will prove to be research supported. Even though some teachers are reporting noticeable improvements in both their students' grades and their attitudes toward learning, some students likely will not thrive in Flipped Classroom settings (Butrymowicz, 2012). As with any other methods used in teacher preparation programs, Flipped Classroom should not be the only method of instruction used, not even in blended learning environments. Because many preservice learners, particularly in geographically remote or isolated locations, still do not have reliable or fast internet connections, teacher educators should plan alternative ways of learning for those students to fall back on if or when technology access is limited or non- existent (Butrymowicz, 2012). Because it is often difficult for teachers to provide meaningful instruction for technologically savvy students, the issue of whether Flipped Classroom promotes student learning, including preservice learning and whether the method can be used in a classroom environment geared toward pedagogical concerns should be carefully researched as well.

CONCLUSION

This chapter is intended to assist teacher educators and others to create positive learning environments using Flipped Classroom. These environments can support learning even as they serve as models of best practices when using technology to support learning. In particular, a meaningful and authentic learning environment that can support preservice teachers' acquisition of key knowledge, skill, and/

or dispositional learning can be created using Flipped Classroom.

We write this because we believe that Flipped Classroom can be appropriately used in preservice teacher preparation programs. We note, however, that technology for technology's sake is not appropriate. Therefore, we offer ways of thinking about Flipped Classroom and ways of doing (or implementing) Flipped Classroom into instruction that can provide guidance to those considering its use for the first time. The ways of doing highlighted in this chapter are reflective of theory and emerging research.

The audience for this chapter includes preservice educators and specialized inservice teacher trainers. However, interest in the chapter is also shaped nationally and internationally by an emerging interest in whether and to what extent Flipped Classroom can be used as a positive learning tool. This interest in Flipped Classroom is an outgrowth of a society that is fully integrating technology into everyday experiences (Bergmann, & Sams, 2012). Teacher preparation programs should be no exception and, in fact, must be part of this process. Furthermore, as today's technology savvy youth move into the teacher workforce, it becomes more likely that technologies, such as Flipped Classroom, will be embraced by many.

REFERENCES

Albion, P. R. (2001). Some factors in the self-efficacy beliefs for computer use among teacher education students. *Journal of Technology and Teacher Education*, *9*(3), 321–347.

Ausubel, D. P. (1968). *Educational psychology: A cognitive view*. New York, NY: Holt, Rinehart & Winston.

Baker, J. W. (2000). *The ''classroom flip'': Using web course management tools to become a guide by the side*. Paper presented at the 11th International Conference on College Teaching and Learning. Jacksonville, FL.

Bandura, A. (1977). *Social learning theory*. Englewood Cliffs, NJ: Prentice Hall.

Becker, H. J. (2000). How exemplary computer-using teachers differ from other teachers: Implications for realizing the potential of computers in schools. *Journal of Research on Computing in Education*, *26*(3), 291–321.

Bergmann, J., & Sams, A. (2012). *Flip your classroom: Reach every student in every class every day*. Washington, DC: International Society for Technology in Education.

Bransford, J. D., & Schwartz, D. L. (1999). Rethinking transfer: A simple proposal with multiple implications. In A. Iran-Nejad & P. D. Pearson (Eds.), Review of research in education (pp. 61-100). Washington, DC: American Educational Research Association (AERA).

Bruner, J. T. (1993). *Schools for thought: A science of learning in the classroom*. Cambridge, MA: MIT Press.

Brunsell, E., & Horejsi, M. (2013). Flipping your classroom in one take. *Science Teacher (Normal, Ill.)*, 8.

Budin, H. (1999). The computer enters the classroom. *Teachers College Record*, *100*(3), 656–669. doi:10.1111/0161-4681.00007

Buerck, J. P., Malstrom, T., & Peppers, E. (2003). Learning environments and learning styles: Non-traditional student enrollment and success in an internet-based versus a lecture based computer science course. *International Journal on Learning Environments Research*, *6*(2), 137–155. doi:10.1023/A:1024939002433

Butrymowicz, S. (2012). Promise of the ‘flipped classroom’ eludes poorer school districts. *The Hechinger Report.* Retrieved from http://hechingerreport.org/content/promise-of-the-flipped-classroom-eludes-poorerschool-districts

Buzzetto-More, N., & Sweat-Guy, R. (2007). The technology ownership and information acquisition habits of HBCU freshmen. *Interdisciplinary Journal of Information, Knowledge, and Management*, *2*(1), 59–72.

Center for Universal Design. (2008). *Universal design principles*. Raleigh, NC: North Carolina State University.

Chickering, A.W., & Ehrmann, S. C. (1996, October). Implementing the seven principles: Technology as lever. *AAHE Bulletin,* 3-6.

Collins, B., de Boer, W., & van der Veen, J. (2001). Building on learner contributions: A web supported pedagogic strategy. *Educational Media International*, *38*(4), 229–240. doi:10.1080/09523980110105169

Coulter, G., & Ray, B. (2009). Teacher candidates’ perceptions of the efficacy of the use of webcasts as online supplemental instruction in a traditional education course. In T. Bastiaens, et al. (Eds.), *Proceedings of the World Conference on E-Learning in Corporate, Government, Healthcare, and Higher Education* (pp. 2475). Chesapeake, VA: AACE.

Cuban, L. (1986). *Teachers and machines: The classroom use of technology since 1920*. New York, NY: Teachers College Press.

Darling-Hammond, L. (2003). Keeping good teachers. *Educational Leadership*, *60*(8), 6–13.

Darling-Hammond, L., & Bransford, J. (Eds.). (2005). *Preparing teachers for a changing world: What teachers should learn and be able to do*. San Francisco, CA: Jossey Bass.

Dexter, S., & Riedel, E. (2003). Why improving preservice teacher educational technology preparation must go beyond the college’s walls. *Journal of Teacher Education*, *54*(1), 334. doi:10.1177/0022487103255319

Eggen, P. D., & Kauchak, D. P. (2007). *Educational psychology: Windows on classrooms*. New York, NY: Prentice Hall.

Elen, J., & Clarebout, G. (2001). An invasion in the classroom: Influence of an ill-structured innovation on instructional and epistemological beliefs. *Learning Environments Research*, *4*, 87–105. doi:10.1023/A:1011450524504

Ellis, A. K. (2001). *Teaching, learning, and assessment together: The reflective classroom*. Poughkeepsie, NY: Eye on Education.

Engle, S., & Ochoa, A. (1988). *Education for democratic citizenship: Decision making in the social studies*. New York, NY: Teachers College Press.

Ertmer, P. A. (2005). Teacher pedagogical beliefs: The final frontier in our quest for technology integration? *Educational Technology Research and Development*, *53*(4), 25–39. doi:10.1007/BF02504683

Ertmer, P. A., & Ottenbreit-Leftwich, A. T. (2010). Teacher technology change: How knowledge, beliefs, and culture intersect. *Journal of Research on Technology in Education*, *42*(3), 221–251.

Fabry, D. L., & Higgs, J. R. (1997). Barriers to the effective use of technology in education: Current status. *Journal of Educational Computing Research*, *17*(4), 385–395. doi:10.2190/C770-AWA1-CMQR-YTYV

Flumerfelt, S., & Green, G. (2013). Using LEAN in the flipped classroom for at risk students. *Journal of Educational Technology & Society*, *16*(1), 356–366.

Gallagher, S. A., Shers, B. T., Stepien, W. J., & Workman, D. (1995). Implementing problem based learning. *School Science and Mathematics*, *95*, 136–146. doi:10.1111/j.1949-8594.1995.tb15748.x

Gannod, G. C., Burge, J. E., & Helmick, M. T. (2008). Using the inverted classroom to teach software engineering. In *Proceedings of the 30th International Conference on Software Engineering*. Leipzig, Germany: IEEE.

Garrison, D. R., & Kanuka, H. (2004). Blended learning: Uncovering its transformative potential in higher education. *The Internet and Higher Education*, *7*(2), 95–105. doi:10.1016/j.iheduc.2004.02.001

Georghiades, P. (2004). From the general to the situated: Three decades of metacognition. *International Journal of Science Education*, *26*(3), 365–383. doi:10.1080/0950069032000119401

Ginns, P., & Ellis, R. (2007). Quality in blended learning: Exploring the relationships between on-line and face-to-face teaching and learning. *The Internet and Higher Education*, *10*(1), 53–64. doi:10.1016/j.iheduc.2006.10.003

Hall, R., Stark, S., Hilgers, M., & Chang, P. (2004). A comparison of scaffolding media in a learning system for teaching web development. In J. Nall & R. Robson (Eds.), *Proceedings of World Conference on E-Learning in Corporate, Government, Healthcare, and Higher Education 2004* (pp. 1906-1913). Chesapeake, VA: AACE.

Halpin, R. (1999). A model of constructivist learning in practice: Computer literacy integrated into elementary mathematics and science teacher education. *Journal of Research on Computing in Education*, *32*(1), 128–138.

Heinich, R. (2011). The proper study of instructional technology. In *Instructional technology: Past, present, and future* (pp. 31–54). Santa Barbara, CA: Libraries Unlimited.

Hershberger, K., Zembal-Saul, C., & Starr, M. L. (2006). Evidence helps the KWL get a KLEW. *Science and Children*, *43*(5), 50–53.

Hess, D. (2009). *Controversy in the classroom: The democratic power of discussion*. New York, NY: Routledge.

Holbrook, J., & Dupont, C. (2010). Making the decision to provide enhanced podcasts to post secondary science students. *Journal of Science Education and Technology*, *20*, 233–245. doi:10.1007/s10956-010-9248-1

Hung, W. (2011). Theory to reality: A few issues in implementing problem-based learning. *Educational Technology Research and Development*, *59*, 529–552. doi:10.1007/s11423-011-9198-1

Kagan, D. (1992). Professional growth among preservice and beginning teachers. *Review of Educational Research*, *62*(2), 129–169. doi:10.3102/00346543062002129

Kline, S., Stewart, K., & Murphy, D. (2006). Media literacy in the risk society: Toward a risk reduction strategy. *Canadian Journal of Education*, *29*(1), 131–153. doi:10.2307/20054150

Kumar, D. D. (2010). Approaches to interactive video anchors in problem-based science learning. *Journal of Science Education and Technology*, *19*, 13–19. doi:10.1007/s10956-009-9154-6

Lage, M. J., Platt, G. J., & Treglia, M. (2000). Inverting the classroom: A gateway to creating an inclusive learning environment. *The Journal of Economic Education*, *31*, 30–43.

Lambert, C. (2012). Twilight of the lecture. *Harvard Magazine*, *114*(4), 23–27.

Larson, B., & Keiper, T. (2011). *Instructional strategies for middle and secondary social studies: Methods, assessment and classroom management*. New York, NY: Taylor & Francis Group.

Lehman, J. R. (1994). Secondary science teachers' use of microcomputers during instruction. *School Science and Mathematics*, *94*(8), 415–420. doi:10.1111/j.1949-8594.1994.tb15708.x

Lowry, R. B. (1999). Electronic presentation of lectures–Effect upon student performance. *University Chemistry Education*, *3*(1), 18–21.

Marzano, R. J., Pikering, D. J., & Pollock, J. E. (2001). *Classroom instruction that works: Research based strategies for increasing student achievement*. Upper Saddle River, NJ: Pearson Merrill Prentice Hall.

Mayer, R. E. (2011). *Applying the science of learning*. Boston, MA: Pearson.

Moore Johnson, S.The Project on the Next Generation of Teachers. (2004). *Finders and keepers: Helping new teachers survive and thrive in our schools*. San Francisco, CA: Jossey Bass.

Niederhauser, D. S., & Lindstrom, D. L. (2007). Evidence of the NETS*S in K-12 classrooms: Implications for teacher education. *Journal of Technology and Teacher Education*, *15*, 483–512.

Niess, M. L. (2005). Preparing teachers to teach science and mathematics with technology: Developing a technology pedagogical content knowledge. *Teaching and Teacher Education*, *21*(5), 509–523. doi:10.1016/j.tate.2005.03.006

Noddings, N. (2005). *Educating moral people: A caring alternative to character education*. New York, NY: Teachers College Press.

Ogle, D. M. (1998). K-W-L: A teaching model that develops active reading of expository text. *The Reading Teacher*, *39*, 564–570. doi:10.1598/RT.39.6.11

Overbay, A., Patterson, A. S., & Grable, L. (2009). On the outs: Learning styles, resistance to change, and teacher retention. *Contemporary Issues in Technology & Teacher Education*, *9*(3).

Palak, D., & Walls, R. T. (2009). Teachers' beliefs and technology practices: A mixed-methods approach. *Journal of Research on Technology in Education*, *41*(4), 417–441.

Piaget, J., & Inhelder, B. (1969). *The psychology of the child*. New York, NY: Basic Books.

Redfield, D. L., & Rousseau, E. W. (1981). A meta-analysis of experimental research on teacher questioning behavior. *Review of Educational Research*, *51*(2), 237–245. doi:10.3102/00346543051002237

Reiser, R. A., & Dempsey, J. V. (2012). *Trends and issues in instructional design and technology*. Boston, MA: Pearson.

Rogers, E. (2004). *Diffusion of innovation*. New York, NY: The Free Press.

Schon, D. A. (1983). *The reflective practitioner: How professionals think in action*. London: Temple Smith.

Schunk, D. H. (2011). *Learning theories: An educational perspective*. Upper Saddle River, NJ: Pearson Merrill/Prentice Hall.

Sharp, D. L. M., Bransford, J. D., Goldman, S. R., Risko, V. J., Kinzer, C. K., & Vye, N. J. (1995). Dynamic visual support for story comprehension and mental model building by young at-risk children. *Educational Technology Research and Development*, *43*, 25–42. doi:10.1007/BF02300489

Shen, J. (2003). *New teachers' certification status and attrition pattern: A survival analysis using the baccalaureate and beyond longitudinal study 1993–97*. Paper presented at the AERA Annual Meeting. Chicago, IL.

Snider, S. (2003). Exploring technology integration in a field-based teacher education program: Implementation efforts and findings. *Journal of Research on Technology in Education*, *34*(3), 230–249.

So, H-J., & Brush, T. A. (2008). Student perceptions of collaborative learning, social presence and satisfaction in a blended learning environment: Relationships and critical factors. *Computers & Education*, *51*, 318–336. doi:10.1016/j.compedu.2007.05.009

Sockman, B. R., & Sharma, P. (2008). Struggling toward a transformative model of instruction: It's not so easy! *Teaching and Teacher Education*, *24*(4), 1070–1082. doi:10.1016/j.tate.2007.11.008

Stiggins, R. J., Arter, J. A., Chappuis, J., & Chappuis, S. (2007). *Classroom assessment for student learning: Doing it right--Using it well*. Upper Saddle River, NJ: Pearson Education, Inc.

Strasburger, V. C., Wilson, B. J., & Jordan, A. B. (2009). *Children, adolescents, and the media*. Thousand Oaks, CA: Sage.

Strayer, J. F. (2012). How learning in an inverted classroom influences cooperation, innovation and task orientation. *Learning Environments Research*, *15*, 171–193. doi:10.1007/s10984-012-9108-4

Teachers' Curriculum Institute. (2013). *The interactive student notebook*. Rancho Cordova, CA: Teacher's Curriculum Institute. Retrieved from http://www.teachtci.com/interactivesocial-studies-notebook.html

Topp, N. W. (1995). Building a technology-using faculty to facilitate technology-using teachers. *Journal of Computing in Teacher Education*, *11*(3), 11–14.

Valadez, J. R., & Duran, R. (2007). Redefining the digital divide: Beyond access to computers and the internet. *High School Journal*, *90*(3), 31–44. doi:10.1353/hsj.2007.0013

VanSledright, B. (2002). *In search of America's past: Learning to read history in elementary school*. New York: Teachers College Press.

Watson, D., Blakeley, B., & Abbot, C. (1998). Researching the use of communication technologies in teacher education. *Computers & Education*, *10*(1-2), 15–21. doi:10.1016/S0360-1315(97)00074-2

Zimmerman, B. J. (1989). A social cognitive view of self-regulated academic learning. *Journal of Educational Psychology*, *81*(3). doi:10.1037/0022-0663.81.3.329

ADDITIONAL READING

Bergmann, J., Overmyer, J., & Willie, B. (2011). The flipped classroom: Myth vs. reality. *The Daily Riff*. Retrieved from http://www.thedailyriff.com/articles/the-Flipped class-conversation-689.php

Brunsell, E., & Horejsi, M. (2013, February). A flipped classroom in action. *Science Teacher (Normal, Ill.)*, 8.

Council for Accreditation of Educator Preparation (CAEP). (2010). *CAEP standards for accreditation of teacher preparation*. Washington, D. C.: Council for Accreditation of Teacher Preparation.

Educause. (2012). *Seven things you should know about flipped classroom*. Washington, D. C.: Educause. Retrieved from http://net.educause.edu/ir/library/pdf/eli7081.pdf

Fulton, K. P. (2012). Ten reasons to flip. *Kappan*, *94*(2), 20–24.

TechSmith. (2013). *Exploring the flipped classroom*, Okemos, MI: TechSmith. Retrieved from http://assets.techsmith.com/Docs/pdf-landing-pages/flippedclassroom-explore.pdf

Ted-Ed. (2012). *Flip this video*. New York: Ted-Ed. Retrieved from http://ed.ted.com/about

KEY TERMS AND DEFINITIONS

CAEP Standards: A set of national standards developed by the Council for the Accreditation of Educator Preparation (CAEP) to guide the preparation of teachers in the United States.

Constructivist Learning: A method or philosophy of learning that promotes meaningful student centered learning via the use of multiple resources and data sources.

Flipped Classroom: A technology based method of learning that reverses instruction moving homework or more learner-centered activities into class time even as it moves traditional instruction (i.e., lectures) out of the class into the homework slot using videos or other audiovisual means.

Preservice: A term used to describe beginning teacher educators, particular those enrolled in Teacher Preparation Programs.

This work was previously published in Promoting Active Learning through the Flipped Classroom Model edited by Jared Keengwe, Grace Onchwari, and James N. Oigara, pages 1-22, copyright year 2014 by Information Science Reference (an imprint of IGI Global).

APPENDIX A

Table 1. Alignment of selected educational videos with CAEP teacher preparation standards

Standard	Video Selection	Source
Standard 1: Content and Pedagogical Knowledge		
Instructional Practice		
1.3 Candidates design, adapt, and select a variety of valid and reliable assessments (e.g., formative and summative measures or indicators of growth and proficiency) and employ analytical skills necessary to inform ongoing planning and instruction, as well as to understand, and help students understand their own, progress and growth.	**What is "Authentic" Assessment?** http://www.edutopia.org/stw-assessment-school-of-the-future-introduction-video **Keeping It Relevant and "Authentic"** http://www.edutopia.org/stw-assessment-authentic-relevant-lessons-video **Making Sure They Are Learning** http://www.edutopia.org/stw-assessment-authentic-reading-skills-teacher-video **Five-Year-Olds Pilot Their Own Project-Based Learning** http://www.edutopia.org/kindergarten-project-based-learning-video **Andreas Schleicher: Use data to build better schools** http://www.ted.com/talks/andreas_schleicher_use_data_to_build_better_schools.html	Edutopia Ted: Ideas Worth Sharing
1.4 Candidates engage students in reasoning and collaborative problem solving related to authentic local, state, national, and global issues, incorporating new technologies and instructional tools appropriate to such tasks.	**Project-Based Learning from Start to Finish** http://www.edutopia.org/stw-project-based-learning-best-practices-new-tech-video **Student Voice: Experiencing Deeper Learning Through PBL** http://www.edutopia.org/project-based-learning-rahil-profile-video **Collaborative Learning Builds Deeper Understanding** http://www.edutopia.org/stw-collaborative-learning-math-english-video **Differentiating Instruction Through Interactive Games** http://www.edutopia.org/tech-to-learn-differentiated-instruction-interactive-games-video	Edutopia
The Learner and The Learning Community		
1.8 Candidates build strong relationships with students, families, colleagues, other professionals, and community members, so that all are communicating effectively and collaborating for student growth, development, and well-being	**How to Get Students Ready for Learning** http://www.edutopia.org/stw-sel-classroom-management-video **John Seely Brown on Motivating Learners** http://www.edutopia.org/john-seely-brown-motivating-learners-video **How to Engage Underperforming Students** http://www.edutopia.org/stw-school-turnaround-student-engagement-video **Team Teaching: How to Improve Each Other's Game** http://www.edutopia.org/how-to-team-teach-high-school-video	Edutopia
Equity		
1.9 Candidates reflect on their personal biases and access resources that deepen their own understanding of cultural, ethnic, gender, sexual orientation, language, and learning differences to build stronger relationships and to adapt practice to meet the needs of each learner.	**Diana Laufenberg: How to learn? From mistakes** http://www.ted.com/talks/diana_laufenberg_3_ways_to_teach.html?quote=863 **Bryan Stevenson: We need to talk about an injustice** http://www.ted.com/playlists/15/the_pursuit_of_justice.html	Ted: Ideas Worth Sharing

Council for Accreditation of Educator Preparation (CAEP). (2010). C*AEP standards for accreditation of teacher preparation*. Washington, D. C.: Council for Accreditation of Teacher Preparation.

APPENDIX B: SAMPLE VIEWING GUIDE

Project-Based Learning (PBL): Viewing and Implementation Guide

Directions: We will be examining PBL for the next two weeks. As a part of this activity we will used a Flipped Classroom model to assist our efforts. As such, it is your responsibility to view and reflect in writing about the contents of each of the assigned videos (2) and the online reading (1). Written reflections should appear in your reflective journal and that journal must be brought to class each day. The prompts coupled with your written reflections will serve as the foundation for our course discussion on PBL. Be prepared to share your written thoughts and to discuss PBL during each in class meeting on PBL. Once we have discussed PBL, you will work in your assigned group to develop an age appropriate PBL activity for use with K-3 learners. After those in class presentations, we will engage in a process of summative reflection on PBL before moving to our next course topic.

PBL and the process of implementing PBL into your teaching is supported by the following *CAEP Standard: 1.4*

Step 1: Homework in Advance of Tuesday's Class

Video 1: Project Based Learning from Start to Finish
Source: Edutopia
URL: http://www.edutopia.org/stw-project-based-learning-best-practices-new-tech-video
Length: 8:01 minutes
Before Viewing

1. Define Project Based Learning (PBL)
2. Based on your current understanding of PBL, what do you think is its value for learning?

While Viewing

1. Consider how your understanding of PBL is evolving as you view the contents of the video. What one point about PBL made in the view do you find worthy of serious consideration?
2. What point (quote) from one learner do you find most compelling?

After Viewing: Consider and be ready to discuss these questions in class on Tuesday:

1. Look back at your original definition of PBL and update this definition based on what you learned from the contents of the video. How did it change? How did it stay the same?
2. Why is it important to use learners' prior knowledge to "hook" them into the content of the PBL activity?
3. How did the teachers work together to assure learning?
4. How successful were they in aligning PBL to state standards?
5. How would you begin the process of implementing PBL into your teaching?
6. What do you need to know to assure your success with PBL?
7. How successful might PBL with younger learners (K-3)?
8. How did you decide what information contained in the video was important?
9. What connections have you made between the video's contents and your practice?
10. Where in your teaching could you use what you learned from the video?

Reading 1: A Step-by-Step Guide to the Best Projects

Source: Edutopia
URL: http://www.edutopia.org/stw-project-based-learning-best-practices-new-tech-video
Length: NA
Before Reading

1. List the steps you think are involved in planning, implementing and assessing a lesson using PBL.

While Reading

1. Consider the steps and assess, in the moment, your level of comfort placing a **X** on the continuum in the spot that best reflects your comfort level with PBL.

Very Uncomfortable Very Comfortable
0______________________________1_____________________________2

After Viewing: Consider these questions as they will serve as the foundation for the in class discussion of PBL.

1. What are the strengths of PBL?
2. What are the limitations?
3. What strength do you bring to PBL?
4. What strength might you need to master to assure your success with PBL
5. Consider again, this question from earlier: How successful might PBL with younger learners (K-3)? Place an **X** on the spot on the continuum that best reflects your position.

Unsuccessful Successful
0____________________________1_____________________________2

Step 2: In Class Discussion of PBL on Tuesday

Bring reflective journals to class and be prepared to deeply discuss PBL during class. NOTE: Questions from this guide will serve as starting points for out discussion.

Step 3: Homework for Thursday's Class

Video 2: Five-Year-Olds Pilot Their Own Project-Based Learning
Source: http://www.edutopia.org/kindergarten-project-based-learning-video
Length: 9:01 minutes
Before Viewing

1. What special steps might a teacher need to consider before using PBL with young (K-3) children?
2. How realistic do you think long term PBL projects might be for very young children?

While Viewing

1. What themes from K-3 standards might make successful PBL topics?
2. What management issues emerge that a teacher would want to anticipate and plan for when planning to use PBL?

After Viewing

1. Looking back at your earlier self-assessments of comfort and success, go back and place a check (√) on the spot you now think best reflects your understanding.

2. How did your perspectives change? What factor(s) caused you to change (or fail to change) your perspective about PBL?
3. Identify a list of possible management issues to plan for when developing a PBL activity with the assigned age group (K-3).
4. What statements concern you or contradicted previous understanding of PBL?
5. Where in your teaching could you use what you learned from the video?

Step 4: In Class Follow Up Discussion for Thursday's Class

Bring updated reflective journals to class and be prepared to participate in further discussion of PBL focusing on its use with K-3 learners.

Step 5: Group Activity for Thursday's Class (2 Class Periods, Plus out of Class Group Meetings)

1. Identify a guiding theme or guiding question based on one K-3 learning standard and then identify one appropriate to PBL activity to develop and model for your peers based on this work.
2. What prior knowledge is required of the learner?
3. Develop, rehearse, revise, and them implement (model) the activity for your peers in this class.
4. Be sure to build/develop all materials needed for successful implementation.
5. Present/model your PBL activity for the entire group.
6. Post finalized material in Moodle for peer feedback and instructor grading.

Step 6: Post-Implementation Questions for Final Class on PBL

1. What did you learn about PBL from the group activities developed and modeled in class?
2. As you plan for future PBL activities, what specific management, developmental, and/or academic issues do you now know need to consider?
3. What part of the development and modeling of your group's PBL activity was the most successful? Why?
4. What part might you improve if you were to teach the lesson again?
5. What advice would you give to a novice teacher considering PBL for the first time?

Summative Questions

1. What have you learned about PBL from all the materials and activities?
2. What connections have you made to your teaching practice?
3. Is there another way you could use that same information to support learning?
4. What about PBL continues to concerns you and/or contradicts your previous understanding?
5. Which information about PBL is more important to you than other parts?
6. How useful for learning did you find the Flipped Classroom model? To what extend do you think the Flipped Model supported your learning? What other way(s) might you have preferred to learn this information?

Chapter 78
Innovations in Blended-Learning:
Promoting Proficiency in Reading Comprehension among Students with Dyslexia

Edith Gotesman
Ashkelon Academic College, Israel

Miri Krisi
Ashkelon Academic College, Israel

ABSTRACT

This research was born out of a necessity to accommodate students with learning disabilities who study English for Academic Purposes (EAP) at the Ashkelon Academic College in Israel. It was aimed at examining whether a convergence of traditional teaching and computer technology complemented by e-learning could assist students with Learning Disabilities (LD) to bypass their initial disadvantages when it came to studying English. Groups of LD students selected for study were given five regular and two guided reading tests to explore whether the use of blended learning improved the reading comprehension abilities of students in the sample group.

INTRODUCTION

At Ashkelon College, we are moving from a teacher-centered to a learner-focused system of education. New developments in learning and technology provide opportunities for creating well-designed meaningful learning environments for diverse learners including learners with disabilities. With the advent of computer based education and online learning methodologies and technologies, providers of education are combining teaching methods to fulfill the needs of their learners. Academic institutions now increasingly make use of the internet and digital technologies to deliver instruction and training. Many instructors are encouraged to design courses in which students can benefit from blended learning, a relatively new educational practice which integrates

DOI: 10.4018/978-1-4666-8246-7.ch078

classroom face-to-face learning experiences with online learning experiences (Garrison & Kanuka, 2004). Transformation of learning environments in higher education settings for an increasingly electronic world is critical to ensure that the benefits are fully realized (Williams, 2002). Universities and other institutions of higher education are required to "provide for a larger and more diverse cross-section of the population, to cater for emerging patterns on educational involvement which facilitate lifelong learning and to include technology-based practices in the curriculum'' (Hicks, Reid, & George, 2001, p. 143)

Despite the gaining acceptance of blended learning in higher education (Bliuc, Goodyear, & Ellis, 2007), blended leaning is often a neglected pedagogical strategy for teaching students with learning disabilities. The reasons for the lack of use may vary from teachers who are unaware of the options for using blended learning in their courses, to teachers who are familiar with this method of teaching, but might feel threatened by change and the use of new technologies. Thus far, no studies were conducted examining the blended learning experiences of students with learning disabilities, and its contribution to successful learning.

In this study, the use of blended learning emerged out of the necessity to accommodate students with learning disabilities who study English for Academic Purposes (EAP) in higher education. We would like to share our experience in the field by discussing the practical use of blended learning with this particular group of students. For these students, frontal teaching and the use of assistive technologies (AT) were combined with e-learning in order to assist them read in English. The policy at Ashkelon College is that students with learning disabilities are entitled to a reader. This policy is advantageous during exams and while working at home. However, during the lessons which are not specifically suited to the needs of the LD students, they are unable to benefit from a reader. Instead, LD students have to cope with the reading of the text by themselves, which makes the task almost impossible. Often times they become frustrated at their lack of success and lose motivation. The purpose of the current study was to examine the use of blended learning for teaching English to LD students, and its contribution to successful learning.

In the following sections, we will elaborate on the issue of teaching English in higher education settings, in particular in Israel. Moreover, we will present literature related to teaching English to LD students in higher education using assistive technologies, e-learning modalities, and blended learning techniques. Finally, we will share how these techniques were used to teach English to LD students and the effect these pedagogical strategies had on our students at Ashkelon Academic College.

BACKGROUND

Teaching English for Academic Purposes in Higher Education

In the world of globalization, reading academic texts in English is a basic requirement of higher education. English is important both for college or university entry and for graduation. English is a very important subject especially for students in non-English speaking countries. Thus, as part of the academic requirements in Israel, all college and university students have to master academic vocabulary and reach an advanced level of exemption in reading comprehension in order to graduate.

This exemption level is achieved either through psychometric exams or through enrollment in different levels of English courses based on their entrance level of English. Students who did not reach exemption level prior to their admission to college or university take English courses at different levels, from beginners to advanced levels, provided at the institutions of higher education so that they can meet the requirements. The aim of these courses is to assist students in reaching a proper level of text comprehension in English through the teaching of reading strategies and familiarizing students with extended academic vocabulary.

Students identified as having learning disabilities such as dyslexia often struggle to attain literacy in English. These students are required to meet the same requirements in English as students without learning disabilities. At Ashkelon Academic College, English instructors searched for the best method for helping LD students meet the necessary requirements without the feeling of failure or frustration that often accompanies these students during the course. We reasoned that as they had been unable to learn English using the traditional teaching methods, the use of Assistive Technologies combined with e-learning could facilitate their understanding of texts in English and also lead to their becoming autonomous learners.

PROFICIENCY IN READING

Dyslexia and the Use of Assistive Technologies

Dyslexia is defined as a specific functional failure to acquire the age-appropriate reading skills in otherwise normally developing children (Curtin, Manis & Siedenberg, 2001). Thus, individuals with dyslexia exhibit difficulties in acquiring reading and writing skills at the level expected at a particular age. It is evident when accurate and fluent word reading, spelling and writing develop very incompletely or with great difficulty (Siegel & Smythe, 2004). Within the context of our study, it should be noted that reading and writing skills include comprehension as well and not only word recognition and decoding.

Students with dyslexia often find reading texts extremely difficult in their mother tongue, a difficulty that is exacerbated in attempts to read texts in a foreign language such as English. The aim of Ashkelon college English program is to assist students with dyslexia and other language-related difficulties in learning to read English fluently and be able to cope with the different academic texts provided in the exemption courses. After using different teaching strategies, we came to the conclusion that assistive technology, specifically text-to-speech programs, might be more appropriate for achieving these goals.

The use of assistive technology (AT) has been shown to be effective in many areas, including education. Research has shown that the integration of computer technologies into education is uniquely beneficial to students with special needs, on both the academic and the socio emotional levels, especially for students with learning disabilities (LD) who experience deficiencies in basic academic skills as well as social difficulties through their development (Raskind, Margalit, & Higgins, 2006). Nowadays, many computer programs have features that meet the needs of students with LD. Information and communication technologies support writing, spelling, planning, organizing, editing, and calculation in such a way that users feel more able to express their opinions and their needs. Technological developments have highlighted the potential of assistive technologies for special needs populations (Heiman & Olenik-Shemesh, 2012).

Definition and Types of Assistive Technologies

The term assistive technology (AT) is defined as "any item, piece of equipment, or product system, whether acquired commercially, modified, or customized, that is used to increase, maintain, or improve functional capabilities of individuals with disabilities" (Individuals with Disabilities Education Improvement Act, 2004, sec. 602). According to Raskind and Higgins (1998), assistive technology referred to any technology used to bridge the gap between the person's abilities and the demands of the environment, which can compensate for their specific deficits. Lewis

Table 1. Matching AT to students' specific needs

Student's Individual Need	Assistive Technology
Decoding (sounding out words) Reading comprehension	Text-to-speech programs
Handwriting Directionality	Speech-to-text programs
Expressing words in written form	Word processors Word prediction programs
Encoding (spelling)	Proofreading programs Spell checkers
Organization	Outlining/brainstorming programs

(1998) added that the ease of technology usage can promote students' ability to overcome barriers regarding academic difficulties.

AT covers a wide range of software which helps students read, write, organize information and spell. Table 1 presents the ways in which AT can be used to meet the specific needs of students with disabilities.

Research on Assistive Technology and Learning Disabilities

The use of technology has been shown to be effective in a wide range of content areas (Ashton, 2005; Edyburn, 2004; Okolo, Cavalier, Ferretti, & MacArthur, 2000). Research indicates that use of Assistive Technology (AT) can contribute to strengthening students' skills in decoding, comprehending and reading with fluency (Elkind, Cohen & Murray 1993; Higgins & Raskind, 2000), word recognition, reading comprehension, spelling and reading strategies (Raskind & Higgins, 1999), spelling (Dalton, Winbury, & Morocco, 1990), organizing, reading and synthesizing information (Anderson, Inman, Knox-Quinn, & Homey, 1996, Anderson, Inman, Knox-Quinn, & Szymanski, 1999), proofreading (Raskind & Higgins, 1995) and writing (Raskind & Higgins, 1995). While the use of AT has many benefits, it is essential that an instructor is able to select the most appropriate technology that matches their students' needs.

Selecting the Appropriate Technology and Matching it to Students' Individual Needs: Raskind and Higgins (1998) claim that selecting the appropriate technology for an individual with a learning disability requires careful analysis of the interplay between the individual, the specific tasks or functions to be performed, the specific technology and the specific context of interaction. Figure 1 shows the interplay between the individual who requires assistive technology, the context in which it is used - at home for homework, at school for class assignments or in the library - and the type of technology.

Each individual should have access to the type of technology that best complements his or her needs. The chosen type of assistive technology could help an individual with a learning disability to function at a level that is appropriate to their level of intelligence. Table 2 presents various types of AT that correspond to the type of learning difficulty: difficulty in reading, writing, planning and organizing material, spelling and word prediction.

Text-to-Speech Programs: Individuals with learning disabilities such as dyslexia, who have difficulty in decoding and understanding written text, may be able to comprehend printed content better when it is read out loud. These individuals

Figure 1. The interplay of individual, task, context and technology (Source: Raskind, 2006)

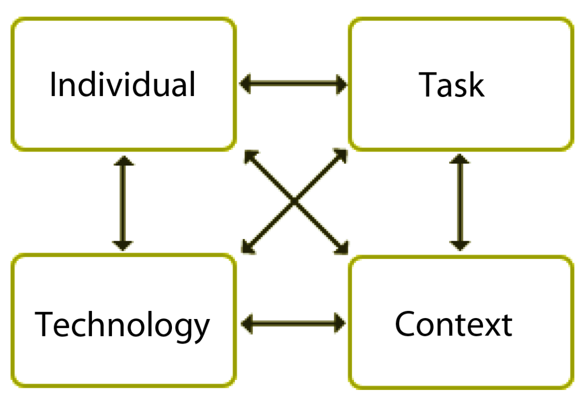


Table 2. AT according to types of difficulty/impairment

Type of Difficulty	At to Consider	Internet Site
Reading	ReadPlease Natural Reader TextAloud TextAssist Kurtzweil Read&Write	www.readplease.com www.naturalreader.com www.textaloud.com www.textassist.com www.kurzweiledu.com http://www.texthelp.com
Writing	DragonNaturally Speaking Intellitalk	www.nuance.com/naturallyspeaking www.intellitools.com
Planning and organization	Inspiration	www.inspiration.com
Spelling and word prediction	WordQ Predictor Pro	www.wordq.com www.readingmadeez.com/products/PredictorPro.html

may have substantial gains in reading scores and comprehension when the text is read aloud for them. Text-to-speech programs allow the electronic text to be synchronized with audio in order to help people with reading difficulties. These reading programs are very useful not only for students with dyslexia. They are also valuable for visually impaired students who can use one of the software features in order to enlarge font, change background and/or listen to the text uploaded to the screen of the reader.

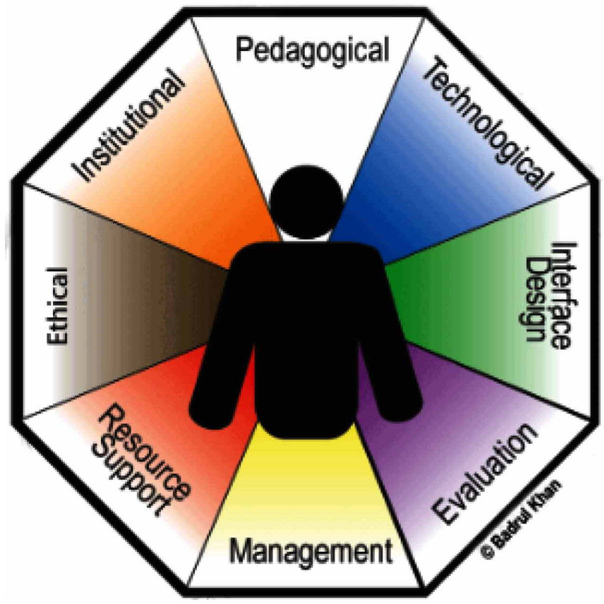
At Ashkelon Academic College our choice for text-to-speech software was TextAloud. This reading program provides multi-modal reading, which means that the text- to-speech is combined with word-by-word highlighting, thus reading a digital text out loud. Students can adjust the reading rate and the font size according to their individual needs. The software provides options for voice type. One of its advantages over other text-to-speech programs is that it can turn text files into audio files. LD students at Ashkelon College use TextAloud to listen to articles both in class while working on assignments and at home when preparing their homework. TextAloud offers AT&T voices, which sound less artificial and are better understood by students.

E-Learning

Most institutions of higher education make use of advanced technologies to improve their distance teaching. E-learning (studying via the Internet) can be viewed as an innovative approach for delivering well-designed, learner-centered, interactive and facilitated learning environment to anyone, anyplace, anytime, by utilizing the attributes and resources of various digital technologies along with other forms of learning materials suited for open and distributed learning environment (Kahn, 2001).

Studies show that with regards to academic aspects, e-learning provides pedagogical and technological alternatives to face-to-face tutorial meetings for students who are unable to attend the group meetings or for students with various disabilities (Heiman & Olenik-Shemesh, 2012). E-learning provides constant academic updates as well as online discussion forums, allowing the learner to reflect prior to responding to a message, and therefore it usually enables a better analytic response (Harasim, 1990). E-learning often includes additional enrichment learning resources, links to databases, Internet sites and multimedia materials that are related to the course of study.

Figure 2. Kahn's octagonal framework



The theoretical framework for our special course at Ashkelon Academic College is based on Khan's e-learning framework 'The Octagonal Framework' (http://asianvu.com/bk/framework/).

According to Khan (2005), a variety of factors are required to be addressed in order to create a meaningful learning environment, many of which are interrelated and interdependent. Since the learning requirements and preferences of each learner tend to vary, it is essential to use a blend of learning approaches and teaching strategies in order to cater for their needs. Placing the learner at the center of Kahn's framework, we identified the critical issues of the learning environment for our particular group of students and adopted the teaching philosophy which best suits the needs of our students: blended learning.

Blended Learning

Today's students are increasingly more diverse than ever before. Incoming undergraduates are in many cases more technologically proficient than their faculty (Dziuban, Hartman & Moskal, 2004). A relatively innovative trend emerging in higher education is the blending of text-based asynchronous Internet technology with face-to-face learning—often referred to as simply blended learning (Garrison & Kanuka, 2004). Bonk and Graham (2005) state in their Handbook of Blended Learning that "The widespread adoption and availability of digital learning technologies has led to increased levels of integration of computer mediated instructional elements into the traditional F2F (face to face) learning experience" (p. 27).

There are a number of potential advantages to blended learning that are emerging. Some of these revolve around accessibility, pedagogical effectiveness, and course interaction. An additional benefit is an increase in interaction over what students and faculty typically perceive in face-to-face courses, and the end result is a learning environment where students can be actively engaged, potentially learning more than in a traditional on campus classroom (Wingard, 2004).

Blended learning represents a shift in educational strategy. It is an educational method that combines the benefits of e-learning, computer technology and the conventional face-to-face teaching methods in order to optimize the teaching and learning process. It intends to take the best of both worlds. Students take advantage of teacher-driven presentation and selection of relevant content, benefit from social interaction, live instruction and immediate feedback. Blended learning supports personalized learning, thoughtful reflection, and differentiate instruction from student to student across a diverse group of learners. Thus, blended learning offers a pedagogical approach that combines the effectiveness and socialization opportunities of the classroom with the technologically enhanced active learning possibilities of the online environment (Dziuban, Hartman & Moskal, 2004).

THE PILOT PROJECT STUDY

Rationale, Problems and Solutions

Pupils with learning disabilities become college students with learning disabilities. In order to meet the needs of students with learning disabilities attending institutions of higher education, these institutions offer various accommodations for students who have been diagnosed as having a disability. Assessment is the key determining factor in deciding whether a student will benefit from a text-to-speech output accommodation. A student who has difficulty decoding multisyllabic words, loses his or her place on the page, or has difficulty comprehending printed text, may benefit from text-to-speech output. The diagnosis is conducted by a certified diagnostician specializing in learning disabilities.

Our college offers LD students enrolled in the EAP program the opportunity to complete their English requirements. Students formally diagnosed as learning-disabled are offered the following accommodations:

1. A modified version of the text: the original text of the article to be studied is edited and rearranged in a different way in a manner that simplifies accessibility to answers. Each group of paragraphs is followed by the set of questions that refer to them. This format helps LD students better focus on their assignment.
2. Time extension.
3. Use of TextAloud program, a text-to-speech software which reads the text of the article and the related questions.

Aim of the Project

The pilot study aimed at examining whether employing blended learning could facilitate the understanding of English texts by LD students and improve their reading comprehension abilities thus leading to their becoming autonomous learners.

Methodology: We used a quantitative experimental research. The experimental study was conducted throughout the academic year of 2010-2011. The stages of the study included a pre-test, intervention and a post-test design. The t-tests, comparing the average scores of the first and final exams of the students in the control group to those of the students in the special group, were statistically analyzed and discussed. In addition, observations of the students in the respective classes were conducted during the academic year, and a follow-up interview with students from both sample and control groups were conducted at the end of the course.

During the observations, notes were taken as to the use of the software by the students in the sample group, the interactions of the LD students in both the specialized and regular classes with the instructors as well as other students, as well as the students' participation in the lesson. The end-of-year interview included questions regarding the student's perceptions, feelings and overall sense of accomplishment at the end of the course.

Two groups of LD students participated in the pilot study. All the students took five exams during the academic year. The t-tests compared the average scores of the first and final exams of the students in the control group to those of the students in the special group. The sample group consisted of 20 students enrolled in the special course for LD students, and the control group consisted of 7 LD students who were entitled to the same accommodations, but chose not to be part of the special course. The special course is designed for LD students. The course includes the same materials, reading strategies and academic vocabulary as those used in the regular EAP courses. However, the specialized English course for LD students differs from the regular courses in that the lesson takes place in a computer lab, where each student sits in front of a computer and uses TextAloud in order to read the materials used during the lesson.

In the study, each group of participants undertook five reading comprehension exams during the annual course. The exams varied in terms of level of difficulty, length of the text and vocabulary. Students took the first exam at the beginning of the course, and the last exam was the final exemption test at the end of the course. The first group of twenty students, who were part of the special course, used TextAloud for class assignments on a regular basis. In order to be able to practice the material taught in class and complete homework assignments by using the reading software, the teaching and learning process was supplemented by e-learning. LD students had access to the learning materials and the TextAloud program online. They in fact experienced blended learning: face-to-face teaching in the computer lab, use of AT and e-learning. The teaching methodology used incorporated frontal teaching – the instructor taught his students traditionally, using books and board, supplemented by the use of assistive technology – students put on their headphones and individually listened to the text and questions read aloud by TextAloud. Thus, every lesson began with a traditional mode of instruction in which the instructor provided explanations of the material taught. The students' independent learning followed in the second part of the lesson. They put on their headphones and used TextAloud in order to listen to the text of the article and related questions. The instructor role is to supervise, answer questions, to provide immediate feedback and technical assistance.

The software assisted LD students decode the text by reading aloud the text copied into the program window. The program's features allowed each student to choose the preferred "natural voice" of a male or female reader, to adjust the speed and pitch of the reading, as well as go back and forth in the text as needed. Students were able to concentrate better as they listened to the text through their headphones. The students worked at their own pace, and greatly appreciated the option of reading speed adjustment. At home students accessed the college site and used the reading software in order to complete their assignments. In the past, students would download the trial version of TextAloud from the Internet site and work at home, but the artificial computer voices that the free trial version offers were not clear enough. The solution was to work online from home. Students virtually connected to the desktop of the college main computer by using their username and password. In this way they could use the college purchased version of TextAloud and listen to the text being read by more natural voices.

The second group included seven LD students who took part in the regular courses, and did not have access to a computer during the regular lessons. Thus, they experienced only the traditional method of face-to-face teaching. These students made use of TextAloud only during in-class and the final exams.

Findings

The results of the 5 exams of all 27 participants were statistically analyzed.

Table 3 presents the means and standard deviations of the scores on the exams of the students in the specialized class. The results point to a significant improvement in the students' scores over time $F(4,76) = 11.6, p < 0.01, \eta^2 = 0.38$. A subsequent Bonferroni test indicates a significant difference in student English test scores from the second to the third exams and the last exam.

In addition, a comparison between the results of the LD students in the specialized class to the results of LD students in the regular classes indicates that although both groups showed a gradual improvement in exam scores, students who attended the specialized class appeared to achieve greater improvements. That is, while no significant differences between groups are found in the scores on the first exam (t (28) =-0.207, p=0.84), significant differences are found in the scores on the exemption exam given at the end of the course (t (28) =1.5, p=0.144) (see Table 4).

CONCLUSION AND RECOMMENDATIONS FOR FURTHER RESEARCH

The pilot study aimed at examining whether employing blended learning could facilitate the understanding of English texts of LD students and improve their reading comprehension abilities thus leading to their becoming autonomous learners. Overall, the results point toward a tendency of

Table 3. Mean ± Standard Deviations of exam scores of LD students in specialized class

	M (N=20)	SD (N=20)
2nd exam	53.60	13.869
3rd exam	56.45	13.987
4th exam	69.10	11.675
5th exam	63.10	11.787
Final exam	76.15	17.064

Table 4. Comparison in means of 1st and final exam

Exam	Dyslexic Students in the Special Course	Dyslexic Students in Regular Courses
1st exam	53.7 (14.98)	55 (13.13)
Exemption exam	75.96 (16.5)	63.6 (26.5)

improvement for both LD groups, those who used the technology and were enrolled in the blended English learning course and those who did not. Nevertheless, while both groups benefited from participating in the course as shown by their improvement in reading English academic texts, those students who took part in the specialized course were able to make greater progress. It appears that the use of blended learning including the use of assistive technology and e-learning best suited the students' needs, and provided the necessary tools to supplement the face-to-face teaching. The use of the computer for reading texts in class helped students to understand the lesson better

Thus, while students in the sample group benefited from TextAloud, which assisted them in bypassing their reading disability, the LD students in the regular class had to rely mainly on the instructor's help during the lesson for reading and comprehending the texts. This, in turn, put them at a disadvantage since the instructor's attention focused on the majority of regular students rather than the LD student. Students' access to TextAloud at home assisted them in doing homework assignments on their own. This enabled them to practice the various strategies and new vocabulary taught in class. LD students who attended the regular classes did not have access to the text-to-speech program from home. Consequently, completing their homework assignments was much more difficult, often leading to frustration and neglect to complete their assignments.

When asked about their experiences with blended learning, most students in the sample group expressed satisfaction with the level of instruction as well as the multitude of teaching media, stating that the use of AT and e-learning greatly contributed to their accomplishments in the course. More importantly, students claimed that their ability to "handle texts on their own" had also helped in boosting up their self-esteem, proving their ability to succeed in the academic studies despite reading difficulties. Hence, it appears that employing blended learning as the teaching strategy increased students' participation in the lesson and helped them be better prepared to reading articles in their individual field of study. Moreover, participating in the specialized course provided students with the opportunity to learn, apply, develop, maintain and generalize new reading strategies, leading to improvements in their reading fluency. This resulted in better grades.

An interesting observation regarding the use of the program is worth noting. It appears that students vary in the way in which they related to the software. While some students made constant use of the software and could not do without the reader, others used it only when they encountered difficult words they were unable to read by themselves. Students from both the sample and control groups acknowledged the advantages of the reader over the tapes they had used in high school: easier movement in the text, possibility to enlarge fonts, arrange text according to individual preferences, adjust the speed/pace of reading, choose the voice of the reader (male or female) which best suited their needs. The fact that students were able to use the reader by working online from home did, in fact, contribute to their success. Students realized that the software could not only help them read in order to understand the texts studied during the course. It could become handy whenever they have to read. After graduation from colleges or universities, students start their own career. Since their reading disability does not disappear, they will be able to benefit from the assistance of screen readers later in life.

Nonetheless, some caveats should be mentioned that future implementation of AT and e-learning should take into consideration. Some students pointed to the lack of inflection and intonation of the reading program, which slightly impaired their understanding. They would rather listen to human voices, to a real person sitting across them and reading to them. In addition, instructors observed that some students found it hard to multitask while working individually during the lesson.

In addition, a follow-up research on a larger population of LD students and a longer period of time is needed. We consider using more varied research tools by adding in-depth interviews and case studies in order to observe individual variation. Research carried out thus far on e-readers indicates that, as is often the conclusion in educational research, individual variation merits greater attention than mere examination of group means (Hecker et al., 2002). The effectiveness of e-readers appears to be highly dependent on individual student traits.

The present study shed some light as to the contribution of blended learning in improving the reading comprehension of LD students. It appears that blended learning provided LD students with the appropriate learning environment and the necessary tools for maintaining an open and flexible learning environment. Educators should not hesitate to integrate technology features into instruction for students who struggle with academic tasks. These approaches can support learning by building literacy, language skills and independence.

REFERENCES

Anderson-Inman, L., Knox-Quinn, C., & Horney, M. A. (1996). Computer-based study strategies for students with learning disabilities: Individual differences associated with adoption level. *Journal of Learning Disabilities*, *29*(5), 461–484. doi:10.1177/002221949602900502 PMID:8870517

Anderson-Inman, L., Knox-Quinn, C., & Szymanski, M. (1999). Computer-supported studying: Stories of successful transition to postsecondary education. *Career Development for Exceptional Children*, *22*(2), 185–212.

Ashton, T. M. (2005). Students with learning disabilities using assistive technology in the inclusive classroom. In D. Edyburn, K. Higgins, & R. Boone (Eds.), *Handbook of special education technology research and practice* (pp. 229–238). Whitefish Bay, WI: Knowledge by Design.

Bliuc, A. M., Goodyear, P., & Ellis, R. A. (2007). Research focus and methodological choices in studies into students' experiences of blended learning in higher education. *The Internet and Higher Education*, *10*(4), 231–244. doi:10.1016/j.iheduc.2007.08.001

Bonk, C., & Graham, C. (Eds.). (2005). *The handbook of blended learning: Global perspectives, local designs*. New York: Pfeiffer.

Dalton, B., Winbury, N. E., & Morocco, C. C. (1990). If you could just push a button: Two fourth grade boys with learning disabilities learn to use a computer spelling checker. *Journal of Special Education Technology*, *10*, 177–191.

Edyburn, D. L. (2004). 2003 in review: A synthesis of the special education technology literature. *Journal of Special Education Technology*, *19*(4), 57–80.

Elkind, J., Cohen, C., & Murray, C. (1993). Using computer-based readers to improve reading comprehension of students with dyslexia. *Annals of Dyslexia*, *43*(1), 238–259. doi:10.1007/BF02928184

Garrison, R. D., & Kanuka, H. (2004). Blended learning: Uncovering its transformative potential in higher education. *The Internet and Higher Education*, *7*(2), 95–105. doi:10.1016/j.iheduc.2004.02.001

Gefen, D., Straub, D. W., & Boudreau, M. C. (2000). Structural equation modeling and regression: Guidelines for research practice. *Communications of the AIS*, *4*, 1–78.

Hecker, L., Burns, L., Elkind, J., Elkind, K., & Katz, L. (2002). Benefits of assistive reading software for students with attention disorders. *Annals of Dyslexia*, *52*(1), 244–272. doi:10.1007/s11881-002-0015-8

Heiman, T., & Olenik-Shemesh, D. (2012). Students with learning disabilities in higher education: Use and contribution of assistive technology and website courses and their correlation to students' hope and well-being. *Journal of Learning Disabilities*, *45*, 308–318. doi:10.1177/0022219410392047 PMID:21252373

Higgins, E. L., & Raskind, M. H. (2000). Speaking to read: The effects of continuous vs. discrete speech recognition systems on the reading and spelling of children with learning disabilities. *Journal of Special Education Technology*, *15*(1), 19–30.

Hirschheim, R. (2005). The internet-based education bandwagon: Look before you leap. *Communications of the ACM*, *48*(7), 97–101. doi:10.1145/1070838.1070844

Kahn, B. (2005). *Managing e-learning strategies: Design, delivery, implementation and evaluation*. Englewood Cliffs, NJ: Educational Technology Publications. doi:10.4018/978-1-59140-634-1

Khan, B. H. (2001). A framework for web-based learning. In B. H. Khan (Ed.), *Web-based training*. Englewood Cliffs, NJ: Educational Technology Publications.

Okolo, C. M., Cavalier, A. R., Ferretti, R. P., & MacArthur, C. A. (2000). Technology literacy and disabilities: A review of the research. In R. Gersten, E. P. Schiller, & S. Vaughn (Eds.), *Contemporary special education research: Syntheses of the knowledge base on critical instructional issues* (pp. 179–250). Mahwah, NJ: Erlbaum.

Raskind, M., Margalit, M., & Higgins, E. L. (2006). My LD: Children's voices on the internet. *Learning Disability Quarterly*, *29*(4), 253–268. doi:10.2307/30035553

Raskind, M. H., Gerber, P. J., Goldberg, R. J., Higgins, E. L., & Herman, K. L. (1998). Longitudinal research in learning disabilities: Report on an international symposium. *Journal of Learning Disabilities*, *31*(3), 266–277. doi:10.1177/002221949803100306 PMID:9599959

Raskind, M. H., & Higgins, E. (1995). Effects of speech synthesis on the proofreading efficiency of postsecondary students with learning disabilities. *Learning Disability Quarterly*, *18*(2), 141–158. doi:10.2307/1511201

Raskind, M. H., & Higgins, E. (1999). Speaking to read: The effects of speech recognition technology on the reading and spelling performance of children with learning disabilities. *Annals of Dyslexia*, *47*(1), 251–281. doi:10.1007/s11881-999-0026-9

Raskind, M. H., & Higgins, E. L. (1998). Assistive technology for postsecondary students with learning disabilities: An overview. *Journal of Learning Disabilities*, *31*(1), 27–40. doi:10.1177/002221949803100104 PMID:9455175

Siegel, L., & Smythe, I. (2004). Dyslexia and English as an additional language (EAL), towards a greater understanding. In *Dyslexia in Context: Research, Policy and Practice* (pp. 132–146). London: Whurr Publishers. doi:10.1002/9780470777916.ch7

Simon, H. A. (1957). *Models of man: Social and rational*. New York: John Wiley and Sons, Inc.

Wingard, R. G. (2004). Classroom teaching in web enhanced courses: A multi-institutional study. *EDUCAUSE Quarterly*, *1*, 26–35.

KEY TERMS AND DEFINITIONS

Assistive Technology: Any item, piece of equipment, or product system, whether acquired commercially, modified, or customized, that is used to increase, maintain, or improve functional capabilities of individuals with disabilities.

Blended Learning: An educational method that combines the benefits of e-learning, computer technology and the conventional face-to-face teaching methods in order to optimize the teaching and learning process.

Dyslexia: A specific functional failure to acquire the age-appropriate reading skills in otherwise normally developing children.

E-Learning: Studying via Internet.

EAP: English for academic purposes.

LD Students: Students with learning disabilities.

Text-to-Speech Programs: Computer programs that use a form of speech synthesis that converts text into spoken voice output.

This work was previously published in Practical Applications and Experiences in K-20 Blended Learning Environments edited by Lydia Kyei-Blankson and Esther Ntuli, pages 295-306, copyright year 2014 by Information Science Reference (an imprint of IGI Global).

Chapter 79
The Ever-Evolving Educator: Examining K-12 Online Teachers in the United States

Jean Larson
Arizona State University, USA

Leanna Archambault
Arizona State University, USA

ABSTRACT

This chapter reviews the current research on the educational, training, and demographic characteristics of those involved in teaching K-12 online. Although very few colleges of education incorporate any aspect of teaching online into their curricula, the existing online teacher preparation programs are discussed. Past and ongoing research reveals a dramatic disconnect between: (a) the rapidly expanding expectations for and implementation of online education at the K-12 levels and (b) the surprisingly limited extent to which teachers are actually being educated, trained, and otherwise prepared to function in this challenging new educational environment. The implications for teacher education programs and current K-12 virtual schools are clear. Effective online teaching techniques must be defined, empirically proven, and efficiently implemented by both future and current K-12 online teachers.

INTRODUCTION

Online education at the K-12 level is in the early stage of an exponential growth pattern that will ultimately result in an entirely new educational paradigm (Miller & Ribble, 2010). The need for highly-qualified, classroom teachers has always been critical, but now such teachers must also be trained to meet the challenges of conveying knowledge to students that are separated from the teacher in space and time (Charania, 2010). This new category of teachers must be capable of (a) transferring knowledge without face-to-face contact, (b) designing and developing course content in a technology-based environment and (c) delivering content in a way that will both engage the remote student and assure that the content is actually learned. Unfortunately, there is a significant disconnect between the growing expectations for online education and the training

DOI: 10.4018/978-1-4666-8246-7.ch079

of teachers expected to teach in this uniquely different environment. While some form of online learning is now available in every state (Watson, Murin, Vashaw, Gemin, & Rapp, 2011), only a small minority of current K-12 online teachers have actually received formal training on how to teach online during the course of their teacher education program (Archambault, 2011; Dawley, Rice, & Hinks, 2010). The current status of online K-12 education must be viewed against a background of teacher training that includes very little, if any, relevant instruction pertaining to teaching in an online environment.

This chapter will present and discuss the following topics:

1. An introduction to online teacher quality and preparation;
2. The characteristics of K-12 online teachers based on current research;
3. Programmatic online teacher preparation efforts, both at the pre-service and in-service levels; and,
4. Implications and recommendations for teacher education programs.

BACKGROUND

Current Status of K-12 Online and Blended Learning

During the 2012-2013 school year, 31 states had at least one fully-online, statewide school (Watson, Murin, Vashaw, Gemin, & Rapp, 2012). Enrollment in K-12 courses offered by online schools has increased from 50,000 course enrollments in 2000 (Clark, 2001) to over 2 million course enrollments in 2009 (Patrick & Dawley, 2009). Watson et al. (2012) report that about 5% of all K-12 students in the United States are enrolled in at least one online class. Queen, Lewis and Coopersmith (2011) found that 55% of public school districts were offering some form of online experience for their students during the 2009-2010 school year. Among these schools, 74% reported an interest in expanding the online opportunities being offered in the following years (Queen, Lewis, & Coopersmith, 2011).

There are many reasons for the increasing number of K-12 students who attend school online, including, for example, the ability to work at one's own pace and to take courses that are otherwise unavailable. As of 2010, Advanced Placement (AP) or International Baccalaureate (IB) courses in common subjects were offered in fewer than 34% of public school districts (Lee, Edwards, Menson, & Rawls, 2011). Advanced courses as well as credit recovery are two of the most common reasons that school districts have made online offerings available to students (Lee et al., 2011).

Online programs have evolved over the past two decades through the independent efforts of geographically and politically separated administrative entities. Different formats have been experimentally implemented in the presentation of different subjects, using different technologies at different grade levels. This lack of any common or centralized development has lead to the adoption and use of different terms for the same or closely similar concepts in online learning. Only recently has there been a trend toward more unified and shared terminology and identification of the basic formats by which K-12 content is delivered, in whole or part, through the Internet.

As defined by Clark (2001), a "virtual school" is "an educational organization that offers K-12 courses through Internet or Web-based methods" (p. 1). According to Watson et al. (2012), one of the fastest growing educational formats is "blended learning," a combination of face-to-face learning with online learning. The structures of blended learning models are themselves evolving to include different elements of communication and different proportions of face-to-face and digital delivery.

Online programs are also being categorized on the basis of the administrative structure by which the underlying program is sponsored, funded, or controlled. For example, an online program may be administered by a school district, some form of a state-level entity, a consortium of schools or school districts, or a post-secondary institution.

With the accelerating growth in online or virtual schooling at the K-12 level, there is a corresponding need for qualified, K-12 online teachers (Charania, 2010; Kennedy & Archambault, 2012b). Independent of the *content* being offered through online courses, the skills needed to effectively convey knowledge in an online environment include, but go substantially beyond, those skills learned in traditional, teacher education programs designed solely for face-to-face instruction (Barbour, 2012b). Interestingly, the vast majority of current research relating to online education is focused on the student and not the teacher. Very few teacher education programs include courses or training designed for the specific preparation of online teachers (Barbour, Siko, Gross, & Waddell, 2012). Furthermore, little is known about the relevant education and training of those currently teaching K-12 online students in the United States (Archambault, 2011). This lack of information, coupled with limited research on effective practices for teaching K-12 students online suggests a troubling disconnect between the rapid expansion of online course offerings and the training of teachers in the design, preparation, and delivery of such courses.

Definition of Terms

Overview

The extensive volume of literature pertaining to online learning and its relation to traditional and other forms of learning has produced a vast array of terms with divergent and sometimes inconsistent meanings and applications. This inconsistency makes it difficult to understand and compare important studies. A meaningful statement on the status of online education can be obscured through inconsistent terminology. For purposes of this chapter, an attempt was made to normalize and simplify definitions currently used in research, including the definitions developed by the Innosight Institute (Staker & Horn, 2012) and *Keeping Pace with K-12 Online & Blended Learning* (Watson et al., 2012). These normalized definitions are presented in the following section.

There are three fundamental forms of learning that can be described and defined as (a) face-to-face learning, (b) online learning and (c) blended learning. Their definitional relation to one another is depicted in Figure 1.

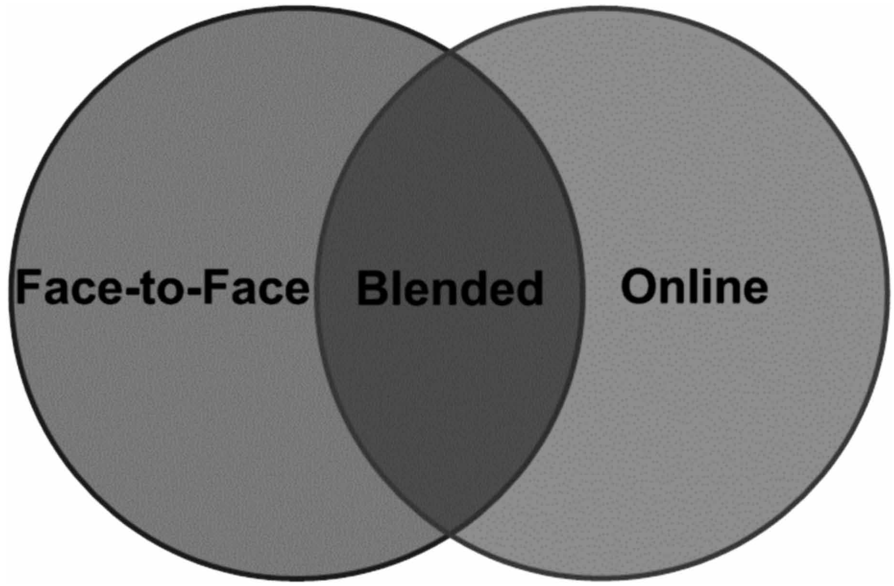
Figure 1 illustrates the fact that face-to-face learning and online learning can each exist independently, or they can be combined to form blended learning, which incorporates elements from both of the two other categories. In the broadest sense, face-to-face learning involves a teacher directly, delivering content to a student who is physically present at the same location at the time of delivery; online learning involves the student remotely obtaining content over the Internet, either concurrently or on a time-delayed basis; and blended learning involves an integration of elements from both face-to-face learning and online learning.

The three basic forms of learning are defined with examples in the following paragraphs and a table collecting and summarizing these definitions is included at the end of this section.

Face-to-Face Learning

Historically, learning has been delivered directly from an instructor to a student on a basis that is quite literally “face-to-face.” Face-to-face teaching is sometimes referred to as the “brick and mortar” or the “traditional learning” model. In this chapter, the term face-to-face learning is defined as education in which a student learns in a *formal educational* program, at a *central* location and *with an instructor*.

Figure 1. Forms of learning



Face-to-face learning includes two major subcategories: *traditional* face-to-face learning, where content is delivered or led by the instructor and *technology-rich* face-to-face learning, where the instructor uses or manages technology to enhance or augment content delivery. Most public schools in the United States still deliver content in the *traditional* face-to-face format. Increasingly, *technology-rich* learning is being implemented where schools use digital textbooks, devices, lesson plans, and the like while a teacher is physically present and directly delivers content and instruction to the student.

Online Learning

With the increasing availability of the Internet and high-speed connections, a second important form of learning has emerged. This form is referred to as online learning and is defined as education in which a student learns in an educational program, through student-controlled Internet delivery of content and instruction. Online learning further breaks down into two major subcategories: *formal online learning*, where the educational program is structured and accredited; and, *informal online learning*, where the educational program is unstructured. Florida Virtual School is an example of a program that offers *formal online learning*. An example of *informal online learning* would be the use of educational games or specialty lessons to provide enhanced learning or tutoring for students.

Blended Learning

Blended learning is being adopted by an increasing number of K-12 programs and is being implemented in many different combinations of face-to-face and online learning. The term blended learning is defined in this chapter as education in which a student learns partially on a *face-to-face* basis and partially through *formal online* learning.

Table 1 combines definitions and examples to provide a definitional structure that allows for the categorization of almost any combination of current learning environments.

Hybrid Forms

The various blended learning models defined by The Clayton Christensen Institute have been further divided into a group of hybrid forms (Christensen, Horn & Staker, 2013). Christensen et al. (2013) define a hybrid as "a combination of the new, disruptive technology with the old technology and represents a sustaining innovation relative to the old technology" (p. 4). The types of "sustaining hybrid innovation" that are characterized by combining the benefits of both online learning with face-to-face learning can be found in the Station Rotation, Lab Rotation and Flipped Classroom blended learning models outlined above. In contrast, the remaining blended learning models (Flex, Self-Blend, Enriched Virtual and Individual Rotation) offer experiences that do not include the primary feature of face-to-face instruction. In fact, very little of what is known as traditional classroom learning is found in these models. Students are in control of the pace of the content and often the place in which the content is delivered (Christensen et al., 2013).

Although there are many variations on the basic learning environments summarized in Table 1, this chapter will focus only on those in which learning occurs in a *formal online* learning program, directed to K-12 students studying in the United States. The scope and coverage of this particular form of learning is depicted in Figure 2, where the face-to-face, blended and informal online learning elements are excluded from the exclusively online model.

Administrative Structures of Online Programs

Overview

There is a wide variety of online programs currently being offered to K-12 students across the United States. These programs combine several key elements into different administrative structures. Some of the factors defining these structures are based on a diagram adapted from *A Primer on Virtual Charter Schools: Mapping the Electronic Frontier* (Vanourek, 2006). These defining factors correspond to a spectrum within which different administrative structures are arrayed according to each program's comprehensiveness, grade level, governance, geographical range, funding sources, and responsibility for course fees. Any particular administrative structure may offer courses that range from a single, supplemental course to a full-time, comprehensive program. Although most programs distinguish between grade levels (elementary, middle, and high school), increasingly, the traditional boundaries between grade levels are disappearing with students allowed to take courses that match their personal attainment levels. Also disappearing are the geographical and political restrictions that have historically limited student attendance to a particular commuting distance or to a particular school district. With high speed communications, there is little difference between attending a locally produced course or one that originates several thousand miles away. In the case of online education, each of the associated administrative structures can uniquely provide for its own management and governance, funding sources, course acquisition, course delivery, assessment of fees and attendance/completion requirements (Watson et al., 2012).

One of the difficult challenges is preparing teachers for such a continuum of blended, hybrid, and online models of learning together with the various administrative structures that exist. To understand the needs of the K-12 online teacher, it is helpful to explore what is known about this particular population of educators.

K-12 Online Teacher Demographics

Overview

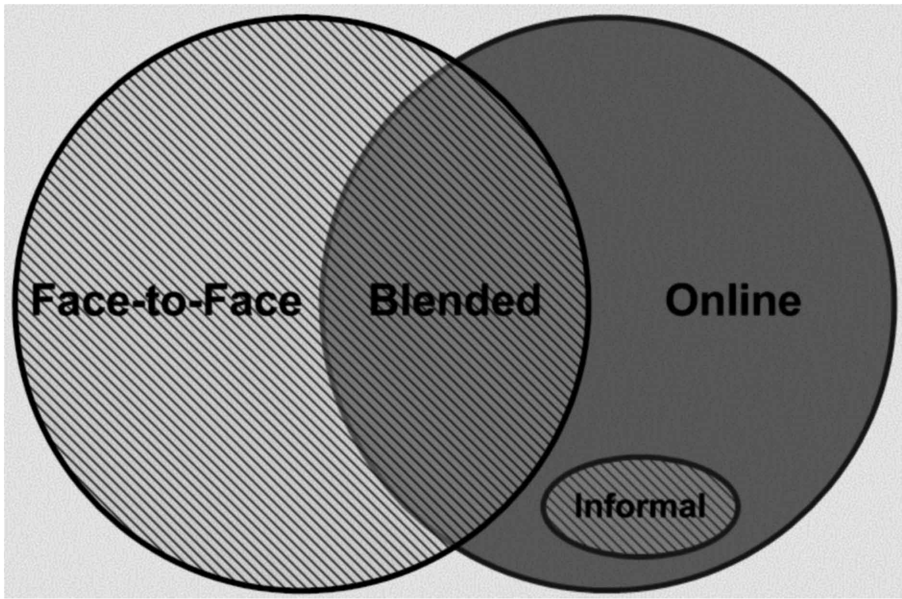
With the growth of online teaching directed to K-12 students, it is increasingly important to understand

Table 1. Types of learning environments

Types	Basic Learning Models	Sub-Categories	Definitions	Examples
Face-to-Face	*A form of education in which a student:* Learns in a formal educational program at a central location with an instructor.	Traditional	Face-to-face learning where the content is delivered or led directly by the instructor.	Most public schools in the United States
		Technology Rich	Traditional face-to-face learning where the instructor also uses or manages technology to enhance and/or augment the delivery of content.	Any school that uses digital textbooks, devices, lesson plans, or the like but still has content and instruction delivered by the teacher and not over the Internet.
Online	*A form of education in which a student:* Learns in an educational program based on student-controlled online delivery of content and instruction.	Formal	Online learning where the educational program is structured and accredited.	Florida Virtual School
		Informal	Online learning where the educational program is unstructured.	Educational games
Blended	*A form of education in which a student:* Learns in an educational program that combines both: Face-to-Face Learning and Formal Online Learning	Rotation Model	An educational program in which the student in a *particular course moves on a fixed schedule* between face-to-face learning and at least one online element.	KIPP LA Empower Academy (Station), Rocketship Education (Lab), Stillwater Area Public Schools (Flipped-Classroom) and Carpe Diem Collegiate High School and Middle School (Individual)
		Flex Model	An educational program in which the student learns on a schedule that is *individually defined and executed* with the student moving between *primarily* online learning with *varying types and degrees* of face-to-face learning.	San Francisco Flex Academy
		Self-Blend Model	An educational program in which the *student elects* to pursue at *least one formal* online course in addition to their traditional, face-to-face program.	Quakertown Community School District
		Enriched-Virtual Model	An educational program in which the student learns *almost entirely* online with *minimal* face-to-face learning within each of the courses.	Albuquerque eCADEMY

the background of the teachers involved and the extent to which they have been educated or trained on how to teach in this very different educational environment (Davis, Roblyer, Charania, Ferdig, Harms, Compton & Cho, 2007; Miller & Ribble, 2010; Archambault, 2011). There is very little research that focuses on the specific differences between online and face-to-face teaching, but there is a consensus that differences do exist (Barbour, 2012b). The online setting requires the teacher to use new forms of communication, engagement and assessment (Searson, Jones, & Wold, 2011). Certain online teaching characteristics can even vary depending on the students. For example, there is generally more instruction delivered online for older students and less for younger students (Watson, Gemin, & Coffey, 2010). Easton (2003) found that online and face-to-face teachers require similar skill sets, yet an online teacher must also manage and engage students virtually and have the skills of an instructional designer and interaction facilitator. It is important to note that there is very

Figure 2. Formal online learning (excluded areas are crosshatched)



little research available on the characteristics and preparation of K-12 online teachers, even though this teaching format represents one of the fastest expanding uses of technology in education (Means, Toyama, Murphy, Bakia, & Jones, 2010).

Personal Demographics

In 2008, Archambault conducted a nationwide survey examining the demographics of K-12 online teachers. The survey included demographic questions such as age, gender, race/ethnicity, education levels, course format and teaching role. The results of this study showed those teaching in the K-12 online setting were 77% female and 23% male. Glick (2011) also conducted a study to compare the gender distribution of online teachers as compared to traditional teachers and found only a minor difference between the online and traditional populations. Because K-12 classrooms have been historically the domain of female teachers, it would not be surprising that this dominance carried over to the online environment. Interestingly, however, Glick (2011) speculates that the proportion of female online teachers may be even higher because it accommodates an "easier integration of traditional family roles like raising children." In terms of age, the range of K-12 online teachers fell predominately in the range of 26-45 years, with 34% of these teachers being between 26 and 35 years of age and 29% within the 36 to 45 age range (Archambault & Crippen, 2009). Race and ethnicity of those who were teaching online also closely mirror the national trends observed in the case of face-to-face teachers (Glick, 2011). Archambault and Crippen (2009) found that 91% of the K-12 online teacher population was White/Caucasian, while 3% was Hispanic, 2% was Black/African American, 1% was Asian/Pacific Islander, 2% was mixed racial background, less than 1% was Native American and about 3% were self-classified as "other/prefer not to answer." During the same school year covered by Archambault's study, the National Center for Education Statistics (2008) reported the following characteristics for traditional public school teachers: 83% White, 7% Hispanic, 7% Black, 1% Asian, 1% mixed and under 1% Native American. Glick's 2011 study showed a much smaller difference in the distribution of White/Not Hispanic teachers as between the online (81.57%) and the face-to-face (83.10%) teaching environments.

Education and Experience

As part of a research series that began in 2007, Dawley et al. (2010) conducted a follow-up national survey of online teachers to identify "the unique needs and status of professional development for K-12 online teachers" (p. 7). Of the teachers responding to the survey, 99% held a teaching credential and 60% held a Master's degree or higher (Dawley et al., 2010). Archambault also looked at what certificates, if any, were held by the online teachers. Although 43 of the 596 participants reported having some additional certification, only two were for an Online Teaching Certificate (Archambault & Crippen, 2009). When examining the number of years the respondents had been teaching (both face-to-face and online), the authors found that the average participant had 14 years of teaching experience. Dawley et al. (2010) reported in the most recent *Going Virtual!* Research Series, that 73% of responding K-12 online teachers had been teaching for a total of six or more years. In a closer examination of online teaching experience, Archambault and Crippen (2009) reported that respondents had been working at their current online school for an average period of four years. The duration of online teaching experience ranged from being a first-time teacher to a teacher having 32 years of experience, some of which involved some form of distance education. As recently as 2010, Dawley et al. found that 12% of newer teachers did not have any face-to-face teaching experience before undertaking their current online teaching job. In addition, Kennedy and Archambault (2012b) found only 1.3% of surveyed university level education programs offered field experiences in online settings in an effort to train future educators how to teach online.

Teaching Assignment

There are many variables that must be considered when describing the actual functions that must be performed in the course of a K-12 online teaching assignment. Included among these variables is the geographical distribution and cultural backgrounds of students, the range of different course creation and delivery formats and technologies, the number and size of the classes taught and the grade level, and subject matter toward which the course material and teaching must be directed.

The actual course delivery format in the online K-12 setting can also vary. In some instances, courses are offered on a completely asynchronous basis, where the students are independent, self-paced and can attend the online course at any time (Barbour et al., 2012). Alternatively, the course may be offered on a synchronous basis, where the students and the instructors are all online at the same time. Courses offered on a synchronous basis tend to be the most similar to a traditional, face-to-face classroom setting (Barbour et al., 2012). Archambault and Crippen (2009) reported that 81% of the surveyed online teachers taught courses asynchronously. Stated differently, over 80% of the respondents teach in the format which is the "most dissimilar" to the traditional face-to-face environment for which they were educated and trained. There would seem to be an implicit assumption that if a teacher is competent to teach in the classroom, that competency carries over to teaching online. This apparent assumption is consistent with the fact that fewer than 2% of university education programs are preparing teachers by offering field experiences and formal courses involving the knowledge and processes one must have to successfully teach students who are separated in time and space (Kennedy & Archambault, 2012a).

In most cases, the teacher assigned to a class of students was not the person who actually created the online course (Archambault & Crippen, 2009). Forty-two percent of online teachers use texts and course materials that were created by a content provider. A slightly smaller percentage (38%) report the teacher as the primary creator of the materials used in the class they taught online (Archambault & Crippen, 2009). Queen and Lewis (2011) found that courses developed by outside organizations were used in 75% of districts that offer their students online classes.

As to the course titles and subject matter being taught online, there is not one particular subject that is being offered online to an extent that is substantially greater than other widely offered subjects. Archambault and Crippen (2009) found a fairly consistent distribution of respondents teaching in the areas of Math (14%), Science (14%), Language Arts/Reading (17%), Social Studies (14%) and Humanities (12%). Within this survey, teachers who were not teaching within one of these areas selected "Other" to indicate they were teaching a course that was not listed, such as Physical Education or Business or a more general area such as multiple subjects, special education, or a combination of classes. Twenty-eight percent of the teachers reported teaching one class, while 22% reported teaching seven or more separate groups of students (Archambault & Crippen, 2009). Finally, although the study included teachers in all grades from pre-kindergarten through twelfth grade, the large majority of the online courses were offered at the high school level.

K-12 Online Teacher Preparation

Overview

There is no question as to the pressing need for more and better prepared K-12 teachers. This need is only amplified in the emerging specialty of online teaching (Miller & Ribble, 2010). The qualities and skills that characterize successful K-12 teachers are necessary, but not sufficient to achieve an equivalent level of success when teaching students who are learning at a different place and a different time. Online teachers require skills and knowledge that traditional teachers simply do not need when dealing with students on a face-to-face basis (Davis et al., 2007). The problem is that these skills have not been properly defined, evaluated or verified through empirical research (Barbour, 2012b). Additional research is needed to develop a better understanding of the skill set that is actually required to effectively and efficiently transfer knowledge through intervening dimensions of time, space and digital technology.

It is widely, but inaccurately, perceived that the skills necessary for traditional teaching are essentially the same as those required for online teaching. In the simplest terms, it is thought that a good classroom teacher automatically will be an equally effective online teacher (Archambault, 2010). The different or additional skills thought to be necessary for teaching online have been discussed by many authors in the context of many different programs. Barbour et al. (2012) note that some of the additional elements believed necessary for online teaching may actually cause more harm than good. This is thought to occur through the introduction of what the authors refer to as "faulty methods" within teacher education programs. The question raised here is on how teachers are currently being trained to teach online, in an environment where the student and teacher are not communicating on a face-to-face basis.

Even in the context of K-12 education, it is recognized that different skills and techniques are required to teach at the K through 8 grade levels as compared to the 9 through 12 grade levels. These differences are dictated by the fact that the two groups are characterized by materially different students in terms of age, experience, knowledge, discipline, learning skills and socialization. Likewise, but for different reasons, there are significant differences between teaching online and teaching face-to-face. These differences are dictated by the fact that the teacher and the student are physically separated from one another and both must proceed without the continual expressive interchange and feedback which has been at the heart of the student-teacher connection throughout history. Unfortunately, there is essentially no credible, research-based definition of the skills and techniques necessary to convert knowledge into learning while delivering the content through technologies that limit or preclude any real-time expressive interchange between the teacher and the student (Barbour et al., 2012). The effects of this technological barrier may be attenuated as the age of the targeted students increase and as the teaching content becomes more narrowly defined and sophisticated, but the challenges of teaching online are and will remain most pronounced at the K-12 levels.

Against this background, the narrower question is how and to what extent do educators currently learn the actual processes of and best practices for teaching online? As in the case of traditional teacher training, there are two basic ways by which new or experienced teachers can learn how to teach online. The first way is through a formal pre-service educational program and the second is through in-service training or as part of a professional development or on-the-job training program. There is a desperate need for research in both of these areas (Charania, 2010). In the following two sections, the current status of these two modes of teacher training will be reviewed in the context of an increasing need for online teachers; a need that is being driven by the widely held perception and expectation that online education will result in a K-12 system where students learn more subjects on a more efficient, effective, convenient and rewarding basis (Dillon & Tucker, 2011).

Pre-Service Training

As K-12 educational programs expand into online formats, the need for teachers who are prepared to teach in this new and different environment is also expanding. This major transition raises the foundational question "How and to what extent are teachers currently being educated and trained to teach online?" The answer to this question, as derived from the most recent literature, is summarized in this section on the status of pre-service training and the following section on the status of in-service training.

Typically, a teacher obtains certification at the K-12 level by completing a university-based course of study to obtain a Bachelor's or more advanced degree (Arizona Department of Education, 2013). These educational programs almost always include a student-teaching experience in an existing classroom environment under the supervision and guidance of an experienced teacher. Ideally, students training to become certified K-12 teachers would also receive training on the methods and principled practices involved in teaching online, that is, training that would be delivered through formal coursework and by way of a supervised online teaching practicum (Compton, Davis, & Mackey, 2009). The fact is, most experienced classroom teachers have received no formal training in online teaching because they were certified before online learning became possible or even marginally implemented (Archambault, 2011). The literature indicates that only a small number of those certified since the 1990s have been exposed to this form of teacher training, simply because no such training was included in the curriculum. This lack of available training in the case of teachers having over 10 years of experience is understandable. What is surprising, however, is that only 1.3% of pre-service teachers in formal education programs are even offered a field experience that involves teaching online, let alone formal course work (Kennedy & Archambault, 2012b).

New teachers, who are well-prepared to teach in a traditional face-to-face setting, are not prepared to teach online. Because the demand for K-12 online teachers exceeds even the demand for classroom teachers, the first teaching opportunity offered to a new graduate may be in the online environment for which they probably will not be adequately prepared (Archambault, 2011). Dawley et al. (2010) conducted a national survey of those teaching online and reported that of the most recently hired online teachers, 12% had never taught in a face-to-face classroom, let alone online.

To equip new K-12 teachers with the skills necessary to be effective online, teacher preparation programs must include classes in the emerging techniques, strategies and technologies for teaching at a distance, along with field experiences that allow the teacher to apply these methods in a practical setting. Zeichner (2010) noted the traditional importance of closely integrating coursework with field placement and training. This is equally important in the process of training teachers to effectively educate students online. For example, it would be ideal to provide a teacher-in-training with not only coursework including instructional design, new technologies, online pedagogy and communication techniques, but also to provide a real experience in the preparation and delivery of online classes intended for the K-12 learners (Kennedy, Cavanaugh & Dawson, 2013).

Barbour (2012a) suggests that the only difference between a traditional, face-to-face field experience and an online field experience is some form of initial technical training. An "orientation" of this type would expose pre-service teachers to the different online tools available and increase their general comfort level with the online environment itself. However, this kind of introduction alone cannot provide a meaningful understanding of the complex psychological, engagement, discipline and feedback challenges that uniquely characterize online teaching.

Unfortunately, teacher education programs face several barriers that limit the expansion of their curriculum to include courses involving methods for creating and delivering educational content online. Often there are misconceptions about the career prospects for teaching online. Pre-service teachers have a widespread belief that an increase in online courses will lead to fewer positions for traditional teachers (Compton, Davis, & Correia, 2010). In addition, pre-service teachers may never have taken, let alone created, a high-quality online course (Compton et al., 2010). For this reason, they may have the perception that online courses are inferior to face-to-face classroom presentations (Barbour & Unger, 2009; Miller & Ribble, 2010). An increasing number of states are now making it a high school graduation requirement that all students complete at least one online course (Watson et al., 2012). With an increasing number of those studying to be teachers do have at least some experience in online courses (Kennedy et al., 2013). Unfortunately, these early experiences online may have been modeled on poor teaching methods or lack any meaningful interaction or may demonstrate ineffective instructional design (Kennedy et al., 2013).

University faculty members can impede the offering of new courses specifically directed to the process of teaching online. Numerous reasons have been given for their reluctance to teach online courses, including a burdensome increase in workload, problems with changes in the instructor's role, lack of institutional support, a perceived sacrifice of class quality and negative reactions by colleagues (Miller & Ribble, 2010). The modeling of quality online teaching in a teacher training program is crucial to teaching these skills (Compton et al., 2010). However, it is difficult to change or supplement teaching methods because educators tend to teach the way they themselves were taught (Miller & Ribble, 2010; Barbour, 2012b). Jo Wagner, a teacher, mentor and instructional program manager at the Florida Virtual School, writes "... the first year of teaching online is similar in many ways to the first year of teaching in the traditional classroom; however, there are many new skills to learn" (Wagner et al., 2012, p. 39).

Kennedy and Archambault (2012a) found that some teacher education program personnel perceived that their pre-service teachers were being prepared to teach online simply because part of their teacher education program is delivered online. These pre-service teachers may have experienced an online environment, but they did so only as a student and not as a teacher. It is one thing to watch a good teacher; it is something else to become one.

Some teacher training programs seek to facilitate the process of online teaching by providing informative websites and instructional specialists to aid faculty members in setting up online classes (Miller & Ribble, 2010). Such efforts can be part of an overall program, but taken alone, are simply inadequate. It is imperative that colleges of education adjust their curriculum and requirements to meet the growing needs of teachers entering the workforce today. Searson et al. (2011) stress the importance for universities and colleges to re-evaluate their teacher education programs to ensure they include the skills that are really needed to teach online. The first step is to define what these skills are, and equally important, to confirm the effectiveness of these skills through empirical testing. Even after these skills are identified and validated, it is still necessary to define the best way to teach the skills and provide training on the implementation of the skills within the context of K-12 education (Barbour, 2012b).

One response to inconsistency among teacher education programs has been to provide a set of standards for those involved in training teachers. In 2011, the International Association for K-12 Online Learning (iNACOL) revised their 2008 online teaching standards to include eleven standards outlining the skills needed to teach online (iNACOL, 2011). These standards have been widely adopted by organizations to train and evaluate online teachers. However, Barbour (2012b) indicates that these standards are not based on research, have not been verified, and "provide little systematic guidance for teaching online" (p. 505). If there are to be standards for training and ultimately for certification of online teachers, then the underlying skills required must not only be defined, they must also be empirically shown to produce measurable learning outcomes in the targeted online students.

It should not be surprising that there are very few existing models of teacher education programs which prepare K-12 teachers to teach online, given the insufficient and inconsistent identification of what skills are even needed to teach online, compounded by the lack of research in support of the standards that have been suggested (Barbour et al., 2012). Examining and comparing the few models that are available and encouraging the implementation and testing of new models should ultimately lead to more consistent and coherent pre-service training programs from which more rigorous standards can emerge (Kennedy & Archambault, 2012b).

Online education and training programs for pre-service teachers can benefit from cooperative ventures between universities and K-12 online programs (Barbour et al., 2012). Kennedy and Archambault (2012b) examined existing teacher education program models across the United States. Almost 79% of the programs reported that they did not include any form of pre-service field experience in online teaching while half (49%) felt that they should offer such field experiences.

Two research-based initiatives of pre-service teacher education programs that do include elements of online teaching are the Teacher Education Goes Into Virtual Schooling (TEGIVS) project at Iowa State University and partnerships between Florida Virtual School (FLVS) and several Florida universities (Barbour et al., 2012). The relevant characteristics of these programs are summarized in the following section.

Teacher Education Goes Into Virtual Schooling (TEGIVS)

Iowa State University's Center for Technology in Learning and Teaching, along with three other universities, have addressed the demand for prepared K-12 online teachers by incorporating new elements into their teacher training program. To provide a meaningful introduction to the potential for online learning, an online seminar was added to the existing pre-service teaching class and an online field experience was offered early in the teacher training curriculum (Compton et al., 2010). This project sought to orient pre-service teachers to the online teacher's role of Designer, Teacher and Facilitator and to model effective online teaching practices (Davis et al., 2007).

Florida Virtual School (FLVS)

A second example of a program that involves preparing pre-service teachers to teach virtually is found at the Florida Virtual School (FLVS). Because FLVS has been successful in their K-12 online courses, it is an ideal laboratory for training teachers and allowing opportunities for pre-service teachers to experience this growing setting (Barbour et al., 2012). Partnerships between FLVS and several Florida universities have been formed to offer field experiences in K-12 online courses. These internships are offered year-round through the FLVS and typically last two semesters. The program through the University of Central Florida offers two student-teaching internships that last seven weeks, during the first semester. Pre-service teachers have the option to complete one of these internships in a virtual setting. Regardless of which type of internship was completed in the first semester, during the second semester, the students have the choice between a 14-week student-teaching experience either in a face-to-face classroom or an online version (Barbour, 2012b).

Over the years, the FLVS internship experience for pre-service teachers has evolved to include more mentoring support. Once the university candidates are fingerprinted and background checked, they are placed with a specified subject area, state-certified teacher (Wagner et al., 2012).

Kennedy (2010) studied the virtual field experiences of three volunteer pre-service teachers placed at the FLVS through the University of Florida. While these pre-service teachers were assigned to an online teacher for a four-week period along with created activities for this experience, they were not simultaneously enrolled in a corresponding course at the university. Kennedy et al. (2013) suggest offering a related course that might include reflection on pre-service teachers' past online experiences would alleviate some misconceptions. Although this online field experience gave the pre-service teachers a clearer picture of what virtual schools can offer K-12 students, they felt that it was too short and hard to stay motivated since it was voluntary (Kennedy et al., 2013). Currently, the FLVS is looking into working with additional Florida universities, as well as universities in other states, to offer virtual field experiences (Barbour, 2012b).

In-Service Training

As shown in the preceding sections, there are few examples of universities that offer courses and field experiences that meaningfully prepare pre-service teachers to successfully function in the online environment. Accordingly, what training is available to teachers is derived from in-service training (Barbour, 2012b). As Dawley et al. (2010) discovered, 94% of online teachers received their related teacher training from the online school that employed them and only 30% learned from teacher education programs at a university. Surprisingly, there was no training at all given to 25% of first-year online teachers. Many virtual schools, such as the Virtual High School Global Consortium, not only offer courses in online pedagogy, they require such training be taken by all newly hired teachers prior to teaching online (Barbour, 2012b).

The Florida Virtual School (FLVS) has trained new online teachers since the beginning but their training has evolved over the years to include more mentoring. The mentors are given fewer students and mentor less than 10 new teachers at a time. The new teachers complete an orientation and receive eight follow-up calls from their mentors, which are allocated on the basis of content area (Wagner et al., 2012).

The Georgia Virtual School (GaVS) is another example of an online school that has developed teacher training and mentoring for their teachers. Their training program is divided into four different parts, in which mentoring is included as an integral component. For newly hired teachers there is a New Instructor Preparation Course, which meets once a week for 14 weeks. Because not all newly hired GaVS teachers have experience teaching in an online environment, this course is designed to help them become more familiar with this format. The content, discussions, and assessments are delivered online and the same late policies enforced on future students are modeled and expected by the new hires. During the last four weeks of this course, the new hire is assigned to a mentoring teacher and acts as a student teacher in a live class. The next phase of the training, called "Just-In-Time training," allows the teacher to be in charge of up to five students while still working with a mentor. Even veteran faculty is offered mentoring opportunities by enrolling in a colleague's class as a "Visiting Educator." There are several other mentoring programs for current, full-time teachers that include support in attending conferences to Leadership Track opportunities for those interested. There are also mentoring options for those seeking an Online Teaching Endorsement or Graduate Certificate which require field experience (Cozart, 2012).

A growing trend to receiving training in online teaching is by obtaining a graduate certificate in Online Teaching. Although many of these certificates are not specifically geared toward K-12 online learning, several of the programs do include options for focus in this area. For example, the state of Georgia allows current teachers to add an online teaching endorsement by completing the graduate certificate program at either Georgia State University (Georgia State University, 2013) or Valdosta State University (Valdosta State University, 2013). Both of these certificate programs focus specifically on teaching K-12 online. Arizona State University also offers a graduate certificate in online teaching for grades K-12. The 15 required credit hours of graduate coursework includes an online teaching practicum. This certificate program focuses on instructional strategies and best practices for teaching online, along with emerging technologies used in the field (Arizona State University, 2013). Other graduate certificates, such as the one offered by the University of Wisconsin-Stout (University of Wisconsin-Stout, 2012), is designed to prepare teachers to teach online and even meets the prerequisite to teach online in that state. Because some virtual schools, such as Virtual High School Global Consortium (VHS), already have partnerships with universities and offer courses to prepare teaching online, these courses can lead to graduate credit and even a graduate certificate in Online Teaching and Learning. Another important course that VHS offers is a field experience where the teacher is paired with a current online teacher (Barbour et al., 2012).

Another option for in-service teachers to become more knowledgeable in the online environment would be to obtain a Continuing Education Certificate in Online Teaching. There are two universities in California (California State University, East Bay and University of California – Irvine) that offer this type of certificate. However, these continuing education programs are not as long as typical university courses and do not necessarily lead to degrees, as it is with the graduate certificates (Barbour et al., 2012).

On top of the standard teaching certificate required by all states to teach, several states are taking the next step and requiring an additional online teaching endorsement in order to teach in these environments (Kennedy et al., 2013). The training for these endorsements usually covers primarily how to use online tools, online course design and delivery, and less on pedagogy, since the participants already have a teaching certificate. Georgia, the first state to offer an online teaching endorsement, has three participating universities offering endorsements that all require a field experience.

An initiative for an online teaching endorsement was passed in Idaho in 2011, which also requires the teacher to hold a teaching certificate before beginning the program (Archambault, DeBruler, & Freidhoff, 2014). Barbour et al. (2012) argue that the training offered in these online teaching endorsement programs would even benefit the teacher in the traditional classroom.

A Disconnect between Training and Teaching

A careful review of the literature suggests a significant disconnect between (a) growing expectations for the expansion of cost-effective online education at the K-12 levels and (b) the manner and extent to which teachers are being prepared to function in this new educational paradigm. Most current studies, dating back over five years, indicate that very few university-based education programs offer formal courses or clinical programs directed to the methods and best practices required for successfully conveying knowledge to online K-12 students (Compton et al., 2009). Training, if any, has mostly been through in-service mechanisms such as self-teaching, on-the-job training, and mentoring. The current literature also indicates a need for research into and the empirical validation of those teaching methods and practices that will produce optimal results for K-12 students (Charania, 2010; Searson et al., 2011; Barbour, 2012b).

SOLUTIONS AND RECOMMENDATIONS

There is an urgent need to find out what K-12 teaching techniques actually produce effective learning at a distance and to validate these techniques through empirical testing and analysis. When effective online teaching techniques (including the definition of skills, strategies, methodology, psychology, etc.) have been defined, the underlying research can provide a meaningful basis for defining real educational standards.

With empirically tested and proven standards in place, it will be possible to develop courses that incorporate the best practices for effective online K-12 classrooms. In addition to their training in online teaching, pre-service teachers should have the opportunity to implement and practice what they have learned by way of an internship, mentorship, or student teaching experience in an online or virtual classroom. Current virtual teachers should be given the opportunity to attend workshops, orientations, discussions, ongoing experimentation and testing along with mentorships to better prepare them for the virtual classroom. In addition, colleges of education and virtual schools must become more consistent and adjust to meet the changing needs of teachers entering the profession, while assuring that these teachers understand and can capably implement educationally sound, empirically-proven teaching techniques.

FUTURE RESEARCH DIRECTIONS

As noted above, the single most critical research to be conducted involves the development and empirical testing of virtual teaching practices. In addition, once standards are developed, research is needed on the best way to implement those standards in a college of education and separately for in-service training programs for current teachers.

The recent iNACOL report Partnering for Success: A 21st Century Model for Teacher Preparation (Kennedy & Archambault, 2013) takes a closer look at several teacher education programs that have partnered with virtual schools to offer teacher training on how to best teach K-12 learners online. The various authors in the report present a range of suggestions for future research in this area. In the Forward to the report, Susan Patrick, President and CEO of iNACOL, discusses the importance of "modernizing" teacher education programs and states, "No teacher should start their career with anything less than complete confidence that they have been effectively prepared for Day One" (Patrick, 2013, p. 4).

In addition to proposing online student-teaching experiences at Wayne State University, a Graduate Certificate Program in Online Teaching is also available. Barbour (2013) shares how the materials being incorporated into the Graduate Certificate in Online Teaching courses at Wayne State University are all research-based and many of the courses are also a perfect setting for additional research studies.

As part of the discussion of the partnership between the University of Central Florida and the Florida Virtual School, the authors offer suggestions in order to build a stronger teacher preparation program and prepare teachers for online classrooms. One such suggestion is the creation of a "research-based screening tool that would help select candidates who would be most successful in online K-12 environments" (Hynes, Zugelder, & Zajac, 2013, p.36). Further research is also needed to determine successful online teaching methods and the most efficient way of transferring those methods to pre-service teachers.

In the conclusion of the report, Archambault (2013) stresses the importance of the use of consistent guidelines, standards, resources and skills within pre-service teacher training to guarantee consistency across all teacher training programs. Further research is also crucial in creating high-quality and effective professional development for in-service K-12 online teachers.

As to the need for further research, it is clear from the literature that the adoption of online coursework at the K-12 level is advancing at a pace that far exceeds the progress of research into how best to create and present this coursework and, equally important, how to actually train teachers to succeed in this new environment, where the student separated from the teacher in both space and time.

CONCLUSION

There are enthusiastic expectations that online courses and programs will enhance the quality, efficiency, and effectiveness of K-12 education. Clearly, the number and coverage of K-12 online courses is rapidly expanding in the schools. However, the hope and excitement that surrounds these new programs may mask an underlying deficiency in how and the extent to which K-12 teachers are being educated and trained in the complexities of conveying knowledge over time and space, especially to young students who have yet to develop their own method and discipline for learning.

There is little research on the level of experience held by K-12 online teachers or how they were prepared to work in the online environment (Archambault, 2011). Much of the current research is focused on the students' online experience or the quality of the online program itself (Rice, 2006), rather than on the teacher's education and training in the process of effective online teaching at the K-12 level.

With the growth of elementary and secondary online education, there will be a continued and expanding demand for properly educated and competent teachers in this area. Training for educators at the K-12 level has historically been provided through colleges of education housed within a university setting. If these programs do not expand to include content on online teaching methodologies, many newly certified teachers will find themselves working in an environment for which they are simply unprepared (Archambault, 2011).

REFERENCES

Archambault, L. (2010). Identifying and addressing teaching challenges in K-12 online environments. *Distance Learning*, *7*(2), 13–17.

Archambault, L. (2011). The practitioner's perspective on teacher education: Preparing for the K-12 online classroom. *Journal of Technology and Teacher Education*, *19*(1), 73–91.

Archambault, L. (2013). Conclusion. In K. Kennedy & L. Archambault (Eds.), Partnering for success: A 21st century model for teacher preparation (p. 41). Vienna, VA: International Association for K-12 Online Learning.

Archambault, L., & Crippen, K. (2009). K-12 distance educators at work: Who's teaching online across the United States. *Journal of Research on Technology in Education*, *41*(4), 363–391. doi:10.1080/15391523.2009.10782535

Archambault, L., DeBruler, K., & Freidhoff, J. (2014). K-12 online and blended teacher licensure: Striking a balance between policy and preparedness. *Journal of Technology and Teacher Education*, 22(1), 83-106.

Arizona Department of Education, Certification Unit. (2013). *Requirements for elementary certificates*. Retrieved from http://www.azed.gov/educator-certification/files/2011/09/requirements-for-elementary-certificate.pdf

Arizona State University, Mary Lou Fulton Teachers College. (2013). *ASU graduate certificate online teaching for grades K-12*. Retrieved from http://education.asu.edu/uploads/academic/Online_Teaching_for_Grades_K-12_-_Final_Web.pdf

Barbour, M. (2013). Wayne State University. In K. Kennedy & L. Archambault (Eds.), Partnering for success: A 21st century model for teacher preparation (pp. 22-25). Vienna, VA: International Association for K-12 Online Learning.

Barbour, M. K. (2012). Models and resources for online teacher preparation and mentoring. In K. Kennedy & L. Archambault (Eds.), Lessons learned in teacher mentoring: Supporting educators in K-12 online learning environments (pp. 83-102). Vienna, VA: International Association for K-12 Online Learning.

Barbour, M. K. (2012). Training teachers for a virtual school system: A call to action. In D. Polly, C. Mims, & K. Persichitte (Eds.), *Developing technology-rich teacher education programs: Key issues* (pp. 499–517). Hershey, PA: Information Science Reference. doi:10.4018/978-1-4666-0014-0.ch032

Barbour, M. K., Siko, J., Gross, E., & Waddell, K. (2012). Virtually unprepared: Examining the preparation of K-12 online teachers. In R. Hartshorne, T. Heafner, & T. Petty (Eds.), *Teacher education programs and online learning tools: Innovations in teacher preparation* (pp. 60–81). Hershey, PA: Information Science Reference. doi:10.4018/978-1-4666-1906-7.ch004

Barbour, M. K., & Unger, K. (2009). Challenging teachers' preconceptions, misconceptions, and concerns of virtual schooling. In *Proceedings of the Conference of the Society for Information Technology and Teacher Education* (pp.785-790). Norfolk, VA: Association for the Advancement of Computing in Education.

Charania, A. (2010). *Preparing future teachers for virtual schooling: Assessing their preconceptions and competence.* (Doctoral dissertation). Iowa State University, Ames, IA.

Christensen, C. M., Horn, M. B., & Staker, H. (2013). *Is K-12 blended learning disruptive? An introduction of the theory of hybrids* (White paper). San Mateo, CA: Clayton Christensen Institute.

Clark, T. (2001). *Virtual schools: Trends and issues. A study of virtual schools in the United States*. San Francisco, CA: Western Regional Educational Laboratories.

VHS Collaborative. (2012). *Annual report.* Retrieved from http://thevhscollaborative.org/sites/default/files/public/VHS_Annual%20Report_FINAL_4_26.pdf

Colorado Springs School District 11. (2011). *About Us*. Retrieved from http://achieve.d11.org/pages/aboutourschool.aspx

Compton, L., Davis, N., & Correia, A. (2010). Pre-service teachers' preconceptions, misconceptions, and concerns about virtual schooling. *Distance Education*, *31*(1), 37–54. doi:10.1080/01587911003725006

Compton, L., Davis, N., & Mackey, J. (2009). Field experience in virtual schools – to be there virtually. *Journal of Technology and Teacher Education*, *17*(4), 459–477.

Cozart, J. (2012). Just-in-time training: How Georgia Virtual School scaffolds mentoring programs to meet a variety of teacher needs. In K. Kennedy & L. Archambault (Eds.), Lessons learned in teacher mentoring: Supporting educators in K-12 online learning environments (pp. 51-59). Vienna, VA: International Association for K-12 Online Learning.

Davis, N., Roblyer, M. D., Charania, A., Ferdig, R., Harms, C., Compton, L., & Cho, M. (2007). Illustrating the "virtual" in virtual schooling: Challenges and strategies for creating real tools to prepare virtual teachers. *The Internet and Higher Education*, *10*(1), 27–39. doi:10.1016/j.iheduc.2006.11.001

Dawley, L., Rice, K., & Hinks, G. (2010). *Going virtual 2010! The status of professional development and unique needs of K-12 online teachers.* Retrieved from http://edtech.boisestate.edu/goingvirtual/goingvirtual3.pdf

Deer Valley Unified School District. (2013). *eSchool student guide.* Retrieved from http://eschool.dvusd.org/Documents/eSchoolStudentGuide13-14.pdf

Dillon, E., & Tucker, B. (2011). Lessons for online learning. *Education Next*, *11*(2), 50–57.

Easton, S. (2003). Clarifying the instructor's role in online distance learning. *Communication Education*, *52*(2), 87–105. doi:10.1080/03634520302470

Georgia State University. (2013). *Online teaching endorsement*. Retrieved from http://msit.gsu.edu/4878.html

Glick, D. (2011). *The demographics of online students and teachers in the United States.* Retrieved from http://gsehd.gwu.edu/documents/users/juliestella/Online_Demographics_Glick_2011.pdf

Hynes, M., Zugelder, B., & Zajac, J. (2013). University of Central Florida and Florida Virtual School. In K. Kennedy & L. Archambault (Eds.), Partnering for success: A 21st century model for teacher preparation (pp. 34-36). Vienna, VA: International Association for K-12 Online Learning.

International Association for K-12 Online Learning (iNACOL). (2011). National standards for quality online teaching. Vienna, VA: International Association for K-12 Online Learning.

International Association for K-12 Online Learning (iNACOL). (2012). A guide to programs, services and membership [Brochure]. Vienna, VA: International Association for K-12 Online Learning.

Kennedy, K., & Archambault, L. (Eds.). (2013). Partnering for success: A 21st century model for teacher preparation. Vienna, VA: International Association for K-12 Online Learning.

Kennedy, K., & Archambault, L. M. (2012a). Design and development of field experiences in K-12 online learning environments. *Journal of Applied Instructional Design*, *2*(1), 35–49.

Kennedy, K., & Archambault, L. M. (2012b). Offering pre-service teachers field experiences in K-12 online learning: A national survey of teacher education programs. *Journal of Teacher Education*, *63*(3), 185–200. doi:10.1177/0022487111433651

Kennedy, K., Cavanaugh, C., & Dawson, K. (2013). Preservice teachers' experience in a virtual school. *American Journal of Distance Education*, *27*(1), 56–67. doi:10.1080/08923647.2013.756757

Kennedy, K. M. (2010). *The essence of the virtual school practicum: A phenomenological study of pre-service teachers' experiences in a virtual school.* (Doctoral dissertation). University of Florida, Gainesville, FL.

Lee, J. M., Edwards, K., Menson, R., & Rawls, A. (2011). *The college completion agenda 2011 progress report.* College Board Advocacy and Policy Center. Retrieved from http://completionagenda.collegeboard.org/sites/default/files/reports_pdf/Progress_Report_2011.pdf

Lynde, H. (2012). Increasing online learning options for K-12 students: The role of school districts. Atlanta, GA: Southern Regional Education Board (SREB) Educational Technology Cooperative.

Means, B., Toyama, Y., Murphy, R., Bakia, M., & Jones, K. (2010). *Evaluation of evidence-based practices in online learning: A meta-analysis and review of online learning studies*. Washington, DC: Department of Education.

Miller, T., & Ribble, M. (2010). Moving beyond bricks and mortar: Changing the conversation on online education. *Educational Considerations*, *37*(2), 3–6.

National Center for Education Statistics. (2008). Fast facts: Teacher trends. Retrieved from http://nces.ed.gov/fastfacts/display.asp?id=28

Patrick, S. (2013). Forward. In K. Kennedy & L. Archambault (Eds.), Partnering for success: A 21st century model for teacher preparation (p. 4). Vienna, VA: International Association for K-12 Online Learning.

Patrick, S., & Dawley, L. (2009). *Redefining teacher education: K-12 online-blended learning and virtual schools. Brief prepared for the Summit on Redefining Teacher Education for Digital Age Learners*. Austin, TX: The University of Texas.

Queen, B., Lewis, L., & Coopersmith, J. (2011). *Distance education courses for public elementary and secondary school students: 2009-2010 (NCES 2012-009)*. U.S. Department of Education, National Center for Education Statistics.

Rice, K. L. (2006). A comprehensive look at distance education in the K-12 context. *Journal of Research on Technology in Education*, *38*(4), 425–448. doi:10.1080/15391523.2006.10782468

Searson, M., Monty Jones, W., & Wold, K. (2011). Reimagining schools: The potential of virtual education. *British Journal of Educational Technology*, *42*(3), 363–371. doi:10.1111/j.1467-8535.2011.01178.x

Staker, H., & Horn, M. B. (2012). *Classifying K-12 blended learning* (White paper). San Mateo, CA: Clayton Christensen Institute.

University of Nebraska High School. (2013). *Why UNHS?* Retrieved from http://highschool.nebraska.edu/About-UNHS/Why-UNHS.aspx

University of Wisconsin-Stout. (2012). *E-learning and online teaching graduate certificate*. Retrieved from http://www.uwstout.edu/soe/profdev/elearningcertificate.cfm

Valdosta State University. (2013). *Online teaching endorsement*. Retrieved from http://www.valdosta.edu/colleges/education/deans-office/online-programs/online-teaching-endorsement.php

Van Beek, M. (2011). Expanding virtual learning opportunities in Michigan [Electronic version]. *Michigan Science*, *15*, 11–13.

Vanourek, G. (2006). *A primer on virtual charter schools: Mapping the electronic frontier*. Issue Brief for National Association of Charter School Authorizers, August 2006.

Watson, J., Gemin, B., & Coffey, M. (2010). A parent's guide to choosing the right online program. Paper in Promising Practices in Online Learning series. Vienna, VA: International Association for K-12 Online Learning.

Watson, J., Murin, A., Vashaw, L., Gemin, B., & Rapp, C. (2011). *Keeping pace with K-12 online learning: An annual review of policy and practice*. Evergreen, CO: Evergreen Education Group.

Watson, J., Murin, A., Vashaw, L., Gemin, B., & Rapp, C. (2012). *Keeping pace with K-12 online & blended learning: An annual review of policy and practice*. Evergreen, CO: Evergreen Education Group.

Wisconsin eSchool Network (2013). *Fast facts*. Retrieved from http://www.wisconsineschool.com/network/about

Zeichner, K. (2010). Rethinking the connections between campus courses and field experiences in college- and university-based teacher education. *Journal of Teacher Education*, *61*(1-2), 89–99. doi:10.1177/0022487109347671

ADDITIONAL READING

Archambault, L. (2010). Identifying and addressing teaching challenges in K-12 online environments. *Distance Learning*, *7*(2), 13–17.

Archambault, L. (2011). The practitioner's perspective on teacher education: Preparing for the K-12 online classroom. *Journal of Technology and Teacher Education*, *19*(1), 73–91.

Archambault, L. (2012). Policy and technology advantages to online courses in K-12 school environments. In K. Brady (Ed.), *Debating issues in American education - Technology in schools* (pp. 54–58). Thousand Oaks, CA: SAGE Publications.

Archambault, L. (2014). Teaching virtually: Strategies and challenges in the 21st century online classroom. *International Journal of Online Pedagogy and Course Design*, 4(1), 1-15

Archambault, L., & Crippen, K. (2009). K-12 distance educators at work: Who's teaching online across the United States. *Journal of Research on Technology in Education*, *41*(4), 363–391. doi:10.1080/15391523.2009.10782535

Archambault, L., DeBruler, K., & Freidhoff, J. (2014). K-12 online and blended teacher licensure: Striking a balance between policy and preparedness. *Journal of Technology and Teacher Education*. 22(1), 83-106.

Archambault, L., & Kennedy, K. (2012). Situated online: Theoretical underpinnings of field experiences in virtual school settings. In C. Maddux (Ed.), *Research highlights in technology and teacher education* (pp. 53–60). Chesapeake, VA: Society for Information Technology & Teacher Education.

Barbour, M. (2013). Wayne State University. In K. Kennedy & L. Archambault (Eds.), Partnering for success: A 21st century model for teacher preparation (pp. 22-25). Vienna, VA: International Association for K-12 Online Learning.

Barbour, M., Archambault, L., & DiPietro, M. (2013, January). K–12 Online Distance Education: Issues and Frameworks. *American Journal of Distance Education*, *27*(1), 1–3. doi:10.1080/08923647.2013.759452

Barbour, M. K. (2012a). Models and resources for online teacher preparation and mentoring. In K. Kennedy & L. Archambault (Eds.), Lessons learned in teacher mentoring: Supporting educators in K-12 online learning environments (pp. 83-102). Vienna, VA: International Association for K-12 Online Learning.

Barbour, M. K. (2012b). Training teachers for a virtual school system: A call to action. In D. Polly, C. Mims, & K. Persichitte (Eds.), *Developing technology-rich teacher education programs: Key issues* (pp. 499–517). Hershey, PA: Information Science Reference. doi:10.4018/978-1-4666-0014-0.ch032

Barbour, M. K., Siko, J., Gross, E., & Waddell, K. (2012). Virtually unprepared: Examining the preparation of K-12 online teachers. In R. Hartshorne, T. Heafner, & T. Petty (Eds.), *Teacher education programs and online learning tools: Innovations in teacher preparation* (pp. 60–81). Hershey, PA: Information Science Reference. doi:10.4018/978-1-4666-1906-7.ch004

Barbour, M. K., & Unger, K. (2009). Challenging teachers' preconceptions, misconceptions, and concerns of virtual schooling. In GibsonI. (Eds.), *Proceedings of the annual conference of the Society for Information Technology and Teacher Education* (pp. 785-790). Norfolk, VA: Association for the Advancement of Computing in Education.

Charania, A. (2010). *Preparing future teachers for virtual schooling: Assessing their preconceptions and competence.* (Doctoral dissertation). Iowa State University, Ames, IA.

Christensen, C. M., Horn, M. B., & Staker, H. (2013). *Is K-12 blended learning disruptive? An introduction of the theory of hybrids* (White paper). San Mateo, CA: Clayton Christensen Institute.

DiPietro, M., Ferdig, R. E., Black, E. W., & Preston, M. (2008). Best practices in teaching K-12 online: Lessons learned from Michigan Virtual School teachers. *Journal of Interactive Online Learning*, *7*(1), 10–35.

Ferdig, R. E., Cavanaugh, C., DiPietro, M., Black, E. W., & Dawson, K. (2009). Virtual schooling standards and best practices for teacher education. *Journal of Technology and Teacher Education*, *17*(4), 479–503.

International Association for K-12 Online Learning. (2011). National standards for quality online teaching, Version 2. Vienna, VA: International Association for K-12 Online Learning.

Kennedy, K., & Archambault, L. (Eds.). (2013). Partnering for success: A 21st century model for teacher preparation. Vienna, VA: International Association for K-12 Online Learning.

Kennedy, K., & Archambault, L. M. (2012). Design and development of field experiences in K-12 online learning environments. *Journal of Applied Instructional Design*, *2*(1), 35–49.

Kennedy, K., & Archambault, L. M. (2012). Offering pre-service teachers field experiences in K-12 online learning: A national survey of teacher education programs. *Journal of Teacher Education*, *63*(3), 185–200. doi:10.1177/0022487111433651

Kennedy, K., & Cavanaugh, C. (2009). *Modeling gone virtual: What teachers 'see' is what students get.* Paper presented at the Society for Information Technology and Teacher Education (SITE) Annual Conference. Charleston, SC.

Kennedy, K., & Cavanaugh, C. (2010). Development and support of online teachers: The roles of mentors in virtual schools. *Journal of Technology Integration in the Classroom*, *2*(3), 37–42.

Kennedy, K., Cavanaugh, C., & Dawson, K. (2013). Preservice teachers' experience in a virtual school. *American Journal of Distance Education*, *27*(1), 56–67. doi:10.1080/08923647.2013.756757

Kennedy, K. M. (2010). *The essence of the virtual school practicum: A phenomenological study of pre-service teachers' experiences in a virtual school.* (Doctoral dissertation). University of Florida, Gainesville, FL.

Watson, J., Murin, A., Vashaw, L., Gemin, B., & Rapp, C. (2013). *Keeping pace with K-12 online & blended learning: An annual review of policy and practice*. Evergreen, CO: Evergreen Education Group.

KEY TERMS AND DEFINITIONS

Blended Learning: Education in which a student learns partially on a face-to-face basis and partially through formal online learning.

Consortium Structure: A cooperative group of educational entities that share in the creation, distribution and operational costs associated with courses that benefit their students.

District Structures: District-level online programs that can include a single district that produces and offers online programs for its own students or multiple districts that work together to produce programs for common use within their combined districts.

Face-to-Face Learning: Education in which a student learns in a formal educational program, at a central location and with an instructor.

Online Learning: Education in which a student learns in an educational program, through student-controlled Internet delivery of content and instruction.

Post-Secondary Structure: University-based online programs designed for K-12 students and offered through post-secondary institutions.

State-Level Structure: Online schools that are sanctioned and governed pursuant to the same legislative initiatives that extend to all public schools.

This work was previously published in Exploring the Effectiveness of Online Education in K-12 Environments edited by Tina L. Heafner, Richard Hartshorne, and Teresa Petty, pages 169-190, copyright year 2015 by Information Science Reference (an imprint of IGI Global).

Chapter 80
Challenges and Opportunities in the First Year of a 1:1 iPad Initiative in a High-Poverty, Highly Diverse Urban High School

Gayle Y. Thieman
Portland State University, USA

ABSTRACT

The digital divide between technology-mediated instruction for students in low versus high socio-economic schools is a serious equity issue with repercussions for student learning. While there is a growing body of research on blended learning and 1:1 mobile devices, there seems to be little research on the potential of iPads to reduce disparity of access and impact student learning in high poverty schools. This chapter reports first year results of a 1:1 iPad project on teachers' attitudes and experiences and on high school students' technology access and use. Using iPads resulted in blended learning opportunities for some but not all students. Those who had an individually assigned iPad to use at school and home reported significantly higher satisfaction and proficiency with technology. These students also reported significantly greater use of online iPad applications and technology activities for instruction both during class and outside of school.

INTRODUCTION

The digital divide between technology-mediated instruction for students in low versus high socio-economic schools is a serious equity issue with repercussions for student learning. While there is a growing body of research on blended learning and on 1:1 mobile devices, including the iPad in K-12 schools, there seems to be little research on the potential to reduce disparity of access and impact student learning in high poverty schools.

The purpose of this chapter is to investigate the degree to which a 1:1 iPad initiative in a high-poverty, diverse high school reduces the disparity

DOI: 10.4018/978-1-4666-8246-7.ch080

of technology access, provides opportunity for blended learning, and improves student achievement. The author is working with an urban high school in the Pacific Northwest in a multi-year, mixed-method study of how students access and use individual iPads for learning and the resulting impact on these students' attendance, behavior, and academic achievement. This chapter focuses on two of the research questions: What is the impact of the 1:1 iPad project on teachers' attitudes and experiences with instructional uses of iPads? What is the impact of the 1:1 iPad project on students' access, skills and experiences, and use of technology?

THEORETICAL FRAMEWORK

The National Education Technology Plan (U.S. Department of Education, 2010), calls on teachers to "leverage [technology] to provide engaging and powerful learning experiences and content, as well as resources and assessments that measure student achievement in more complete, authentic, and meaningful ways" (p. ix). Despite near universal access to high-speed Internet connections in most public school classrooms (NCES, 2006), the digital divide between the instructional opportunities for students in low and high socio-economic status (SES) classrooms remains. DeWitt (2007) found the curriculum and technology taught by teachers in higher SES schools was more intellectually rigorous and provided more opportunity for creativity and higher-order thinking skills than curriculum in lower SES schools. He concluded, "[Students'] social class appears to influence teacher beliefs about the implementation of instructional uses of computers" (p.300). More recently, Boser (2013) reported "students from high-poverty backgrounds were far less likely to have rigorous learning opportunities when it comes to technology" (p.2). Similarly, Talley (2007) noted that searching, summarizing, and evaluating complex information on the Internet is more challenging than navigating social media. He cautioned: "Ignoring the literacy demands of new technologies may have especially dire consequences for children in disadvantaged homes and schools" (p. 315).

There seems to be little research on how iPads can reduce the digital divide in high-quality technology instruction and access experienced by low income, racially and linguistically diverse students. The New Media Consortium Horizon Report: 2013 K-12 Edition (Johnson, et al., 2013) forecasts mobile-learning as a "near-term horizon" technology to have a large impact and mainstream use in K-12 education within the next twelve months. The report also cites the importance of access to these devices as the equalizer for low-income students.

More research is also needed on the potential of technology and its measureable impact on K-12 student learning. According to recent federal guidelines (U.S. Department of Education, 2010), the ultimate result of technology integration must be an increase in student achievement. Three meta-analyses of published articles on mobile learning provide an overview of research findings in the last decade. Pollara and Broussard (2011) reviewed 11 studies published between 2005 and 2011 and reported that the benefits of using mobile devices included increased student achievement, productivity, motivation, and engagement.

Wu et al. (2012) conducted a meta-analysis and synthesized 164 studies from 2003-2010. They found that mobile phones and PDAs were the most widely used mobile devices, noted in 75% of the studies. Over half of the studies evaluated the effects of mobile learning, and the majority indicated positive outcomes. However, while over half of the studies examined mobile learning in higher education, research in elementary and secondary schools represented only ¼ of the studies. This is not surprising as K-12 schools have been slow to embrace mobile learning and until recently restricted students' use of mobile phones.

Most recently, Liu et al. (2014) reviewed 63 studies of mobile learning in K-12 schools from

2007 to present. The authors concluded that existing research was primarily exploratory and focused on understanding the educational affordance of using mobile devices in instructional practices. Most of the studies were conducted on a small scale with a single class. The majority of the schools were located in Asia with only seven schools in the United States. Slightly over half of the articles focused on mobile learning in elementary schools while only 1/5 reported mobile learning in high schools. Liu and colleagues (2014) also noted that mobile phones and PDAs were most often studied. Researchers examined student perceptions of technology, participation, and engagement and described learning outcomes. Nine of the 13 articles that compared the effectiveness of mobile learning to traditional learning showed positive learning gains for students who used mobile technology compared to students without mobile access. The authors concluded, the "ability to access content and communication with peers and teachers at any time proved to be an important benefit of using mobile devices" (p.13).

Among the articles in the Liu et al. (2014) meta-analysis, several are especially pertinent to this chapter. In an experimental study, Brown (2009) found that using mobile phones to pre-teach vocabulary significantly improved ninth grade students' reading comprehension and motivation over students who received traditional instruction. Hwang and Chen (2012) reported that when English Learner students used PDAs, they increased their English language practice and improved language acquisition. The school-provided mobile devices extended learning from the school to the home and resulted in positive outcomes. Kalloo and Mohan (2011) found that using a mobile learning math application on their smart phones resulted in high school students' improved math performance. Ferrer, Belvis and Palmes (2011) found that lower SES students benefitted more than higher SES students from 1:1 tablet PC's in terms of achievement, and the technology helped to reduce socio-economic inequalities among the elementary students.

Several articles examined the impact of using mobile learning to increase student and teacher communication. Hung, Lin and Hwang (2010) found that when instructors provided individualized feedback and support for students while they used PDAs in guided and independent science field observations, students' skills improved. Rau, Gao and Wu (2008) reported the positive effects of instant messaging on student-teacher relationships and high school students' motivation.

Despite the accelerating purchase of iPads for use in K-12 schools (Kaufman, 2012), there has been little scholarship on the effectiveness of iPads for learning and teaching (Government of Alberta Minister of Education, 2011). Norris, Hossain and Solloway (2012) examined 1:1 laptop initiatives and reported that when computing devices are used as "essential" curriculum tools, student achievement increased; however, when the devices are "supplemental" there is no impact on student learning. However, most of the research on 1:1 iPad initiatives in K-12 education focuses on teacher reports of instructional applications of iPads and student reports of engagement and satisfaction (NAACE, 2012; Reid & Ostashewski, 2011; Virginia Department of Education, 2011). According to a recent large study of 1:1 initiatives in 19 European countries, "only a very few identified improved learning outcomes as a project rationale" (Balanskat et al., 2013, p. 19).

Recently, Lundy (2013) conducted an experimental study comparing the use of digital and print texts in high school social studies classrooms and found that use of the digital text with an iPad supported high poverty students' technological fluency and creation of more sophisticated learning products. The iPads also provided differentiation for multiple learning styles, a more supportive reading experience and supported increased student engagement for racially diverse students.

METHODOLOGY AND DATA SOURCES

The Technology Immersion Pilot (TIP) is a multi-year, mixed-method study involving concurrent and interactive qualitative and quantitative data (Creswell and Plano Clark, 2011) on the impact of providing a 1:1 mobile device (iPad) to each ninth and tenth grade student in a high poverty, urban high school. "Nearly 80% of the students qualify for free and reduced lunch, 30% meet the federal definition of homeless, 68% are from an identified minority group, and only 37% are completing the necessary credits for graduation" (District, 2010, p.5). The TIP is designed to improve the quality of and access to technology tools and resources, which are essential to the curriculum and may result in greater student achievement.

The district technology initiative is situated within the context of blended learning. Staker and Horn (2012) define blended learning as "a formal education program in which a student learns at least in part through online delivery of content and instruction with some element of student control over time, place, path, and/or pace and at least in part at a supervised brick-and-mortar location away from home" (p.2). This chapter describes a high school that uses a "station-rotation model" of blended learning (pp. 8-9). Within an individual class period students are directed by the teacher to use iPads to complete a variety of online activities; at other times during the class period students are engaged in small group or whole class instruction without the iPads.

Sample and Data Collection Procedures

The sample for the research study includes all 426 students who were enrolled in ninth and tenth grade in the 2012-2013 academic year. Detailed demographics are included in Table 2. The qualitative data sources include classroom observation notes (Appendix 1) and a teacher focus group (Appendix 2). The quantitative data sources include student technology skills and experience surveys conducted at the beginning and end of the school year (Appendix 3); student technology use surveys conducted in spring (Appendix 4); a teacher survey (Appendix 5), and district confidential data for ninth and tenth grade students enrolled in 2012-13. These data include identification number, demographics, ELL/home language status, special education status, attendance rates, discipline records, standardized assessment results, GPA and high school credits in core academic subjects.

During the 2011-2012 academic year, the author observed iPad training for the teachers, assisted the district instructional technology department in refining the evaluation parameters for the grant, helped develop the student and teacher surveys, and created the focus group and classroom observation protocols. During the 2012-2013 academic year, the author conducted nine classroom observations of student use of iPads, facilitated a focus group with seven classroom teachers and began preliminary data analysis of student technology experience and use surveys and teacher surveys.

High school technology staff administered a survey of technology experience, skills, and attitudes to each ninth and tenth grade student at the beginning and end of the 2012-2013 school year (Appendix 3). Beginning in January, 2013, the high school teachers were encouraged to have students complete a brief online survey of their iPad use at the end of each class when iPads were used for instruction (Appendix 4). District technology staff administered a teacher survey in fall, 2012 (Appendix 5).

Data Analysis Procedures

The first research question investigates the impact of the 1:1 iPad project on teachers' attitudes and experiences with instructional uses of iPads. Teachers completed an anonymous survey in fall, 2012, about their familiarity with the iPad and their attitudes toward integrating technology as well as their frequency of technology use and observation of student behavior when using technology in the classroom. Classroom observations and a teacher focus group provided additional data. Descriptive and correlational analysis was used to discover statistical relationships in the survey data, and classroom observation and teacher focus group notes were examined for possible confirmation of the teacher survey findings.

The second research question examines the impact of the 1:1 iPad project on students' access, skills and experiences, and use of technology. Three data sets helped to answer this question. The first is assignment of a Take Home iPad (THP) that could be used by the student throughout the school day and at home. In order to have a THP the student and a parent/guardian had to sign a technology consent form and pay a $40 insurance fee. Students who did not have a THP could use an iPad or laptop in the classroom, when directed to do so by the teacher. Chi square analysis was conducted to determine if there were significant differences by gender, race, ethnicity, home language, and identified academic needs between the two groups: those who had a THP and those who did not.

The second component of this research question focused on students' responses to the technology skills and experiences survey (Appendix 3). Responses were reported on a four point Likert scale. The survey included self-report of overall proficiency and satisfaction with use of the iPad. Student experiences included questions on the helpfulness and ease in using the iPad for academic tasks at school and the frequency of iPad use at school and at home for various tasks.

The author hypothesized students who were assigned a Take Home iPad (THP) and could use it throughout the school day and at home would report greater satisfaction, proficiency, frequency and ease of use and helpfulness of the iPad than students who could only use technology in the classroom when prompted by the teacher. A t test was used to compare the means for the two groups to determine if the differences in technology skills and experiences between students who had a THP and those who did not were statistically significant.

The third component of this research question focused on students' responses to the technology use survey (Appendix 4). The researcher created an index of the number of reported technology uses including types of applications and purposes of iPad uses from the surveys. For each student who completed one or more technology use surveys, the total number of applications (e.g., Web Browser, Educreations) was combined with the total number of purposes (e.g. created multimedia presentation, did research) to create a numerical index of Technology Use. There were 30 different applications that students could report and 14 different purposes for using the iPad in class with a possible index ranging from 0-44. The author hypothesized that students who were assigned a Take Home iPad would report greater use of iPads in their classes, including more applications and a greater variety of purposes. A t test was used to compare the means for the two groups to determine if the differences in technology use reported by students who have a THP and those who do not were statistically significant.

PRELIMINARY FINDINGS

Impact of the 1:1 iPad Project on Teachers' Attitudes and Experiences with iPads

In early fall, 2012, teachers were asked to complete a survey (Appendix 5) about their attitudes and experiences with iPads in the classroom. The survey was conducted when most of the iPads were still assigned to a classroom cart, not to individual students. A total of 38 teachers completed the survey (75% response rate) representing math, science, English, social studies, ESL, special

Table 1. Student response to technology by teacher attribute (N= 38)

Student Response	Teacher Attribute	Chi-Square	*p*-value
Student Engagement	Subject Area	x^2 (18) = 47.41	<.001
Behavior Problems	Confidence	x^2 (6) = 13.74	<.05
Higher Order Thinking	Confidence	x^2 (6) = 14.19	<.05
Student Writing	Confidence	x^2 (9) = 20.47	<.05
Student Writing	Frequency of Tech Integration	x^2 (9)= 17.25	<.05

needs, and other subjects. Two-thirds of the teachers reporting being familiar or very familiar with iPads, while 72% reported feeling comfortable or very comfortable integrating technology into their classrooms. Interestingly, while 62% felt they had received enough professional development to use the iPads in their classroom, 84% wanted additional training.

The majority of teachers (77%) reported they integrated technology into their lessons either once a week or two to three times a week while 20% reported they integrated technology daily. However, the survey question did not specify if technology was being used by the teacher or the students or both.

The survey also asked teachers to rate student behavior, engagement, writing, and higher order thinking when students used technology in their classes. Overall, the majority of teachers (87%) reported behavior problems decreased or there was no behavior change when students used technology. Over 90% of the teachers reported that student engagement increased when students used technology. However, only about ½ of the teachers (53%) reported student writing increased when students used technology, and still fewer (46%) reported student higher order thinking increased when students used technology.

A chi square test indicated that teacher responses differed significantly by subject area when reporting student engagement with technology (Table 1). ESL/SPED, math, and science teachers reported higher student engagement when using technology than teachers of English, social studies, or other subjects. However, there were no other significant differences by subject area.

There were significant associations between teachers' comfort with integrating technology in the classroom and their report of student behavior, higher order thinking, and student writing when using technology (Table 1). Teachers who were most comfortable integrating technology reported student behavior problems decreased when their students used technology. Similarly teachers who were most comfortable integrating technology also reported student higher order thinking increased while teachers who were less comfortable reported no change in student higher order thinking. Finally, teachers who were most comfortable integrating technology also reported student writing increased when using technology. Not surprisingly, teachers also reported student writing increased when they integrated technology more frequently.

Seven teachers responded to the invitation to participate in a focus group in April, 2013 (Appendix 2) representing English, ESL, math, science, and social studies. Five of the teachers had served on the technology cadre that year and were considered by the technology coach to be early technology adopters who had explored and used iPads in a variety of ways with their students. Key ideas from the taped, transcribed discussion focused on strengths and limitations of the iPad project, effects of the iPads on student behavior and attendance, the need to reduce the disparity of student access, and increase technology professional development.

Teachers were enthusiastic about the variety of applications which engage students in new ways and allow students to proceed at their own pace and self-differentiate. For example one teacher reported: "Some students are finding ways to engage in the content in a way that is better for them." The iPads also supported organization of student materials and resources, promoted communication between teachers and students, and enhanced formative feedback during class.

Limitations of the iPads focused on three areas: access, technology training for students, and professional development for teachers. Teachers were frustrated by the inability to implement systems they had suggested to ensure every student would have a personal iPad. Also the high school student population has a higher than average turn-over rate, and teachers were concerned about the lack of technology instruction for students, especially those who entered the school midyear They suggested a weekly orientation for new students with the technology staff to set up the iPad and provide basic instruction.

Recognizing that the learning curve for teachers and students is steep, teachers were concerned about the lack of agreement on common applications to be used school-wide. Teachers recommended increasing technology professional development to twice a month, focusing on a few iPad apps that everyone would learn with substantial time to practice using an app after it was introduced. One teacher whose students used iPads frequently commented, "I get the impression that the administration thinks we have a training and then it's solved. They don't understand the complexity of using the iPads."

Teachers noted there was less distracting behavior and fewer side conversations, but some students were still off task with iPads. Teachers definitely needed to incorporate appropriate iPad use into classroom management routines. They also acknowledged, "Part of our job is to teach kids to be successful with technology." There were minimal effects on student attendance: "Kids who were able to take an iPad home have family support and good attendance. Kids who miss a lot of class don't have a Take Home iPad."

Overall teachers viewed the iPads as a positive enhancement. "Students are coming to [school] for iPads; they are a sustainability device." Noting that the high school had multiple reforms that year (new humanities curriculum, diversity, technology), they recommended a sustained focus on instructional strategies using iPad applications. "Systemic reform takes three years; we need two more years of sustained effort."

Classroom observations (Appendix 1) in spring were used to confirm the teacher survey and focus group data. Seven teachers responded to the request to observe their classes in English, social studies, science, math, and ESL. During all nine observations students used iPads for at least part of a class period. In general, most students were on task the majority of the time, although this varied with the classroom management skills of the teacher.

Students accessed teacher websites (Weebly, Schoology, Edmodo) for instruction, resources, and learning tasks. Frequently students used Google docs to write essays and Google forms to respond to quizzes and took notes with Notability. They also used their iPads to watch podcasts or videos and scanned QR codes to access online references. Students used some subject-specific applications such as Geometers Sketchpad.

Those students who had individually assigned iPads (THP) could and, according to teacher comments, did continue to work on assignments at home. They frequently used their iPads to look up definitions and search for information during class.

Several teachers used the application Doctopus to push out assignments to students and to review and comment on their work. Teachers also used Explain Everything and Educreations to support lectures. Most of these applications were modeled in the iPad training the previous year and during monthly technology cadre professional development. The only class that used the iPad for drill and practice was the ESL class for newcomer immigrant students who did not speak English and were using the Quizlet App to support vocabulary development. These students also used Raz-Kids to access e-books and improve reading comprehension.

In some classes there were missed opportunities to incorporate iPads. For example students were asked to create a graphic organizer about the main themes of a novel on paper, rather than using a drawing application. In many classes students wrote notes in their own paper journals rather than on iPads because the majority of the students did not have their own THP.

Impact of the 1:1 iPad Project on Students' Access, Attitudes, and Experiences with Technology

The original intent of the project (District, 2010) was for every ninth and tenth grade student to have a personally assigned iPad that could be used at school and at home. Given the delay in implementing check-out procedures at the beginning of the 2012-13 school year and the requirements for allowing students to take an iPad home, only 40% of the students (171) were assigned a Take Home iPad (THP) by April, 2013. The remaining 60% of students had the opportunity to use an iPad on a cart in their humanities classrooms and in some math and science classrooms. However, students could not take these iPads out of the assigned classroom to use in other classes or at home. The unintended consequence of the iPad distribution procedures was that students' opportunities for blended and online learning were limited. Staff acknowledged the initial roll-out was problematic. During the spring focus group teachers commented: "We were supposed to have the iPads the first six weeks." "We lost momentum because kids didn't get their iPads right away."

Inequity of Assignment to iPads by Disaggregated Groups

Disaggregated data on iPad assignment by student grade level, gender, race, ethnicity, first language, academic needs, and GPA indicated some differences in iPad access across categories. Table 2 reports Chi Square analysis of disaggregated iPad assignment data during the 2012-2013 school year. There was a significant association between grade level and iPad assignment. Tenth graders were somewhat less likely to be assigned a Take Home iPad (THP) than ninth graders. There was also a significant association between race and iPad assignment. In general, white students were more likely to be assigned a THP than non-white students. While there was not a significant association between students who had an IEP or were identified TAG and their iPad assignment, there was a small significant association between ESL services and iPad assignment. Students who received ESL services were somewhat more likely to be assigned a THP compared to those who were not receiving ESL services. In the focus group interview an ESL teacher commented: "For my sheltered class it has helped some of them because otherwise they would never have access to an iPad. They carry that iPad around and it is amazing. We use the iPads almost every day."

There was also a significant association between identification as an Academic Priority student and iPad assignment. Students thus identified were less likely to be assigned a THP compared to students who were not so identified. While the district did not provide free/reduced lunch data on individual students due to FERPA regulations, Academic Priority has been considered a proxy for low income. In 2010 the district established the Academic Priority Zone to support elementary and secondary students with the greatest needs to help close the achievement gap for race and poverty. The high school in this study is included in the Academic Priority Zone because in prior years the school failed to make adequate yearly

Table 2. Assignment of Take Home iPads (THP) by student category (N= 426)

Student Category	THP	No THP	Chi-Square	*p*-value
Grade				
9th	113 (46%)	133 (54%)		
10th	58 (32%)	122 (68%)	(χ^2 (1) = 8.13	<.01
Gender				
Female	79 (44%)	102 (56%)		
Male	92 (54%)	153 (62%)	(χ^2 (1) = 1.61	.205
Ethnicity				
Hispanic	60 (41%)	87 (59%)		
Non-Hispanic	111 (40%)	168 (60%)	(χ^2 (1) = .04	.836
Race				
White	107 (45%)	133 (55%)		
Non-White	64 (34%)	122 (66%)	(χ^2 (1) = 4.52	<.05
First Language				
English	101 (39%)	159 (61%)		
Spanish	47 (43%)	63 (57%)		
Other Lang	22 42%)	30 (58%)	(^{2} (3) = .97	.808
Special Education				
IEP	41 (48%)	45 (52%)		
No IEP	130 (38%)	210 (62%)	χ^2 (1) = 2.55	.111
ELL Status				
ELL Service	22 (55%)	18 (45%)		
ELL Monitor	12 (40%)	18 (60%)		
ELL Refused Service	0	7 (100%)		
Not ELL	137 (39%)	212 (61%)	(χ^2 (3) = 8.48	<.05
TAG				
Yes	12 (46%)	14 (54%)		
No	159 (40%)	241 (60%)	χ^2 (1) = 4.17	.519
Academic Priority				
Yes	88 (35%)	164 (65%)		
No	83 (48%)	92 (52%)	χ^2 (1) = 7.0	<.01
GPA Fall 2012				
0-.99	6 (21%)	22 (76%)		
1-1.99	26 (24%)	81 (76%)		
2-2.99	73 (48%)	80 (52%)		
3-3.99	54 (46%)	63 (54%)		
4.0	1 2 (67%)	6 (33%)	χ^2 (4) = 25.86	< .001

progress and a high percentage of the students (nearly 80%) qualified for free/discounted meals.

Finally there was a strongly significant association between students' GPA at the end of fall semester and their iPad assignment. Students with a GPA of 2.00-3.99 were twice as likely as those with lower GPA's to be assigned a THP, and students with a 4.0 GPA were three times more likely as those with GPA's below 2.00 to have a THP. A t-test of individual students' GPA and iPad assignment confirmed these results. Thus an unintended consequence of the iPad distribution was the inequity of opportunity to participate in online learning both during and after the school day.

In the focus group teachers commented that the large percentage of students who did not have a take home iPad (THP) was a limitation of the project. One teacher noted: "Kids who do have an iPad checked out can use Notability; they can really make it their own. It's more complex for the students without an iPad assigned to take home." Another teacher commented: "There are fundamental shifts out there, but the problem is not all our kids have them [iPads]. I have 15 or 16 for the department in my room. It needs to be the student's iPad and take ownership of it."

Differences in Student Technology Attitudes and Frequency of Use

When students were assigned an iPad, they were to complete an online survey (Appendix 3) regarding their access, satisfaction, proficiency, and experience with technology. The survey was intended to serve as a pre-post assessment each year of the project. However, the initial survey was not administered to every student at the beginning and end of the year as planned. The fall survey was completed by 243 students (57% response rate), but only 106 students (25% response rate) completed the spring survey. The difference in response rates was due to lack of staff/faculty support for administering the online surveys during class time in the spring. Survey results suggested differences between students who were assigned a take home iPad (THP) and those who could only use an iPad or laptop in the classroom when assigned by the teacher.

Of 298 individual students who responded to the survey in fall and/or spring, 81% reported access to a home computer, 84% reported Internet access at home; while 78% reported wireless Internet access at home. These statistics were somewhat higher than the district technology staff had previously researched (personal communication, July 17, 2013). Chi square analysis revealed no significant association between the type of iPad assignment (THP) and students' access to technology at home.

However, there were significant associations between THP assignment and students' technology experiences (Table 3). Students who were assigned a THP were more satisfied with using the technology than those who did not have a THP. Similarly, students with a THP also reported a higher level of proficiency with technology than those who did not.

There was a highly significant association between THP assignment and frequency of use. Students who had a THP reported more frequent use of the iPads at school. In the classroom observations, the author noted that students who had a THP used the iPad to access information for group projects and to complete homework in other classes when the rest of the class was not using the iPads on a cart. Since only the ninth and tenth grade humanities classes and a few math and science classrooms had iPad carts, students who had a THP were at an advantage. These students could benefit from the opportunity to access digital content and instruction online even if there were no iPads or laptops available in the classroom.

Note. 243 students took the online survey in fall 2012 representing 57% of the ninth and tenth grade students. Due to problems with survey administration only 106 students took the online

Table 3. Technology satisfaction, proficiency, and frequency of use compared to iPad assignment

	N	Mean	Std. Dev.	Std. Error Mean	T-Test
Technology Satisfaction 1=Not Satisfied 4= Very Satisfied					
No THP Fall	140	3.49	.62	.05	
THP Fall	103	3.64	.54	.05	t(233.87)= -2.08 p=.04
No THP Spring	67	2.99	1.01	.12	
THP Spring	38	3.68	.47	.08	t(100.15)= -4.83 p=<.001
Technology Proficiency 1= Not very Good 4= Very Good					
No THP Fall	140	3.28	.71	.06	
THP Fall	103	3.56	.59	.06	t (241)= -3.31 p= <.01
No THP Spring	68	3.21	.84	.10	
THP Spring	38	3.53	.73	.12	t (86.31)= -2.06 p=<.05
Frequency of iPad Use at School 1= no classes/week 2= 1-2 classes/week 3= 3-5 classes/week 4= every class/week					
No THP Fall	140	2.16	1.00	.08	
THP Fall	103	2.20	1.07	.11	t (241) = -.296 p= .77
No THP Spring	68	1.96	.44	.05	
THP Spring	38	2.50	.83	.13	t (104)= -4.42 p=<.001

survey in spring 2013 representing 25% of the ninth and tenth grade students.

Differences in Student Report of Usefulness of the iPad

Table 4 summarizes students' report of the degree to which the iPad was helpful in completing academic tasks. Preliminary survey results suggest significant differences between the fall and spring administration for students with a THP and those without.

In the fall, students' responses about the iPad's helpfulness for academic tasks did not differ significantly between those who had a THP and those who could only use an iPad in the classroom. However, by spring there was a significant association between iPad access and helpfulness for the following academic tasks: homework, writing assignments, communication and collaboration, organizing school work, and staying motivated and engaged. Students who had a THP reported a significantly higher mean score for the iPad's helpfulness for these academic tasks. However, there was not a significant association in the

Table 4. Helpfulness of iPad for academic tasks compared to iPad assignment

Academic Task 1 = Not Helpful 2 = Somewhat Helpful 3 = Helpful 4 = Very Helpful	N	Mean	Std. Dev.	Std. Error of Mean	t-Test
iPad Helpful with Homework					
No THP Fall	140	3.10	.84	.07	
THP Fall	103	3.20	.72	.07	t(241)= -1.01 p=.31
No THP Spring	68	2.52	1.03	.12	
THP Spring	38	3.26	.76	.12	t(96.02)=-4.27 p=<.001
iPad Helpful with Writing Assignments					
No THP Fall	140	3.18	.81	.07	
THP Fall	103	3.22	.77	.08	t(241)= -.436 p=.66
No THP Spring	68	2.96	1.06	.13	
THP Spring	38	3.58	.55	.09	t(103.64)= -3.99 p= <.001
iPad Helpful with Communicating/Collaborating					
No THP Fall	140	2.99	.83	.07	
THP Fall	103	3.15	.80	.08	t(241)= -1.51 p= .13
No THP Spring	68	2.62	1.04	.13	
THP Spring	38	3.18	.83	.14	t(91.06)= -3.07 p=<.01
iPad Helpful with Organizing Schoolwork					
No THP Fall	140	3.06	.86	.07	
THP Fall	103	3.01	.86	.08	t(241)= .49 p= .63
No THP Spring	68	2.29	1.02	.12	
THP Spring	38	3.12	.91	.15	t(104)= -4.21 p=<.001
iPad Helpful with Doing Research					
No THP Fall	140	3.61	.63	.05	
THP Fall	103	3.58	.68	.07	t(241)= .29 p=.77
No THP Spring	68	3.59	.67	.08	
THP Spring	38	3.66	.53	.09	t (104)= -5.48 p=.58
iPad Helpful with Staying Motivated					
No THP Fall	140	3.08	.87	.07	
THP Fall	103	3.15	.78	.08	t(241)= -.62 p= .54
No THP Spring	68	2.56	1.03	.12	
THP Spring	38	3.18	.87	.14	t(104)= -3.17 p= <.01
iPad Helpful to Access Information					
No THP Fall	140	3.50	.67	.06	
THP Fall	103	3.58	.63	.06	t(241)= -9.68 p=.33
No THP Spring	68	3.23	.77	.09	
THP Spring	38	3.50	.65	.11	t(104)= -1.79 p=.08

Note. 243 students took the online survey in fall 2012 representing 57% of the ninth and tenth grade students. Due to problems with survey administration only 106 students took the online survey in spring 2013 representing 25% of the ninth and tenth grade students.

spring between iPad access and helpfulness for doing research and accessing information. In the classroom observations the author noted these online activities were most frequently completed at school.

Differences in iPad Use in School

Table 5 summarizes the frequency of iPad use in school on the student technology use survey (Appendix 4) from January to May, 2013. Over 550 student technology use surveys were completed by 204 individual students, representing 48% of the ninth and tenth grade students in the sample. A *t* test indicated a statistically significant difference between students who had a THP and those who did not. The mean score for total number of technology applications reported by students with a THP was double the mean score for students without a THP. Similarly, the mean score for technology activities by students with a THP was almost twice that of students without a THP. Also, the mean Technology Use score for students with a THP was twice that of students who did not have a THP. The survey results clearly indicate that students who had a THP had a significantly greater opportunity to benefit from blended and online learning opportunities.

Students reported using eleven different iPad applications. The top four were web browser; presentation tools, e.g., Educreate, Explain Everything and Slide Shark; Google tools; and learning management systems, e.g., Schoology and Edmodo. Students also reported using note taking applications such as Notability and assessment applications, e.g., Socrative and Quizlet.

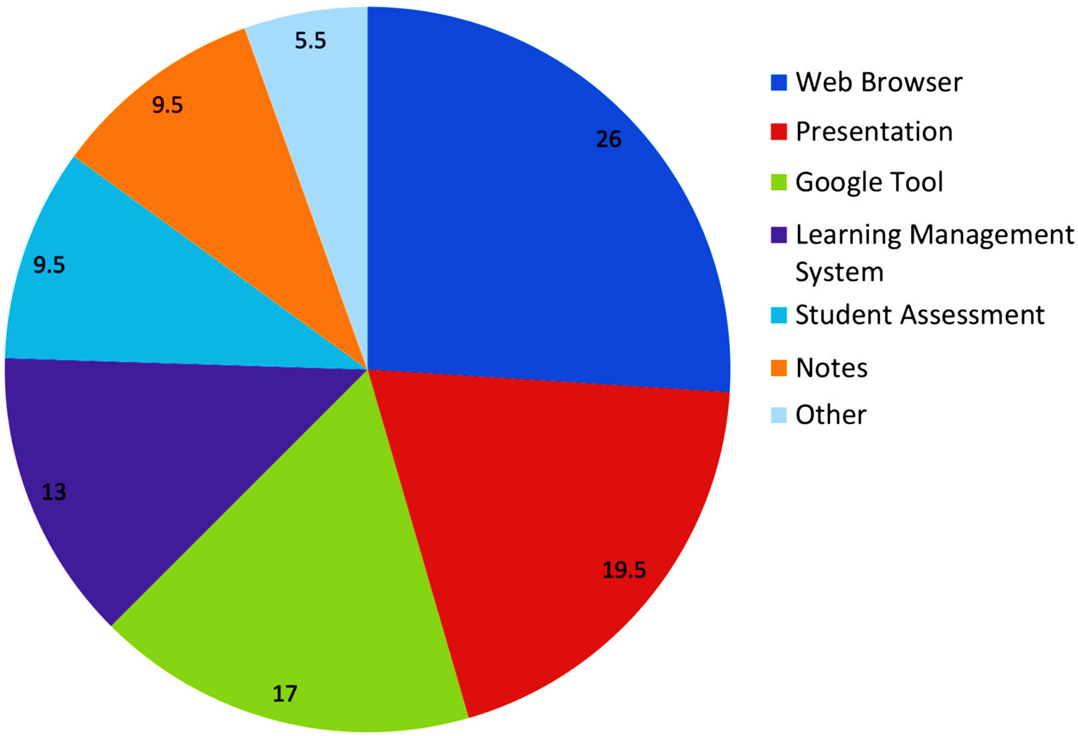
Students reported 15 purposes for using the iPad applications. Doing research and using references was reported most frequently, followed by reading, writing, taking notes, and producing media, e.g. taking digital photos and videos. Students also reported creating multimedia presentations, listening to music and playing games, working on collaborative projects, and to a lesser extent watching videos. Students reported using their iPads to solve math or science problems or communicate by email least often.

In 2012-2013, students from a minority of teachers accounted for the majority of technology use surveys. Of the 559 surveys completed, six out of 22 teachers whose students completed the survey accounted for 79% of the surveys. Two of the teachers taught ESL, one each taught science, math, social studies and English. Students were most likely to report using iPads in one science teacher's class, but not in other science teachers' classes. This

Table 5. Technology use in school compared to iPad assignment N=150

	N	Mean	Std. Dev.	Std. Error of Mean	t-Test
iPad Applications					
No THP	85	2.12	1.94	.21	
THP	65	4.59	4.70	.57	t (85.17) = -4.07 p=<.001
iPad Uses					
No THP	85	5.29	4.91	.53	
THP	65	9.74	12.28	1.49	t (84.10) = -2.81 p= .006
Combined iPad Application/Use Index					
No THP	85	7.41	6.02	.65	
THP	65	14.32	16.06	1.95	t (82.06) = -3.37 p=.001

Figure 1. iPad applications by percent



science teacher was a member of the technology cadre and the most enthusiastic proponent of iPads as instructional tools. Students were also more likely to report using iPads in their ESL classes and in one of the math teacher's classes. These teachers were also members of the technology cadre.

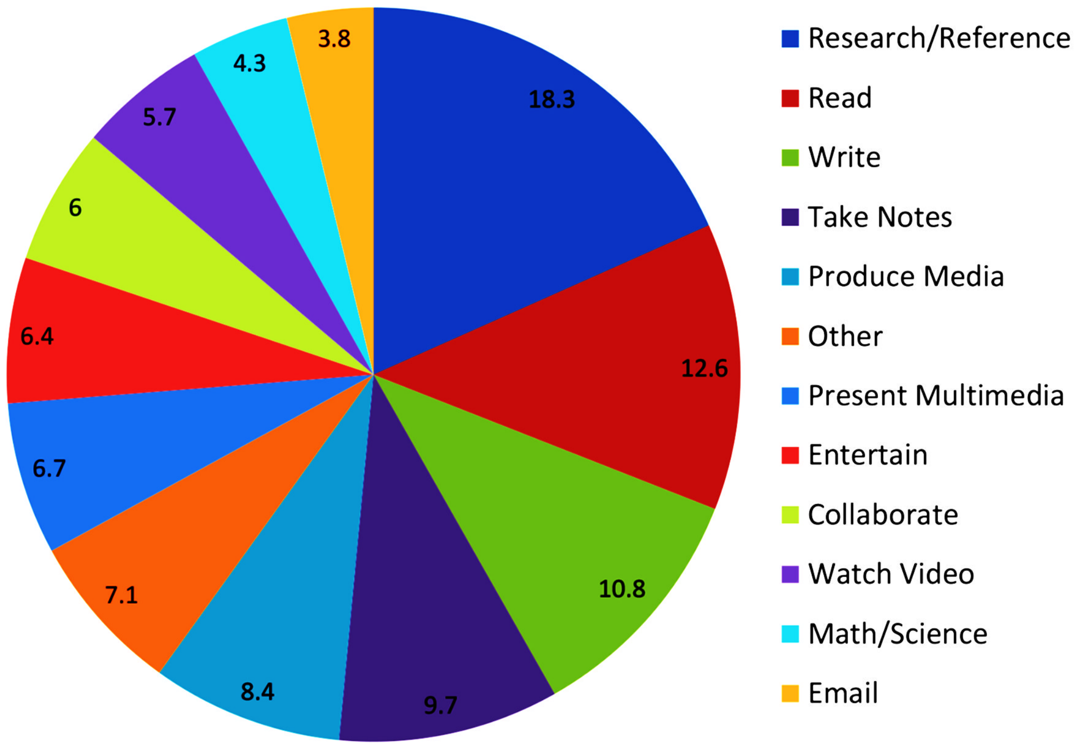
Differences in iPad Use Outside of school

Table 6 summarizes students' report of the frequency of iPad use outside of school. There were significant differences in students' responses between the fall, 2012 and spring, 2013 surveys. On seven of the eight indicators, there were no significant differences in the fall between students who had a THP and those who used an iPad from the classroom cart. However, the fall survey does indicate a small significant association for using the iPad outside school for social media.

On the spring, 2013 survey, there was a significant association between iPad access and all eight indicators. Students who had a THP reported significantly higher use of the iPad outside of school for doing homework, communicating and collaborating, creating videos and presentations, accessing information, watching videos, playing games, listening to music, and using social media than did students who could only use the iPad on a classroom cart.

Overall, 29% of the students who completed the technology experience survey reported they used their iPads (or laptops) at home to do homework 2-3 times/week while another 18% reported they used technology to do homework every day. There was a difference between students who had a THP and could use the iPad at home versus those who could only use an iPad at school. In general, students with a THP reported using iPads to do homework more often; 47% reported 2-3 times a

Figure 2. Uses of the iPad by percent



week, and another 34% reported using an iPad to do homework every day. However, only 18% of students without a THP reported using technology to do homework 2-3 times per week and only 10% reported using technology to do homework daily. Thus the opportunities for online learning were limited for students without a THP.

DISCUSSION

Opportunities Provided by 1:1 iPad Project

In the first year of the project, the 1:1 iPad initiative resulted in blended learning opportunities for some, but not all students. Classroom observations, the teacher focus group, and student surveys indicated that in some classrooms students were engaged in a variety of online activities. Moreover, the 40% of students who had an individual THP could choose when and where to complete assignments and also to extend their learning. According to Liu et al. (2014) expanding learning opportunities beyond the schoolhouse and school day is one of the key benefits of mobile devices. However, the iPad distribution significantly limited expanded online learning opportunities for students who did not have a Take Home iPad. Thus a key affordance of mobile devices was underutilized.

Student surveys confirmed that students used iPads most often to research information, read, write, take notes, and produce media. A key feature of blended learning is that "what the students learn online informs what they learn face to face" (Staker & Horn, 2012). In a 90-minute class period students often received direct instruction, collaborated with peers in a discussion or problem-solving activity and used iPads to support

Table 6. Frequency of iPad use outside of school compared to iPad assignment

iPad Use 1= never 2= once/week 3= 2-3times/week 4= every day	N	Mean	Std. Dev.	Std. Error of Mean	t-Test
Do Homework					
No THP Fall	140	2.71	1.13	.10	
THP Fall	103	2.64	1.20	.12	t(241)= .488 p= .63
No THP Spring	68	1.81	1.07	.13	
THP Spring	38	3.13	.78	.13	t(96.82)= -7.32 p=<.001
Communicating/email, blog, chat					
No THP Fall	140	2.59	1.11	.09	
THP Fall	103	2.57	1.11	.11	t(241)= .09 p=.93
No THP Spring	68	1.75	1.04	.13	
THP Spring	38	3.03	1.00	.16	t(104)= -6.14 p= <.001
Create videos, presentations					
No THP Fall	140	2.22	1.05	.09	
THP Fall	103	2.18	1.01	.10	t(241)= .28 p= .78
No THP Spring	68	1.77	1.07	.13	
THP Spring	38	2.53	.95	.15	t(104)= -3.66 p= <.001
Find information					
No THP Fall	140	2.99	1.03	.09	t(201.61)= .57 p=.57
THP Fall	103	2.90	1.18	.12	
No THP Spring	68	2.15	1.21	.15	
THP Spring	38	3.45	.65	.10	t(103.83)= -7.20 p=<.001
Watch videos					
No THP Fall	140	2.90	1.11	.09	
THP Fall	103	2.72	1.18	.12	t(241)= 1.23 p=.22
No THP Spring	68	1.87	1.09	.13	
THP Spring	38	3.32	.74	.12	t(100.06)= -8.11 p= <.001
Play games					
No THP Fall	140	2.56	1.15	.10	
THP Fall	103	2.45	1.16	.11	t(241)= .79 p=.43
No THP Spring	68	1.77	1.17	.14	
THP Spring	38	3.03	.82	.13	t(98.64)= -6.47 p= <.001
Listen to music					
No THP Fall	140	3.09	1.17	.10	
THP Fall	103	2.89	1.25	.12	t(241)= 1.27 p=.20
No THP Spring	68	1.94	1.21	.15	
THP Spring	38	3.13	1.04	.17	t(104)= -5.10 p= <.001

continued on following page

Table 6. Continued

iPad Use 1= never 2= once/week 3= 2-3times/week 4= every day	N	Mean	Std. Dev.	Std. Error of Mean	t-Test
Use social media					
No THP Fall	140	2.91	1.20	.10	
THP Fall	103	2.53	1.22	.12	t(241)= 2.37 p=<.05
No THP Spring	68	1.77	1.15	.14	
THP Spring	38	2.92	1.08	.17	t(104)= -5.09 p=<.001

Note. 243 students took the online survey in fall 2012 representing 57% of the ninth and tenth grade students. Due to problems with survey administration only 106 students took the online survey in spring 2013 representing 25% of the ninth and tenth grade students.

and differentiate their learning through online instruction. Students accessed teacher webpages to view short informational videos and were able to work at their own pace. They could follow links for definitions and more detailed information, highlight and take notes in the online texts.

The opportunity to extend learning time was especially important for English Learners. One of the ESL teachers emphasized the importance of newcomer immigrant students being able to access the teacher's website and resources from home. "Students with a THP and Internet have 24/7 access to continue learning even when I'm not around. Students access class material from home or after school programs, and often choose to review old material in addition to practicing new material." Even after one student left the high school, she still logged on to the teacher's website and continued to improve her English skills. Her teacher commented, "iPads provide a way for students to access everything and open up the world for them." The iPads also improved teacher/student communication, particularly when teachers provided individual feedback online either during class or after the school day. This is a key benefit of mobile devices in a blended learning environment.

Challenges for the iPad Project

Both the district and high school staff intended for the 1:1 iPad project to improve the quality of technology tools and reduce the disparities in technology access and instruction among low-income students by providing every ninth and tenth grade student an individual iPad. However, THP distribution significantly varied by grade level, race, and academic ability, i.e., designation as an Academic Priority student or GPA.

The importance of this digital divide in access was clearly shown in the student surveys when students with a THP reported significantly higher satisfaction and proficiency with technology than those who did not. Students with a THP also reported significantly greater use of iPad applications for a higher number of technology activities in school and a significantly higher use of the iPad outside of school for academic purposes.

In order for students to benefit from online learning, each must have a mobile device. While this seems obvious, the district underestimated the challenge of ensuring that every student would have an individually assigned iPad. Initial communication with families focused on the financial and legal obligations associated with the iPads but did not emphasize the benefits of the iPads to support student online learning during and after school.

While the majority of teachers reported they were familiar with iPads, and felt comfortable integrating technology into their classrooms, and did so at least weekly, student technology use surveys painted a different picture. The majority of these surveys were completed in six teachers' classrooms; many of these teachers were considered to be early adopters of technology and some were members of the technology cadre that provided professional development to their colleagues. One caveat to this finding is the student technology use surveys were voluntary, and classroom observations indicated that sometimes students used their iPads regularly but were not asked to complete the survey by their teachers.

The teacher focus group clarified another challenge. Given the delay in implementing check-out procedures and the requirements for students to have a THP, only 40% of eligible ninth and tenth graders were assigned an individual iPad. One teacher's comment represented the focus group concern: "If I spend hours developing an activity, and the kid doesn't have an iPad and doesn't even know how to email it to me. All these things play into why we are using technology as a notebook or a presentation." Previous research (Norris, Hossain & Solloway, 2012) suggests that 1:1 devices need to be used as essential curriculum tools rather than supplemental devices in order to impact student learning. In the first year of the project, instructional use of iPads varied considerably across the school.

The need for more technology professional development was a common refrain and substantiated previous findings with technology adoptions (Johnson, et al., 2013).

All too often, when schools mandate the use of a specific technology, teachers are left without the tools (and often skills) to effectively integrate the new capabilities into their teaching methods. The results are that the new investments are underutilized, not used at all, or used in a way that mimics an old process….(p.9)

During the year prior to iPad distribution teachers were given release time with paid substitutes to attend workshops on iPad use presented by Apple certified trainers and by state technology cadre members and district staff. In the first year of iPad distribution to students, the high school technology cadre teachers provided technology instruction in monthly after school department meetings. However, teachers seemed to have a strong desire for more professional development with iPads. Teaching in a blended environment with part of each class period devoted to online content and instruction takes a great deal of time to plan and create lessons and the development of new instructional skills for most teachers.

RECOMMENDATIONS FOR PRACTICE

At a discussion in April, 2013, faculty shared their vision of the opportunities the 1:1 iPad project could provide students.

It [educational technology] can give students and the communities they belong to a voice… They will learn how to use it to address their own academic, professional, and civic needs. This is cultural capital that students from more privileged families take for granted…It gives ALL students access to the tools they will need to be successful in college and the work force, not just the students who have access to technology at home.

Given these goals and the significant differences in access, attitudes, and experiences of students who were assigned an iPad to take home (THP) versus those who could only use an iPad on the classroom cart, it seems imperative for the high school to change the way in which iPads are distributed. Teachers insisted that from a social justice perspective, all students should have the opportunity for a THP. However, given the challenging conditions some of the students faced, e.g., homelessness and dire poverty, not every student was able to take an iPad home. For those students (estimated by teachers at less than 50), arrangements could be made for students to check their iPad in and out each day so it could be available during school. The consequence of not changing the iPad assignment process is to perpetuate the digital divide that limits the academic opportunities and technological affordances of the 1:1 iPad initiative.

Furthermore, instructional use of iPads needs to be an essential curriculum tool that enables students to learn on a daily basis in ways that are not well supported through traditional instruction. The teacher focus group and limited classroom observations suggest that in the first year of implementation, only a few teachers substantively integrated iPads into daily instructional practice at the high school. Research on technology innovation and implementation (Ensminger & Surry, 2008; ISTE, 2012) emphasizes the need for positive administrative expectations, supervision, and support at all levels; expectations that all students will have equitable access to the technology; and ongoing professional development for teachers in using the technology as an integral tool for student learning.

This research focuses on an issue of digital equity that has not yet been studied in depth with 1:1 iPads. Many of the schools and districts that have purchased 1:1 mobile devices for students to take home are private schools or public schools that serve upper middle class students. This case study looks in depth at students' access, attitudes and experiences and use of iPads to support online learning in a high-poverty, highly diverse, urban high school. Analysis of student achievement data is continuing in the second year of the project with a more in-depth look at the types of online experiences students are having.

The author wishes to acknowledge the contributions of Dr. Tatiana M. Cevallos at George Fox University who assisted with data preparation and analysis as a doctoral student.

REFERENCES

Balanskat, A., Bannister, D., Hertz, B., Sigillo, E., & Vuorikari, R. (2013). Overview and analysis of 1:1 learning initiatives in Europe. *Joint Research Centre Institute for Prospective Technological Studies*. Retrieved from: ftp://jrc.es/pub/EURdoc/JRC81903.pdf

Bielefeldt, T. (2012). ISTE classroom observation tool: ICOT v3.1 user manual. *International Society for Technology Education.* Retrieved from: http://nets-assessment.iste.wikispaces.net/file/view/ICOT+Instructions+v3.1.pdf

Boser, U. (2013). Are schools getting a big enough bang for their education technology buck? *Center for American Progress*. Retrieved from http://www.americanprogress.org/issues/education/report/2013/06/14/66485/are-schools-getting-a-big-enough-bang-for-their-education-technology-buck/

Brown, L. (2009). Using mobile learning to teach reading to ninth-grade students. *Journal for Computing Teachers*. Retrieved from http://www.iste.org/jct

Creswell, J. W., & Plano Clark, V. L. (2011). *Designing and conducting mixed methods research* (2nd ed.). Los Angeles, CA: SAGE Publications.

DeWitt, S. W. (2007). Dividing the digital divide: Instructional use of computers in social studies. *Theory and Research in Social Education*, *35*(2), 277–304. doi:10.1080/00933104.2007.10473336

District. (2010). *Technology immersion pilot: Building the blueprint for our future*. Grant application submitted to Mt. Hood Cable Regulatory Commission.

Ensminger, D. C., & Surry, D. W. (2008). Relative ranking of conditions that facilitate innovation implementation in the USA. *Australasian Journal of Educational Technology*, *24*(5), 611–626.

Ferrer, F., Belvís, E., & Pàmies, J. (2011). Tablet PCs, academic results, and educational inequalities. *Computers & Education*, *56*(1), 280–288. doi:10.1016/j.compedu.2010.07.018

Government of Alberta Minister of Education. (2011). *iPads-what are we learning? Summary report of provincial data gathering day*. Retrieved from https://education.alberta.ca/media/6684652/ipad%20report%20-%20final%20version%20 2012-03-20.pdf

Heinrich, P. (2013). *The iPad as a tool for education: A study of the introduction of iPads at Longfield Academy, Kent*. Retrieved from http://www.emergingedtech.com/2012/07/study-finds-benefits-in-use-of-ipad-as-educational-tool

Hung, P.-H., Lin, Y.-F., & Hwang, G.-J. (2010). Formative assessment design for PDA integrated ecology observation. *Journal of Educational Technology & Society*, *13*(3), 33–42.

Hwang, W.-Y., & Chen, H. S. L. (2013). Users, familiar situational contexts facilitate the practice of EFL in elementary schools with mobile devices. *Computer Assisted Language Learning*, *26*(2), 101–125. doi:10.1080/09588221.2011.639783

International Society for Technology in Education. (2012). *Essential conditions*. Retrieved from http://www.iste.org/standards/essential-conditions

International Society for Technology in Education. (2012). *ISTE classroom observation tool (ICOT v3.1)*. Retrieved from http://nets-assessment.iste.wikispaces.net/file/view/ICOT+Instructions+v3.1.pdf

Johnson, L., Adams Becker, S., Cummins, M., Estrada, V., Freeman, A., & Ludgate, H. (2013). NMC Horizon Report: 2013-K-12. Austin, TX: the New Media Consortium.

Kalloo, V., & Mohan, P. (2011). An investigation into mobile learning for high school mathematics. *International Journal of Mobile and Blended Learning*, *3*(3), 59–76. doi:10.4018/jmbl.2011070105

Kaufman, M. (2012). *iPads in Schools*. Retrieved from http://www.ipadsinschools.com

Liu, M., Scordino, R., Geurtz, R., Navarrete, C., Ko, Y. J., & Lim, M. H. (in press). A Look at research on mobile learning in K-12 education from 2007 to present. *Journal of Research on Technology in Education*.

Lundy, S. (2013). *Integrating digital technology in social studies education: A multiple-case study comparing the use of a digital and print text in high school social studies classes*. (Unpublished doctoral dissertation). Portland State University, Portland, OR.

NAACE. (2012). *The iPad as a tool for education. A study of the introduction of iPads at Longfield Academy, Kent*. Retrieved from http://www.mobl21.com/blog/author/admin/

National Center for Education Statistics (NCES). (2011). *Digest of education statistics.* Washington, DC: U.S. Department of Education. Retrieved from http://nces.ed.gov/programs/digest/d11/tables/dt11_109.asp

Norris, C., Hossain, A., & Soloway, E. (2012). Under what conditions does computer use positively impact student achievement? Supplemental vs. essential use. In P. Resta (Ed.), *Proceedings of Society for Information Technology & Teacher Education International Conference 2012* (pp. 2021-2028). Chesapeake, VA: AACE.

Pollara, P., & Broussard, K. K. (2011). Mobile technology and student learning: What does current research reveal? *International Journal of Mobile and Blended Learning*, *3*(3), 34–42. doi:10.4018/jmbl.2011070103

Rau, P.-L. P., Gao, Q., & Wu, L.-M. (2008). Using mobile communication technology in high school education: Motivation, pressure, and learning performance. *Computers & Education*, *50*(1), 1–22. doi:10.1016/j.compedu.2006.03.008

Reid, D., & Ostashewski, N. (2011). iPads in the classroom – New technologies, old issues: Are they worth the effort? In T. Bastiaens & M. Ebner (Eds.), *Proceedings of World Conference on Educational Multimedia, Hypermedia and Telecommunications 2011* (pp. 1689-1694). Chesapeake, VA: AACE.

Staker, H., & Horn, M. B. (2012). *Classifying K-12 blended learning*. Innosight Institute. Retrieved from http://www.innosightinstitute.org/innosight/wp-content/uploads/2012/05/Classifying-K-12-blended-learning2.pdf

Tally, B. (2007). Digital technology and the end of social studies education. *Theory and Research in Social Education*, *35*(2), 305–321. doi:10.1080/00933104.2007.10473337

U.S. Department of Education, Office of Educational Technology. (2010). *Transforming American education: Learning powered by technology*. Washington, DC: Author.

Virginia Department of Education. (2011). *Beyond textbooks: Year one report*. Retrieved from http://www.doe.virginia.gov/support/technology/technology_initiatives/learning_without_boundaries/beyond_textbooks/year_one_beyond_textbooks_report.pdf

Wu, W.-H., Jim Wu, Y.-C., Chen, C.-Y., Kao, H.-Y., Lin, C.-H., & Huang, S.-H. (2012). Review of trends from mobile learning studies: A meta-analysis. *Computers & Education*, *59*(2), 817–827. doi:10.1016/j.compedu.2012.03.016

ADDITIONAL READING

Acosta, S., & Garza, T. (2011). The podcasting playbook: A typology of evidence-based pedagogy for preK-12 classrooms with English language learners. *Research in the Schools*, *18*(2), 40–57.

Beckett, E. C., Wetzel, K., Chisholm, I. M., Zambo, R., Buss, R., & Padgett, H. et al. (2006). Staff development to provide intentional language teaching in technology-rich K8 multicultural classrooms. *Computers in the Schools*, *23*(3-4), 23–30. doi:10.1300/J025v23n03_02

Billings, E., & Mathison, C. (2012). I get to use an iPod in school? Using technology-based advance organizers to support the academic success of English learners. *Journal of Science Education and Technology*, *21*(4), 494–503. doi:10.1007/s10956-011-9341-0

Cheung, A., & Slavin, R. E. (2012). *The effectiveness of education technology for enhancing reading achievement: A meta- analysis*. Baltimore, MD: Johns Hopkins University, Center for Research and Reform in Education. Retrieved from http://www.bestevidence.org/word/tech_read_April_25_2012.pdf

Foulger, T. S., & Jimenez-Silva, M. (2007). Enhancing the writing development of English language learners: Teacher perceptions of common technology in project-based learning. *Journal of Research in Childhood Education*, *22*(2), 109–124. doi:10.1080/02568540709594616

Freeman, B. (2012). Using digital technologies to redress inequities for English language learners in the English speaking mathematics classroom. *Computers & Education*, *59*(1), 50–62. doi:10.1016/j.compedu.2011.11.003

Hur, J. W., & Suh, S. (2012). Making learning active with interactive whiteboards, podcsts,and digital storytelling in ELL classrooms. *Computers in the Schools*, *29*(4), 320–338. doi:10.1080/07380569.2012.734275

Lacina, J. (2008). Technology in the classroom: Learning English with iPods. *Childhood Education*, *84*(4), 247–249. doi:10.1080/00094056.2008.10523019

Langman, J., & Fies, C. (2010). Classroom response system-mediated science learning with English language learners. *Language and Education*, *24*(2), 81–99. doi:10.1080/09500780903096553

National Council for Teachers of English. (2008). *English language learners: A policy research brief produced by the National Council of Teachers of English*. Retrieved from http://www.ncte.org/library/NCTEFiles/Resources/PolicyResearch/ELLResearchBrief.pdf

Rodriguez-Arancon, P., Arus, J., & Calle, C. (2013) The use of current mobile learning applications in EFL. In *Proceedings of the Conference 13th International Educational Technology Conference* (pp. 1219-1225). Kuala Lumpur, Malaysia: Academic Press.

Ullman, E. (2010). Reaching ELLs with mobile devices. *District Administration*.

Warschauer, M., Grant, D., Real, G. D., & Rousseau, M. (2004). Promoting academic literacy with technology: Successful laptop programs in K-12 schools. *System: An International Journal of Educational Technology and Applied Linguistics*, *32*(4), 525–537. doi:10.1016/j.system.2004.09.010

KEY TERMS AND DEFINITIONS

1:1: The provision of a technological tool such as a tablet computer, laptop, or iPad to each individual student rather than providing a lab or classroom cart where students share the technology.

Blended Learning: An educational experience that provides students a combination of independent online content and instruction and supervised classroom based learning.

Digital Divide: Refers to the gap between students who have access to instructional technology, such as computers and iPads, and the Internet both at school and at home versus those who do not.

English as a Second Language: Frequently abbreviated as ESL, this term refers to an educational program for students who are learning English as a second language.

iPad Apps: Software applications specifically designed for the iPad. As of October, 2013, there were almost ½ million iPad apps; about 65,000 apps were designed for education.

iPad: A type of tablet computer created by Apple, Inc. that uses the IOS operating system with a multi-touch screen, virtual keyboard, and built-in wireless connectivity.

Mobile Learning: Learning that takes place anytime and anywhere that the user has a personal electronic device such as an iPad that is portable and can access the Internet.

This work was previously published in Exploring the Effectiveness of Online Education in K-12 Environments edited by Tina L. Heafner, Richard Hartshorne, and Teresa Petty, pages 250-279, copyright year 2015 by Information Science Reference (an imprint of IGI Global).

APPENDIX 1. CLASSROOM OBSERVATION PROTOCOL INSTRUMENT[1]

Observation Date:___________Time:_________________ Grade:_______________
Subject:____________________ Teacher: (pseudonym)______________________
Contextual Background and Activities: Briefly describe the lesson, classroom setting, technology resources, content or skills taught, teacher and student activities related to iPads.
Each time there is a major change in activity note the following: (a) time; (b) predominant type of activity; (c) predominant teacher role; (d) predominant student role. Also note how the iPads were used for instructional purposes and which specific applications were used.

Table 7.

Time	Activity	Student Role	Teacher Role

Table 8. Teacher role

Teacher Activity	With iPad/Laptop/ Other Technology	Without Technology
Lecturing		
Interactive Direction		
Facilitate/Coaching		
Modeling		
Moderate DIscussion		
Other		

Adapted from: Beyond Textbooks Schools Observation Protocol. Virginia Department of Education. (May, 2011). *Beyond textbooks: Year one report*. pp. 24-26. ISTE Classroom Observation Tool (ICOT v3.1). International Society for Technology in Education (August, 2012). http://nets-assessment.iste.wikispaces.net/file/view/ICOT+Instructions+v3.1.pdf

Table 9. Student activities

Learning Activity	With iPad/laptop	Without technology
Receive presentation		
Give presentation		
Create presentation		
Run simulation		
Research		
Information Analysis		
Write		
Take tests or quizzes		
Drill and practice		
Hands-on skills		
Student discussion		
Other (see notes)		

Table 10. Student groupings

	With iPad/Laptop	Without Technology
Individual		
Pair/Small Groups		
Whole Class		

APPENDIX 2. HIGH SCHOOL TEACHER FOCUS GROUP PROTOCOL

The purpose of our discussion is to share your experiences using the iPads with your students and your judgment of the impact of the technology on your students' engagement and learning.
Review Informed Consent Procedures.
Technology Cadre Focus Group Questions April, 2013:

1. In general, what have been the strengths of the iPad project so far?
2. What have been the limitations or frustrations of the iPad project so far?
3. What are some ways your students have used the iPads that seemed to engage them the most?
4. What are some ways your students have used the iPads that seemed to have a positive impact on their learning?
5. To what extent has student use of the iPads noticeably affected student behavior in class?
6. To what extent has student use of the iPads noticeably affected student attendance in class?
7. To what extent has the 1:1 iPad project helped to reduce disparities in access to technology for your students?
8. To what extent has student use of the iPads affected the opportunity to individualize or differentiate instruction for your students?
9. If there is one thing this high school could do differently with the iPad project, what would it be?

APPENDIX 3. ONLINE STUDENT TECHNOLOGY SKILLS AND EXPERIENCES SURVEY

High school staff asked students to follow a link on their iPad to complete the electronic survey when they received their personal iPad.

What is your student ID number? _____________

What grade are you in?

- __9th
- __10th

What type of 1:1 technology have you been assigned?

- __iPad,

Please rate your overall proficiency with use of the iPad:

1 Low to 4 High

Do you have a home computer?

- __Yes
- __No

Do you have internet at home?

- __Yes
- __No

Please rate your overall satisfaction with use of the [iPad] technology?

1 Low to 4 High

What were the strengths of using the iPad?____

What were the challenges of using the iPad? ____

How often have you used your iPad during school?

- __in no classes
- __in 1-2 classes a week
- __in 3-5 classes a week
- __in every class during the week

For the next set of questions the choices were:

- __not helpful
- __somewhat helpful
- __helpful
- __very helpful

How helpful is your iPad in doing the following: homework?

How helpful is your iPad in doing the following: writing assignments?

How helpful is your iPad in doing the following: communicating and collaborating?

How helpful is your iPad in doing the following: organizing schoolwork?

How helpful is your iPad in doing the following: doing research?

How helpful is your iPad in doing the following: accessing information?

How helpful is your iPad in doing the following: staying motivated and engaged?

For the next set of questions the choices were:

- __very hard to use
- __hard to use

__easy to use
__very easy to use
How easy is it to use your iPad for the following: turning in homework?
How easy is it to use your iPad for the following: writing assignments
How easy is it to use your iPad for the following: creating content
How easy is it to use your iPad for the following: installing my own apps
How easy is it to use your iPad for the following: adding my own music
How easy is it to use your iPad for the following: taking care of the device
How easy is it to use your iPad for the following: communicate (IM,email, video chat, blog)
How easy is it to use your iPad for the following: connecting wirelessly at school
Any other comments:
For the next set of questions the choices were:
__never
__once a week
__2-3 times a week
__every day
How often do you use the iPad outside of school to? Do homework
How often do you use the iPad outside of school? Communicate (IM,email, video chat, blog)
How often do you use the iPad outside of school? Create videos, presentations, or projects
How often do you use the iPad outside of school? Find information
How often do you use the iPad outside of school? Watch videos
How often do you use the iPad outside of school? Play games
How often do you use the iPad outside of school? Listen to music
How often do you use the iPad outside of school? Use social media (Facebook, Twitter, etc.

APPENDIX 4. STUDENT IPAD USE SURVEY

High school staff asked students to follow a link on their iPad to complete the electronic survey.
Student Number:
Class Name:
Period:
1
2
3
4
5
6
7
8
After School
Which iPad Apps did you use during this period? If you don't know the name of the App ask your teacher:
__3D Game Lab

__30 Hands
__Adobe Reader
__ATT Scanner
__Bookabi
__Class Website
__Dragon Dictation
__Dropbox
__Edmodo
__Educreations
__Email
__Explain Everything
__Google Drive
__Google Maps
__Google Translate
__Haiku Deck
__iBooks
__ITunesU
__Logger Pro
__County Library
__Notability
__Pandora
__Quizlet
__Schoology
__Show Me
__Slideshark
__Socrative
__Synergy
__WebBroser
__Youtube

How did you use the iPad?

__Created multimedia presentation
__Did research
__Took photos
__Recorded audio or video
__Worked on a writing project
__Read
__Solved math or science problems
__Watched videos
__Collaborated on a project with others
__Communicated via email
__Listened to music
__Played games
__Took notes
__Used reference tools (e.g., dictionary, thesaurus)
__Other:

APPENDIX 5. TEACHER IPAD SURVEY

This survey is for administrators and the project team to track the amount of time iPads are used in the classroom. District staff asked teachers to follow a link on their iPad to complete the electronic survey.
What grade(s) do you teach? (Check all that apply)
___9th ____10th ____11th ____12th ___Other
What subject do you primarily teach?
___arts ___ESL ___language arts ___math ___pe/health
___science ___social studies ___Special Ed ___world languages
Rate your familiarity with the iPad
1. unfamiliar 2. somewhat familiar 3. familiar 4. very familiar
How do you feel about integrating technology in your classroom?
1. very apprehensive 2. apprehensive 3. comfortable 4.very comfortable
How frequently do you integrate technology into your lessons?
1. never 2. once a week 3. 2-3 times/week 4. every day
How much have your technology skills improved in the last year?
1. not improved 2. improved a little 3. improved somewhat 4. improved a lot
When students use technology in my class I observe
Compared to when not using technology,
___decreases ___no change ___increase a little ___increases a lot
student engagement
student writing
student higher order thinking
behavior problems
Do you feel you've received enough professional development to use the iPad in the classroom?
___yes ___no
Do you want additional training in integrating and using the technology in your classroom?
___yes ___no
Which apps do you use most in your class?
Please provide any other feedback regarding using the iPad in the classroom.

Chapter 81
E-Learning:
A Means to Increase Learner Involvement in Research

Marie de Beer
Durban University of Technology, South Africa

Roger B. Mason
Durban University of Technology and Institute of Systems Science, South Africa

ABSTRACT

This paper investigates a method for increasing the involvement of marketing fourth year learners in academic research, by encouraging greater participation in, and commitment to, their research project in the Applied Marketing IV subject. It is assumed that greater involvement will result in a greater pass rate. The main reasons for this lack of interest were found to be a sense of incompetence and a lack of resources which were the main objectives of a research project. These objectives were addressed by using learner centered methodologies with the research method Action Research. This research method with the slow resolution of problems was used together with a teaching methodology whose objectives supported the resolution of the learners' inadequacies. Formative assessment was used at the start of the measuring of the learners' progress and was found useful with its quick and positive feedback in supporting the learners' confidence. An eClassroom was structured for the implementation of the Applied Marketing IV course. It was designed in such a way that it facilitated the learners' use of the more commonly used devices such as surfing the web, email and Internet over and above the chosen course material. Although it was not possible to complete the main intervention of the project it was possible to use the participants' experiences in the navigation of the course material in the eClassroom, to further develop future follow-up courses.

INTRODUCTION

Numerous activities and interventions are being implemented in the Durban University of Technology (DUT) in general and in the Department of Marketing in particular to achieve the goal of increased throughput. One of these initiatives is to "promote learning through … research …"

DOI: 10.4018/978-1-4666-8246-7.ch081

via a strategic objective "to create conditions conducive to research" (Academic Plan Working Document, 2006: 24).

DUT throughput and graduation rates are below national benchmarks of 75% of learners finishing a degree or diploma in minimum time. Considerable pressure is being placed on Universities to improve such throughput rates, while at the same time maintaining acceptable quality levels. The DUT academic plan refers to a higher order intellectual skills associated with holding a Higher Education qualification through knowledge, skills and attitudes associated with their field of specialisation and general and transferable (life) skills (Academic Plan Working Document, 2006: 18).

Learners in the Department of Marketing are introduced to academic research via a subject called Applied Marketing IV in the Bachelor of Technology: Marketing degree. They have to design and implement a full research project, culminating in a mini dissertation. This is important training for those intending to progress to the masters level, but is also important training in more general research and decision making for those who will not follow an academic career, but will move into the business world. Unfortunately, the outcomes of this subject are not at the level that we would prefer. Too many learners 'drop out' of the course. Reasons for this seem to be the fact that they see research as very difficult, because some of the concepts that they have to apply are complex and new to them. The result is that learners do not see research as something they are capable of doing, do not become involved sufficiently, fall behind in the work and therefore become depressed, demoralised and give up.

This paper sets out to examine this problem, trying to 'unpack' it in more detail, to recommend a technique for resolving it, and to review an attempt made at implementing such a recommendation and the implementation problems experienced.

THEORETICAL FRAMEWORK

This research was based on the concepts of knowledge management and learning organisations, which can contribute to educational change and transformation (van der Westhuizen, 2002). Using this approach assists educators to achieve what Kraak (2004) refers to as increased responsiveness to the needs of the community (including business) and to the country's socio-economic needs (growth and technology). This is necessary because of the increase in market pressure on education, especially for greater access and an increase in adult learners (Sehoole, 2004), which places tremendous pressure on the less experienced lecturer. However, appropriate learning and teaching approaches could alleviate this undue stress. An examination of the learning and teaching styles and approaches together with the use of electronic classrooms supported by blended learning based on authentic learning will clarify basic elements of the theoretical framework.

Learning and Teaching Styles and Approaches

As an adjunct to this inexperience and increasing pressure, different learners have different learning styles and therefore respond differently to the standard face-to-face teaching method. Therefore, using only one approach to resolve the above problem may not be optimal. Whatever teaching method is selected, it should be a method that caters for different learning styles and for the satisfaction of the learners.

Electronic Classrooms

The traditional face-to-face mode of lecturing and learning could be replaced by electronic classrooms in order to absorb the undue pressure on staff. Marc Rosenberg (2001) maintains that such classrooms are generally the home of electronic learning (eLearning) facilitated by, and through the use of internet technologies which provide a series of solutions that increase knowledge and performance. He goes on to say that it should be networked, be computer based, with standard internet technology and focus on the broadest view of learning. In support of this, Allison Rossett (2001) considers that eLearning belongs to Technology-Based Training which are delivered "partially or entirely through electronic hardware, software or both".

Welch (2010) found that "there are benefits to e-learning including both a reduction in travel expenses and a reduction in delivery times. There is usually a time saving of around 40% over the traditional classroom training".

Blended Learning

It has been found that face-to-face teaching alone has been inadequate. This would also apply to the other approaches of teaching and learning. The different individual learning and teaching styles, together with the sense of incompetence by the learners and the lack of resources imply that a blended learning approach could be used for this study. Blended learning involves several different, but linked, strategies, in addition to classrooms, to deliver the teaching to learners (Rossett, Douglis & Frazee, 2003), such as, "collaboration software, Web-based courses, EPSS, and knowledge management practices. Blended learning also is used to describe learning that mixes various event-based activities, including face-to-face classrooms, live e-learning, and self-paced learning" (Valiathan, 2002). This latter, event-based approach, is a method currently being used, taught and researched at DUT, and thus seems appropriate for the problem defined above.

It has been found by Salamonson and Lantz (2005 (in Torrisi-Steele & Drew (2013)) that hybrid face-to-face and blended learning fulfilled the basic requirements of learners. They felt that learners satisfaction was influenced by 'individual student differences relating to learning needs, experience of the tutor, and nature of the material covered, and the mix of blended learning and face-to-face interaction".

There are, however, other advantages for using blended learning as well. For instance Sitzman and Ely (2009) found some evidence that this type of blended solution increased learning by an average of 11% for both procedural and declarative knowledge.

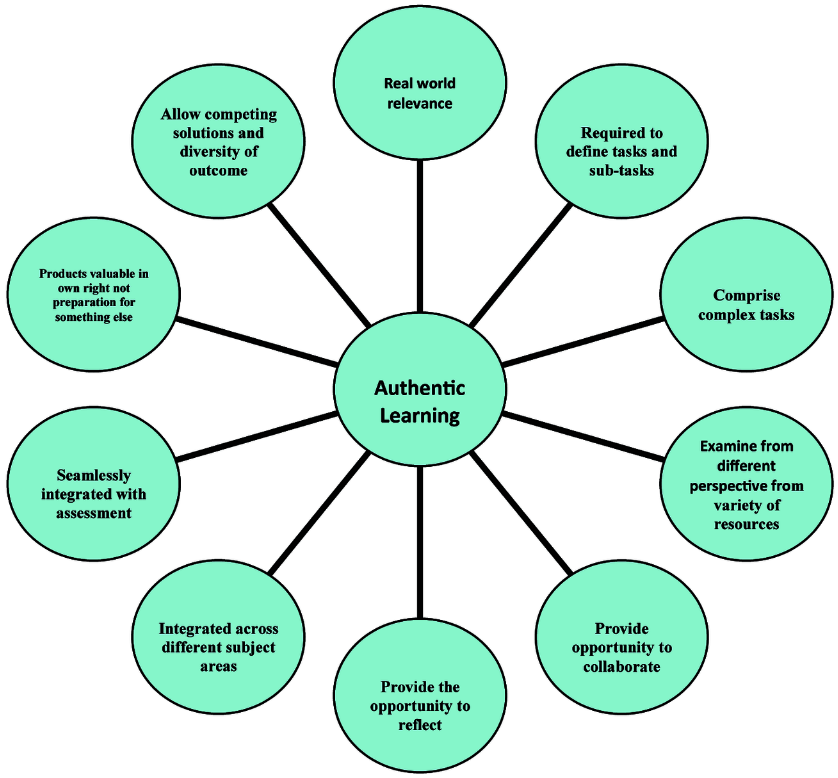
Authentic Learning

Authentic learning, which involves real application of knowledge, skills and practices in a context where they have real consequences and results, appear to have all the elements required to address the problem of generating increased responsiveness to the communal and socio-economic needs of the country (Herrington et al., 2004). It is also held by Revington (n.d.) that for authentic learning "the emphasis is mainly on the quality of process and innovation". He maintains that "The emphasis isn't about understanding teacher speak and regurgitating content just for a unit test, it's about developing a set of culminating skills sets, within a realistic timeline, using self-motivated inquiry methods to create a useful product to be shared by a specific audience".

The ten characteristics, of the authentic activities of the principles of authentic learning according to Herrington et al (2004) are applicable to most research studies (Figure 1). The majority of these characteristics are inherent in the activities of the current study.

Since an authentic learning approach underscores the requirements of this research, the relevant methodology for implementing it should encapsulate the very practical, self-expressive and integrated mode required.

Figure 1. The ten characteristics of authentic learning Source: Herrington et al (2004:11)

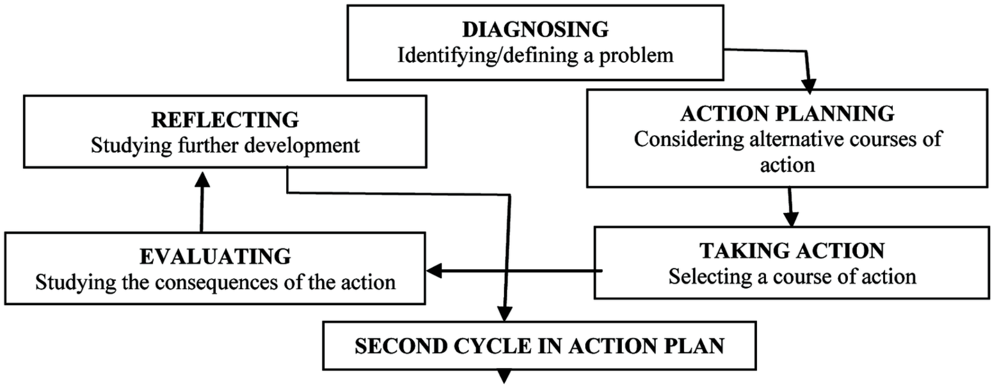


UNPACKING THE PROBLEM

As a generalisation in an academic environment, those learners who regularly attend face-to-face classes complete their subjects successfully – it is very unusual to fail if lectures are attended and all the required work is submitted. However, where learners do not attend face-to-face classes they seem to fall behind and do not get emotionally and intellectually involved in their research projects. Why does this happen? A possible reason could be belief that research is too difficult, too advanced and because the concepts are complex and new to them, with the research topics falling outside their interest area, it is inevitable that this would lead to a belief that they are not capable of doing research. It is, however, necessary to try to understand why they might develop these attitudes! The underlying causes could be two-fold:

- **A sense of incompetence as a result of:**
  - Their lack literacy and numeracy skills, which make them question their abilities.
  - Their general sense of inferiority, possibly due to previous disadvantages, inferior schooling, and difficulties in coping with diploma level studies.
- **Lack of resources:**
  - They do not have the resources to purchase the text book required and so are not able to read adequately on the subject.
  - Access to computer laboratories to do Internet searches for literature and to do data entry and analysis are inadequate on campus, which may discourage learners.
  - There are insufficient mentoring and lecturing facilities.

Figure 2. Action research model (Source: Adapted from O'Brien (1998: 5))



Based on the above analysis of the content and context of the problem, the following question can be posed:

What kind of lecturing and teaching styles and approaches, and relevant facilities for it would encourage learners to participate actively in research projects?

Revisiting the theoretical framework it can be resolved that the answer to this question lies within the ambit of the selection of an appropriate learning and teaching style approach under the umbrella of blended learning using authentic learning principles.

METHODOLOGY

Research Method: Action Research

The method chosen to research for a solution to the learners not participating actively in research projects is that of action research, which involves identifying a problem, applying a possible solution to resolve the problem, reflecting on the success of the action, and then improving on the previous application should the problem not be solved. It involves studying the problem systematically and being suitably informed by theory. A simple model of the action learning cycle, as adapted from O'Brien (1998) portrays the basic research method (See Figure 2).

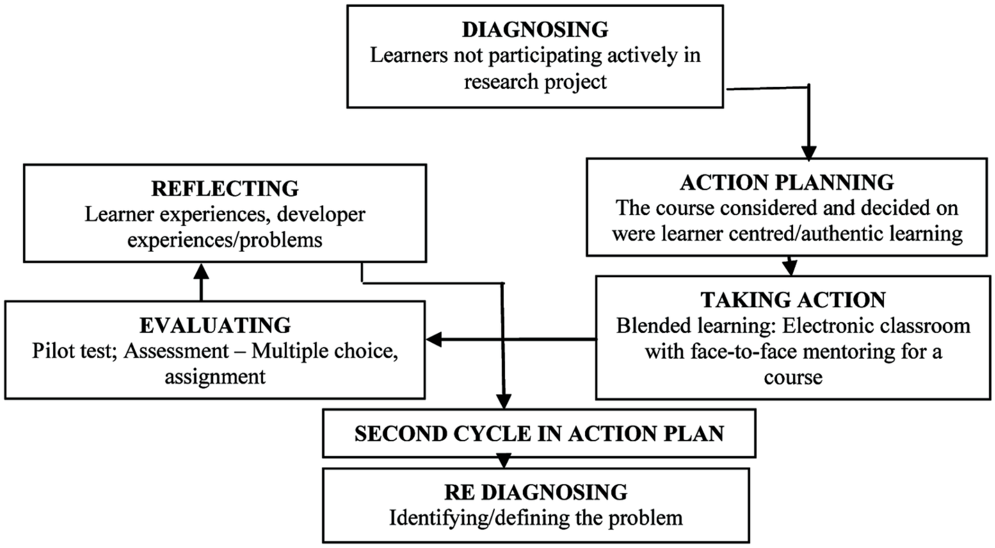
The implementation of the research study follows the basic steps of the action research model (See Figure 3).

The systematic approach of action research, which results in an almost slow resolution of the problem, will be ideally suited for those learners with a sense of incompetence. It will allow them to prove themselves in stages.

Content and Offering Approach of the Proposed Application

The course upon which this study was based and intended for was Applied Marketing IV for the fourth year B Tech: Marketing degree, which involved a reasonably complex research study, culminating in a mini dissertation. For this, the learner was required to identify a research topic, develop, implement and report on their real life research. The class was comprised of 60 learners, both full time and part time, many of whom are working. Currently the teaching methodology involves a traditional classroom lecture every three weeks, interspersed with one-on-one mentoring. The problems experienced for this traditional approach are:

Figure 3. Implementation of action research model (Source: Adapted from O'Brien (1998: 5))



- **Lack of Resources:** Considering there is only two staff allocated, this becomes very time consuming, as some learners can be very demanding. This endorses the serious lack of staff.
- **Repetition:** Another problem is that, at least 50% of what is said in one-on-one sessions is the same for every session. This repetition aggravates the shortage of staff.
- **Excessive Reliance on Input from Lecturer:** This is all individual work and learners, therefore, rely excessively on personal input from the lecturer, thereby exhibiting a serious sense of incompetence and insecurity.
- **New and Foreign Concepts:** The concepts and details of academic research is new and foreign to many learners. Not only does this bear evidence to the complexity of the study but also to the sense of incompetence and insecurity by the learners as already identified.

Based on the problems experienced it is clear that the course will have to also teach researching skills, as well as having to address attitudes about self-learning and working independently, and not just doing what the lecturer tells them. This supports Barr and Tagg's (1995) opinion that there is a paradigm shift away from teaching to an emphasis on learning which has encouraged power to be moved from the teacher to the learner. It also appears, therefore, that all three of Valiathan's (2002) skill-driven learning, attitude-driven learning and competency-driven models will need to be considered in developing the course. This landscape is ideally suited for those learners who need support in this.

Objectives of Teaching Methodology to Be Used

The objectives of the teaching methodology that was to be used were to:

- Cultivate a sense of independence in the learners and encourage them to do the tasks or subtasks needed and in the process examine the task from different perspectives using a variety of resources. This could also lead to opportunities to collabo-

rate with other learners and experts and to reflect on their work.
- Alleviate the gaps caused by the shortage of material, equipment, guidance and mentoring.
- Ensure that different aspects of the problem, subjects and disciplines could be facilitated by the use of electronic facilities such as eClassroom, eLearning and other web based technologies during and after normal lecturing times.
- Include independent assessment and evaluation techniques for the project to ensure objectivity and a high standard of the delivered product and, in the process, allow for competing solutions and diversity of outcomes.
- Through follow-ups and personal attention maintain contact with learners and thereby assist in reducing the 'drop out' rate.

The main objectives of the research namely; addressing the sense of incompetence of the learners and the lack of resources are very appropriately covered by these objectives of the teaching methodology.

The blended learning approach was felt to be ideal for the new course, as on-line learning provides access to knowledge areas such as databases and communication in the various disciplines, over and above the guidance for the specific task on hand. Also the dissemination of information and the handling of information dissemination to groups are greatly enhanced. Nevertheless, it was found that the face-to-face approach is decidedly better for one-to-one relationships and encouraging learner discussions.

It was therefore envisaged to continue with the traditional classroom lectures every third week for the face-to-face contact, which involved the explanation of new material (research steps) and handling problems of a more general nature. Concurrently, on-line learning could be introduced to provide the learners with all the detailed knowledge obtained over the internet that they require. This was also an ideal opportunity to expose the learners to electronic one-on-one discussions between lecturer and learners, and between learners themselves via discussion groups and /or e-mail. In addition where possible the electronic media could be used to fill in the gaps caused by the shortage of material, equipment, guidance and mentoring.

Submission of assessments was on-line, as was the feedback. Learners were able to post their assessments in advance and ask for comment from other learners prior to their final submissions. The problem of course was ensuring that they did not copy from each other! However, since each research topic was different blatant copying was not feasible.

Proposed Assessment of Application

Two assessment methods were used for the research exercise - multiple choice quizzes and an assignment:

- **Multiple Choice Quiz (MCQ):** Since the learners had to acquire the basic principles of research as one of the objectives in the development of the course, an MCQ was chosen to assess their knowledge of the basics, such as the different types of research, sampling methods and procedures, as some statistical procedures. According to Wiggins (2004) good assessment requires standards, feedback and evaluation. The MCQ does most of this by specifying what is correct and how many 'correct' answers are needed to 'pass', i.e. the standards; it provides feedback by giving the results immediate and explaining why the correct answers are in fact correct. This quick, positive feedback encourages involvement and learner participation and the growth of confidence
- **Assignment:** The assignment on the other hand, takes the form of the research pro-

posal that the learners have to develop, based on their basic research methodology knowledge and their choice of research problem. This assessment was intended to test their understanding of their basic research methodology knowledge and to test their ability to apply it in a practical situation. In other words, the outcome it assesses is the ability to design a research proposal based on sound research methodology.

Since these assignments were to be individually and manually graded, they would provide a good opportunity for feedback and evaluation (Wiggins, 2004). The evaluation and measuring facilities of the e-classroom was available and could be used by the learners whenever they wanted to grade themselves. This self-testing and the presence of positive feedback again encourage learners to engage with the material. In addition, the speed of the e-classrooms feedback also encourages engagement.

A further advantage of this type of assignment is that it is authentic (Herrington et al., 2004), as it is a real life research proposal. Furthermore, over and above the e-Learning evaluation (written) on the script and personal (verbal) feedback are also given, as well as positive, supportive evaluation. As such the evaluations provide a strong motivational role and diagnostic information to help the learner improve their proposal and confidence – this means it has both a formative and a summative role (CSHE, 2002), and thus playing a major role in ensuring that the leaner improves on previous efforts and becomes more assertive.

In summary, these two assessments offset each other's weaknesses, e.g. objective/ subjective, recall/application and speed of marking, and together provide the motivational drive to ensure learners continue to engage with the subject.

INTERVENTION

Electronic Classroom

In order to implement the action learning project, an electronic classroom was designed; it included content, assessment, survey and discussion tools. The structure of the classroom is illustrated in Figure 4.

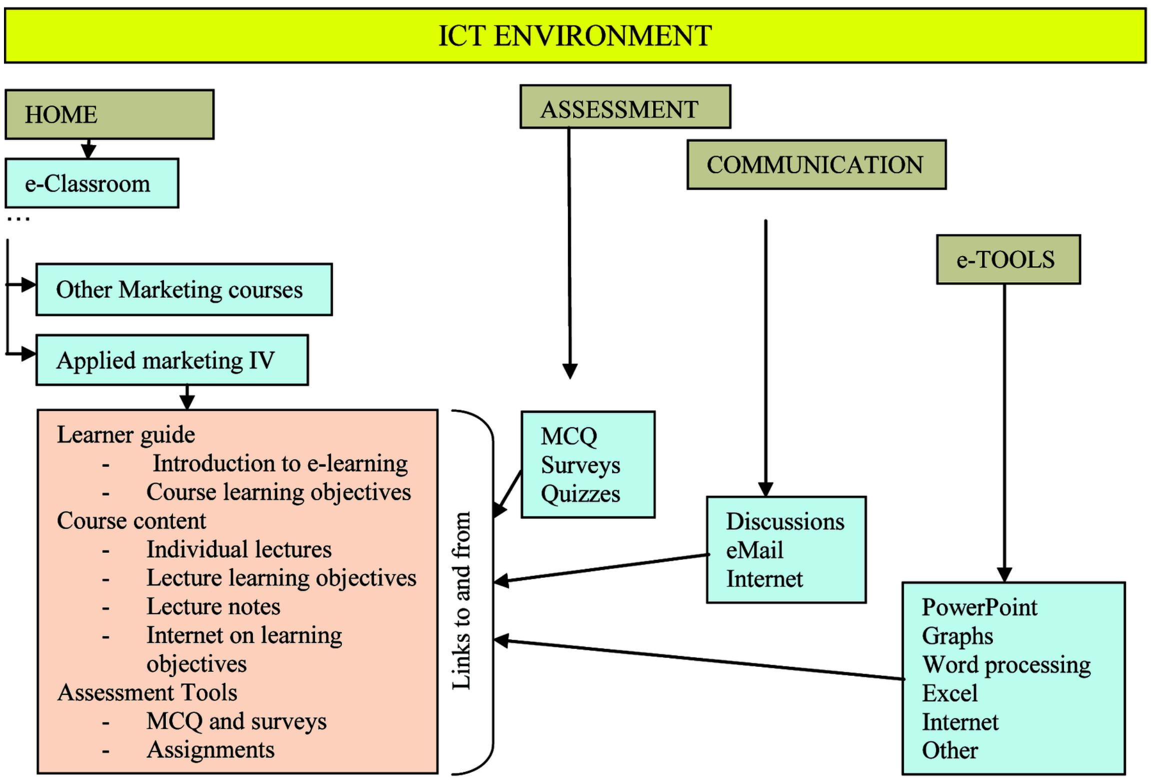
The long term intention of the electronic classroom was to cover all aspects of the research process, providing complete notes, guidelines, and instructions on the page This was done in order to enable learners to have all the material needed to fully engage with the research project, without necessarily having to acquire this information from face-to-face contact. Face-to-face contact was intended to be purely for handling problems, explaining aspects that the learner does not understand and providing individual guidance which was very important for the weaker learner.

Course Content Section of Electronic Classroom

The content section of the classroom included:

- **A Learner's Guide for the Subject:** This included an introduction to the eLearning process for the course as well as more detailed information on the course and of the assignments.
- **A Number of Individual Lectures:** Learners would use this if they have missed a face-to-face lecture, to print out notes, or to revise the lesson
- **Each Lecture Included:**
  a. Learning objectives of the lecture
  b. Lecture notes
  c. Links to:
  d. Formative assessment exercises
  e. PowerPoint slides for the lecture
  f. Internet sites of interest and relevance to the particular lecture

Figure 4. Structure of Applied Marketing IV e-Classroom



In addition to the lecture material, the site has links to various other websites of interest which can stimulate the learner's curiosity, leading them to become involved with other research web sites. Since "surfing the web" is an accepted activity of learners, this should encourage the learners to access more research web sites.

Assessment Section of the Electronic Classroom

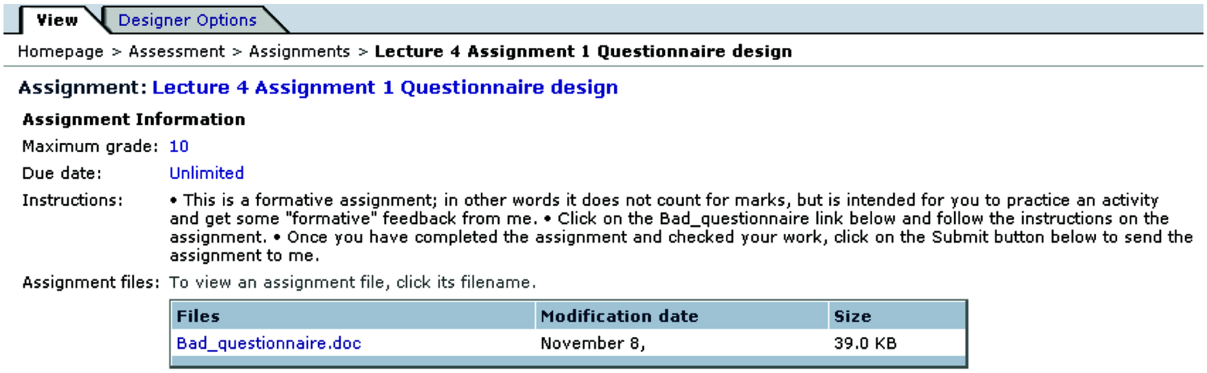
The assessment section of the classroom included a formative assignment to assess the learners' abilities to use the electronic classroom and a survey to assess the learners' abilities to use the electronic classroom. An example of an on-line assignment is given in Figure 5.

Wanting to know how well you are doing is a natural emotion! Such self-test assignments appeal to this emotion, enabling learners to find out how well they are doing. Learners can thus be expected to take the formative assessment on a regular basis, thereby repeatedly engaging with the e-classroom and in the process develop their confidence and become more assertive.

Discussion Tool of the Electronic Classroom

A discussion tool was also included to enable learners to respond to the lecturer, and to each other, about the work and the assignment. The introductory discussion message is shown in Figure 6. Due to Blogging having become a major communication method for learners, this discus-

Figure 5. Example of on-line assignment



View | Designer Options

Homepage > Assessment > Assignments > **Lecture 4 Assignment 1 Questionnaire design**

Assignment: Lecture 4 Assignment 1 Questionnaire design

Assignment Information

Maximum grade: 10

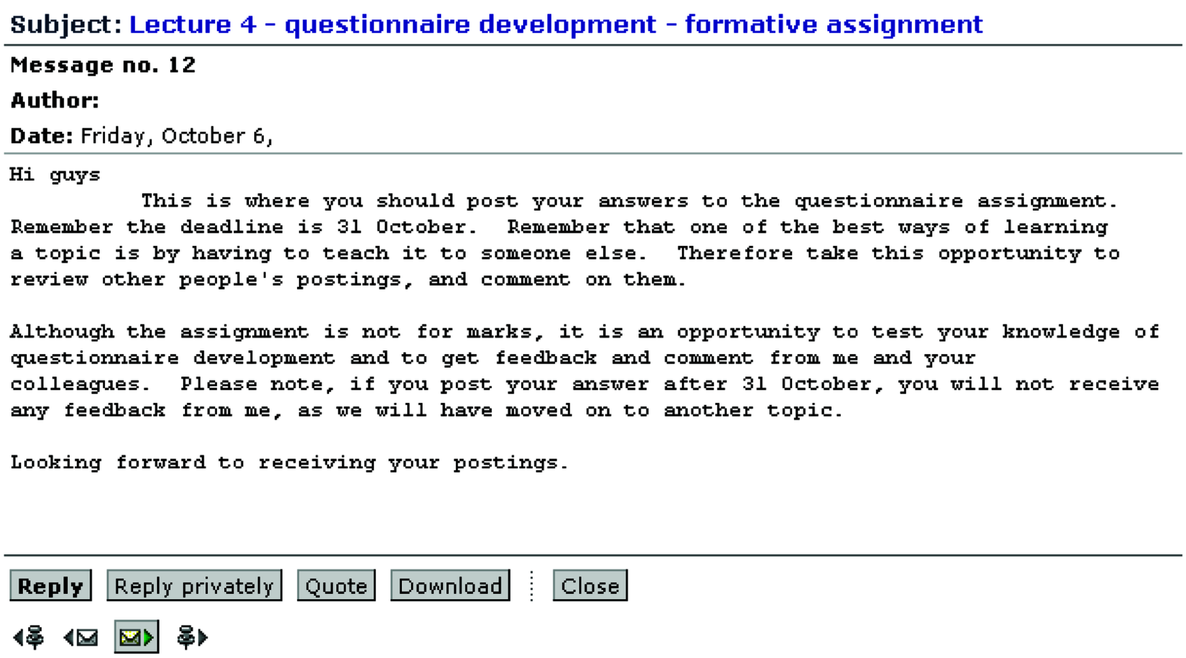
Due date: Unlimited

Instructions: • This is a formative assignment; in other words it does not count for marks, but is intended for you to practice an activity and get some "formative" feedback from me. • Click on the Bad_questionnaire link below and follow the instructions on the assignment. • Once you have completed the assignment and checked your work, click on the Submit button below to send the assignment to me.

Assignment files: To view an assignment file, click its filename.

Files	Modification date	Size
Bad_questionnaire.doc	November 8,	39.0 KB

Figure 6. Introductory discussion message



Subject: Lecture 4 - questionnaire development - formative assignment

Message no. 12

Author:

Date: Friday, October 6,

Hi guys

This is where you should post your answers to the questionnaire assignment. Remember the deadline is 31 October. Remember that one of the best ways of learning a topic is by having to teach it to someone else. Therefore take this opportunity to review other people's postings, and comment on them.

Although the assignment is not for marks, it is an opportunity to test your knowledge of questionnaire development and to get feedback and comment from me and your colleagues. Please note, if you post your answer after 31 October, you will not receive any feedback from me, as we will have moved on to another topic.

Looking forward to receiving your postings.

Reply | Reply privately | Quote | Download | Close

sion falls within the realm of the learners' normal communication methods. It will also help to ensure learners engage with the e-classroom regularly.

Parameters for Development of Electronic Classroom

Based on the fact that learners have different styles (Felder & Soloman, 1999), the e-classroom was developed with the following principles in mind:

- Material should be presented in words and presented in pictures/diagrams.
- Use should be made of colour, especially, colour coding.
- Although material should be presented sequentially, each module should be stand-alone so that 'global' learners can jump around according to their interests.
- Contents outlines should be provided so that 'sequential' learners will have a 'road

map' to follow, while 'global' learners will use it to get an overview of material to be covered.

- Practical activities and assessments should be included for 'sensors', while learning and understanding the theoretical concepts should be included for 'intuitors'.
- The above mentioned will also be helpful for 'sensors' and 'intuitors'. In addition, some degree of group work should be included for 'active' learners, while individually thinking through a problem and providing a 'plan' could be helpful for 'reflective' learners.

The first parameter above has not been adequately incorporated into the e-classroom, because of time and skill constraints, but the second to fifth points have been, to a greater or lesser extent. As the classroom is developed, more visual material will be included .

PILOT TEST

As part of the development process, and in line with the principles of action learning, the online classroom was tested with four participants familiar with the subject.

All four were asked to complete the Lecture 4 assignment as per the following instructions:

Open Internet Explorer to DUT webpage
Click on Online Learning Centre in left hand menu bar
Click on logo just above Login
Enter your user ID (provided separately)
Tab to next box and enter your password (provided separately)
Click on Log In button
Click on 'Training' link
Click on Assessment link at bottom of page
Click on Assignments logo
Click on Lecture 4 Assignment 1 Questionnaire design link
Now follow the instructions on this and subsequent pages to which you are led.
Once you have completed and posted the assignment:
Please go back to the assessment page, click on quizzes/surveys, then click on "L4 questionnaire feedback" and do the survey on this exercise - it is very short! Don't forget to click on the Submit button to send it
Now please post a message to me via the discussion tool, ie instead of clicking on assessment on the front page, click on Communication, then on Discussion, then on questionnaire, then on Lecture 4 - questionnaire, read the message, click on Reply, type your response in the message box, and then click Post.

The results and findings of the pilot testing of the electronic classroom are further reviewed under Pilot review of the eClassroom, under Reflections on the Project.

REFLECTIONS ON THE PROJECT

The outcome of the study up to this point will be reviewed. This will include the review of the eClassroom development for the aptitude of the learners' abilities and the outcome of the pilot study of the e-classroom, the program design experiences in the development of the classroom, its implementation and the challenges faced. Recommendation regarding changes to the programme is also made and this includes improvements to the e-classroom, the infrastructure, and the context of the course.

Review of the eClassroom Development for the Aptitude of Learners Abilities

The research question for this research project "What kind of lecturing and teaching styles and approaches, and relevant facilities, would encourage learners to participate actively in research projects?" was based on what was identified as the plausible reasons why learners do not adequately support the eClassroom concept. These reasons were mainly a 'sense of incompetence' and the 'lack of resources' such as textbooks, lecturers, computer laboratories, and mentoring and lecturing facilities.

The eClassroom proposed by this project makes provision for these inadequacies as follows:

- The research method used was Action Research which systematically studies the problem to identify possible solutions.
- The course to be designed had to satisfy the problems experienced by the traditional approach for the lack of resources and the excessive reliance on input from the lecturer and to facilitate the understanding of new and foreign concepts.

This attention to the main reasons of noncompliance by the learners concerning eClasrooms was further supported by the main objectives of the teaching methodology to be used. The main features of this methodology are directed at the upliftment and support of the learner concerning their independence and alleviating the evident gaps caused by insufficient resources. It is further necessary to identify the possible use of electronic facilities and to ensure that the learners could apply independent assessment evaluation and assessment techniques for their work. Above all to ensure that contact is maintained with the learners.

Right through the course the contact with the learner played an important and active role where the lecture material is designed in such a manner that it stimulates the learner's curiosity and facilitating their other pastimes and hobbies such as 'surfing the web'. To facilitate their sense of incompetence, formative testing takes the foreground and is used to test the learner's abilities to use the electronic classroom before proceeding with the course. The fact that learners have different styles is taken into consideration and provision is made for this in the principles laid down and parameters set for the development of the eClassroom.

PILOT REVIEW OF THE eCLASSROOM

Most of the participants were able to adequately access the relevant aspects of the classroom, complete the assignment and post their responses. However, the assignments were not completed in the detail required, but since the main intention was to test the user-friendliness of the classroom, and not to test their knowledge of the content of the lesson, this was not a problem.

There were, nevertheless, certain procedural problems. For example, one participant somehow submitted the wrong file for his assignment, and a second participant was incensed at his low grading, 4 out of 10, missing the point that it was a formative assignment.

On reflecting on the process the following responses were received:

- Navigation through the classroom was relatively easy and logical.
- This navigation would improve with daily usage.
- The approach was found to be novel and created interest and enthusiasm.
- Generally positive about the electronic classroom concept.

PROGRAMME DESIGN AND IMPLEMENTATION EXPERIENCES

On reflecting on this action learning project, the problems could be grouped into those related to developing the classroom, its implementation and the challenges it experienced.

Developing the Classroom

In beginning the project, it was intended to develop the classroom in a stepwise method, staying one step ahead of the class in terms of the subject content, and thus developing the entire on-line classroom during the year from scratch. The first problem arose when it was not possible to gain enough knowledge, quickly enough, to be able to design the first few lessons by the time they were needed by the learners. By the time the skills to develop a 'lesson' were gained, the academic year was already well under way and the action research problem had thus fallen behind. This meant that the first e-lesson would be about the third or fourth actual lesson, with the previous lessons having been handled in the traditional face-to-face situations. This also did not work because by the time this lesson was developed, the learners had completed the relevant work and were moving on to the next step in the research process. In summary, the skills and the time available to dedicate to the classroom development were insufficient.

Implementation of the eClassroom

A further problem experienced was the fact that this was such a large class (60 learners) which lead to the realisation that it would be difficult to find a computer laboratory able to accommodate the entire class, available in the evening to train the learners in how to use the e-classroom. Such training was essential as was shown by the difficulties the respondents of the pilot study had in getting started on their assignment. Although they could navigate the classroom well enough, they needed a lot of guidance and written instructions on how to get started.

Main Obstacle Experienced

Probably the biggest problem experienced was the lack of time available to dedicate to personal learning and practice of the web learning platform, webpage development and development of the subject materials and assessments in order to be suitable for an electronic classroom. This was because of an excessive workload in our department which resulted from taking on numerous new and in-experienced staff, granting two senior staff members long leave, and preparation for a departmental evaluation. Personal obligations also took a strain with assessor training, extra masters supervisions, and the presentation and publication of three international papers. This abnormally high work load meant there was little extra time to devote to the e-classroom.

RECOMMENDED CHANGES TO THE PROGRAMME

In order to successfully and fully implement the electronic classroom, a number of changes and improvements to the programme, the infrastructure and the context of the course will need to be made.

Improvements to Electronic Classroom

The entire classroom must be completely conceptualised and designed before the course starts. This will allow the lecturers to know exactly what will be covered, when and where in the electronic classroom. The actual 'programming' and creation of each of the lesson pages do not all have to be completed in advance, but they must be ready at least two lessons ahead, i.e. six weeks ahead. This will allow for any developmental difficulties, last minute testing or inclusion of additional material. This process will also allow feedback and additions by other lecturers who might be able to use the classroom (e.g. Applied Promotions IV).

In addition, because different people have different learning styles the classroom should be designed to allow for these different styles. Unfortunately, due to the time pressures and skill limitations, it was not possible to include all the required techniques for catering for different learning styles. In a full electronic classroom, the design must allow for the different learning styles ('active' versus 'reflective', and 'sensing' versus 'intuitive') (Felder & Soloman, 1999).

Improvements to Infrastructure

When the new version of the Learning Management System is implemented it appears as if this will minimise some of the problems or potential problems that have been experienced. For example, it will make the use of the electronic classroom much easier for the learner and will simplify navigating around the whole programme – the easier the programme is to use, the more likely the learners will take up regular use. Further, the new version will be less complicated to navigate for the web designer, facilitator and lecturer as many of the more long-winded ways of doing things have changed. This will enable the development of skills to be quicker and happen more regularly. Better skills and trouble free progress development will help to ensure that the development programme of 'six weeks ahead' can be maintained. Furthermore, any time saved here can be allocated to more innovative and creative web and classroom design.

Another infrastructural issue that will need to be addressed is that of Internet access. Without easy access all the learners cannot be expected to become fully involved. Currently they have access to an adequate Internet computer laboratory, which is in the process of being upgraded. This, together, with access via library computers and personal home computers should be sufficient. In addition, Internet connections, with a computer and a digital projector, in the physical classroom, will enable the lecturer to continually use the electronic classroom in face-to-face situations, thereby training the learners in the e-classroom's use and encouraging them and motivating them about it.

Improvements to Context of the Course

It was found that the development of such a programme in isolation is problematic and is not recommended. Working as part of a team of lecturers, the members have the benefit of providing motivational support, as well as spreading the workload. As far as possible a team of at least two lecturers should work on implementing such an electronic classroom. It will, therefore, be necessary to arrange for at least one more marketing lecturer to participate in the e-learning programme next year. Furthermore, it would help if the department made a commitment to move towards a more modern (i.e. ICT based) teaching environment. However, this cannot realistically be expected until the university itself makes a declaration, and implements effectively, such as:

The University…is at the forefront of new learning technologies (University of Wolverhampton, 2005a).

ICT (Information and Communication Technology) used in exciting and innovative ways to provide lifelong learners with global access to information, learning and support. Information systems that are seamlessly linked to learning support systems, that are enjoyable to use and which enable management" (University of Wolverhampton, 2005b).

SUMMARY

This paper set out to investigate, through an action learning approach, a method for increasing the involvement of marketing fourth year learners in academic research, by encouraging greater participation in, and commitment to, in their research project in the Applied Marketing IV subject. This lack of interest of the learners stem from a sense of incompetence and a lack of resources and these were addressed in the research project.

The research tools to be used were carefully selected in order to ensure that the project is learner centered and make provision for the support of the weaker learner by boosting their confidence and complement the lack of resources. This started with Action research, which was felt to be most suitable with the slow resolution of problems, and followed by the teaching methodology that was employed. The objectives of the teaching methodology supported those of the research. It was also possible to use a formative assessment method at the start of the program, which with its quick and positive feedback supported the learners' involvement and participation in the eClassroom. This eClassroom was structured in such a way that the learners also had access to the more commonly used electronic devices such as surfing the web, email and the Internet over and above the chosen course material.

Although it was not possible to complete the main intervention, because of unexpected large volumes of learners and underestimating the time required for the development of the course, it was found that the learners were able to navigate the main features of the eClassroom and it was possible to use their experiences to further develop the follow-up course.

It is true that an action research is never really completed. There are numerous actions that still need to be implemented in a second cycle of the action research process. The conclusion that is of particular interest in this paper, is that an electronic classroom, well designed, could make a significant contribution to encouraging learners to become more involved and participating in their research projects. Such greater involvement, participation and commitment would undoubtedly result in a greater pass rate, and therefore a greater throughput rate. Thus, an electronic classroom could make a significant contribution to the university's key goal, and at the same time improve the financial standing of the university.

Finally, no empirical research has yet been done with the actual learners, and that is the next major step. In other words, it is recommended that a study be undertaken of learners' attitudes and opinions of the electronic classroom approach as part of an action learning study. Furthermore, a study comparing such attitudes and opinions to the learners' actual pass marks and throughput rates would provide stronger empirical support for the conclusion drawn, namely that an electronic classroom, as part of a blended learning approach, would improve pass rates and thus throughput.

ACKNOWLEDGMENT

With gratitude and thanks to Mari Pete and Nirmi Ziegler for their help in preparing this paper, and the four colleagues who acted as the 'dummy learners'.

REFERENCES

Academic Plan Working Document. (2006). Durban University of Technology.

CSHE. (2002). *Core principles of effective assessment*. Retrieved September 1, 2006, from http://www.cshe.unimelb.edu.au/assessinglearning/05/index.html

Felder, R. M., & Soloman, B. A. (1999). *Learning styles and strategies*. Retrieved April 21, 2006, from www.ncsu.edu/felder-public/ILSdir/styles.htm

Herrington, J., Reeves, T. C., Oliver, R., & Woo, Y. (2004). Designing authentic activities in web-based courses. *Journal of Computing in Higher Education*, *16*(1), 3–29. doi:10.1007/BF02960280

Kraak, A. (2004). Discursive tensions in South African higher education, 1990 to 2002. *Journal of Studies in International Education*, *8*(3), 244–281. doi:10.1177/1028315304265337

O'Brien, R. (1998). *An overview of the methodological approach of action research*. University of Toronto. Retrieved March 9, 2006, from www.web.ca/~robrien/papers/arfinal.html

Revington, S. (n.d.). *Defining authentic learning*. Retrieved January 10, 2014, from http://authenticlearning.weekly.com

Rossett, A., Douglis, F., & Frazee, R. V. (2003). Strategies for building blended learning. *ASTD's Learning Circuits*. Retrieved March 9, 2006, from www.learningcircuits.org/2003/jul2003/rossett.htm

Rossett, A., & Sheldon, K. (2001). *Beyond a podium: Delivering training and performance to a digital world*. San Francisco, CA: Jossey Bass/Pfeiffer.

Sehoole, C. T. (2004). Trade in educational services: Reflections on the African and South African higher education system. *Journal of Studies in International Education*, *8*(3), 297–316. doi:10.1177/1028315304265430

Sitzman, T., & Ely, K. (2009). *Web-based instruction: Design and technical issues which influence training effectiveness*. Retrieved November 2, 2009, from http://webboard.adinet.org?Technologies/Evaluation/Library/Additional1%20Resources/Presentations

University of Wolverhampton. (2005a). *e-Learning*. Retrieved November 22, 2006, from http://asp.wlv.ac.uk/Level3.asp?UserType=5&Level3=84

University of Wolverhampton. (2005b). *The IT services vision*. Retrieved November 22, 2006, from http://asp.wlv.ac.uk/Level4.asp?Level4=1674

Valiathan, P. (2002). *Blended learning models*. ASTD's learning circuits. Retrieved March 9, 2006, from www.learningcircuits.org/2002/aug2002/valiathan.html

Van der Westhuizen, A. J. (2002). *South African higher education institutions as learning organisations: a leadership process model*. Unpublished PhD thesis, University of Stellenbosch.

Welch, J. (2010). *e-Learning versus traditional – Why traditional classroom training still rules over e-learning*. Retrieve January 4, 2014, from http://EzineArticles.com/?expert=Jim_Welch

Wiggins, G. (2004). Assessment as feedback. *New Horizons for Learning*. Retrieved September 1, 2006, from http://www.newhorizons.org/strategies/assess/wiggins.htm

This work was previously published in the International Journal of Web-Based Learning and Teaching Technologies (IJWLTT), 9(2); edited by Mahesh S. Raisinghani, pages 46-63, copyright year 2014 by IGI Publishing (an imprint of IGI Global).

Chapter 82
To Flip Or Not To Flip? That's *Not* The Question: Exploring Flipped Instruction in Technology Supported Language Learning Environments

Joy Egbert
Washington State University, USA

David Herman
Washington State University, USA

Aichia Chang
Washington State University, USA

ABSTRACT

Although the literature on flipped instruction to date appears to be relatively atheoretical, the benefits listed in the flipped literature fit well with theories of optimal learning environments (e.g., Egbert, Hanson-Smith, & Chao, 2007) and student engagement (Lin, 2012, and others). This conceptual paper links flipped instruction to these two models and then briefly describes an ESL teacher education course that involves U.S. pre-service teachers learning Chinese online as part of a flipped classroom. The paper concludes by suggesting how flipped instruction might work in other CALL contexts and related issues.

INTRODUCTION

Much has been written lately about the "new" method of "flipped" instruction and its potential to revolutionize instruction across disciplines (see, for example, Bates & Galloway, 2012; Bergmann & Sams, 2012). However, not much on this topic appears in the CALL literature. Such ideas need to be explored and assessed, and effective uses of technology to support student learning must be constantly updated and shared. Therefore, this paper explores flipped instruction in CALL classrooms. The purposes of this conceptual paper are: 1) establishing a theoretical basis for

DOI: 10.4018/978-1-4666-8246-7.ch082

flipped instruction by relating it to two models, one of conditions for optimal language learning environments (Egbert, Chao, & Hanson-Smith, 2007) and the other of task engagement (Lin, 2012), and 2) briefly describing and assessing an ESL teacher education course that involves U.S. pre-service teachers learning a foreign language online as part of a flipped classroom. To conclude this paper, we suggest how flipped instruction might work in other CALL contexts and related issues. With this work we hope to initiate discussion and research on flipped instruction as part of the CALL repertoire.

Defining Flipped Instruction

Like many terms that come into the education lexicon and are taken up in a variety of contexts, flipped instruction does not yet have a set definition that is used across media. In U.S. settings from K-adult classrooms and in disciplines as distinct as math and history, strategies for flipping that appear similar have even been given different names. For example, Eric Mazur of Harvard found that computer-aided instruction allowed him to "coach" instead of "lecture"; he called his model *peer instruction* (Mazur, 1991). Baker (2000) coined the term "classroom flip" in the late 1990s when describing his strategy of presenting course content on a course management system, allowing opportunities for active learning during class time. Similarly, Lage, Piatt, and Treglia (2000) introduced *inverted instruction*, a strategy which allowed them to differentiate instruction through the use of computer-based lectures and student-centered class time.

Regardless of what it is called and how it is implemented, the overall purpose of flipped instruction is to change classroom dynamics by using technology to present direct instruction outside of class. This frees the instructor and class time for more interactive tasks and additional scaffolding, including team work, individual conferences with the teacher, group and class discussions, and even reiteration of the content where needed (Bergmann & Sams, 2012; Baker, 2000; Kim, Byun, & Lee, 2012; Lage, Platt, & Treglia, 2000). In part, the idea is to give students some control over class content by providing ways for them to direct the pacing of the material, to provide multiple modes for students who learn in different ways, and to allow students to decide what and how they need to learn. Adherents explain that instructors can

Flip [instruction] so that students watch and listen to your lectures for homework, and then use your precious class-time for what previously, often, was done in homework: tackling difficult problems, working in groups, researching, collaborating, crafting, and creating. Classrooms become laboratories or studios, and yet content delivery is preserved. (Martin, 2011)

The way this has been traditionally interpreted in schools, entire K-12 districts, and higher education classrooms, is generally that students watch instructional content videos outside of class and then work on problems in class. The Khan Academy (http://www.khanacademy.org/), one of the most commonly used websites for instructional videos, exemplifies this approach. It provides videos in math, science, and humanities areas that are supported by self-placement quizzes and discussion posts. A Ted Talk by the founder, Salman Khan, explains the philosophy and workings of the online Academy (see it online at http://www.ted.com/talks/salman_khan_let_s_use_video_to_reinvent_education.html). Overall, the goal of flipped instruction is to engage and support students to achieve.

COMPONENTS OF FLIPPED INSTRUCTION

Anecdotal reports and classroom videos regarding flipped instruction abound on the Internet. From these reports, the main components that comprise a flipped classroom include the following.

Outside of Class

Videos, which take the place of in-class direct instruction, are the central component of this approach. Students are required to watch (or listen) at home to teacher-created or premade videos (from sites such as YouTube) and come to class prepared to work with the concepts they studied. To help students prepare, some instructors require students to take notes on the videos (e.g., Bergmann & Sams, 2012), while others suggest that students come to class with questions in hand (Chin, 2002).

A second component that some instructors implement is a learning management system (LMS). The LMS, in the form of an educational wiki or system such as Angel or Blackboard, is used for many different reasons, such as housing web links for the above-mentioned instructional videos, providing handouts and other guidance for students, supplying a place for students to post their questions and/or discuss content, and for sharing assignments.

Additional materials are sometimes included as part of the out-of-class materials. For example, some teachers provide course texts, web sites, and other resources.

In Class

During class time, the component most commonly noted in the flipped literature is discussion, whether in small groups or as a whole class. Time is also spent solving problems (Bergmann & Sams, 2012), working on task processes, and collaborating in different ways. In some flipped classrooms, the teacher works with small groups or individuals for just-in-time lessons or remediation, re-teaching concepts as needed (Bergmann & Sams, 2012; Lage, Platt, & Treglia, 2000; Strayer, 2007).

In the traditional version of a flipped classroom, students follow the same basic schedule and move forward as a group, while in the "mastery" version (Bergmann & Sams, 2012), students move through course materials and work toward specific goals at their own pace, advancing as they demonstrate mastery of the content.

Theory and Research for Flipped Instruction

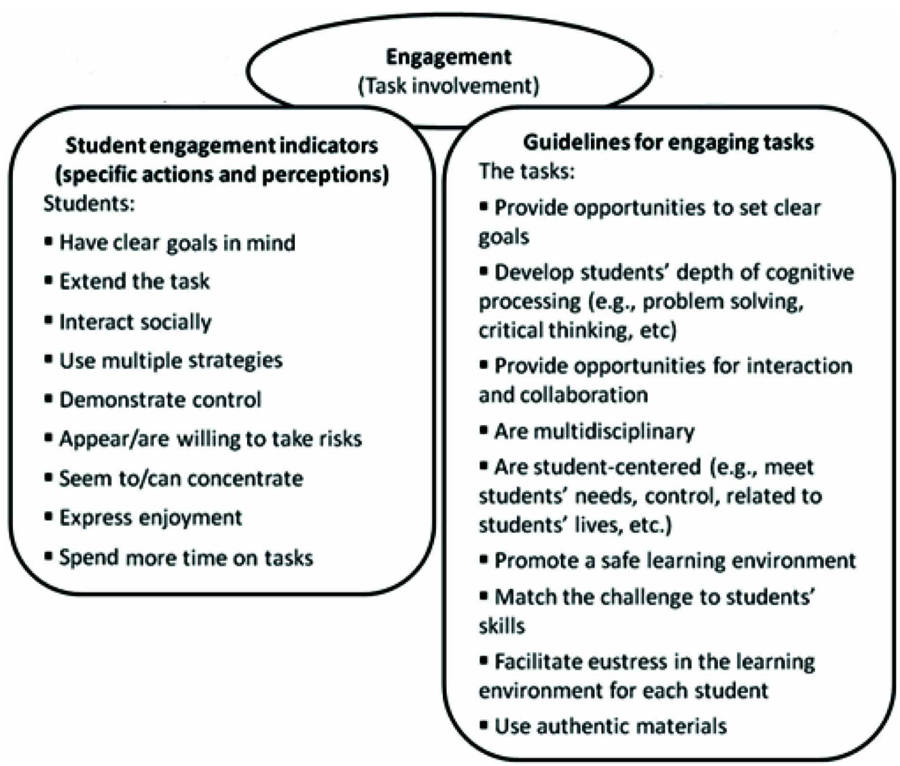
Although the literature on flipped instruction to date appears to be relatively atheoretical, the benefits listed in the flipped literature fit well with theories of optimal learning environments (e.g., Egbert, Hanson-Smith, & Chao, 2007) and student engagement (Lin, 2012, and others). For example, based on research in literature including computer-assisted language learning, educational technology, teacher education, and theories of pedagogy, Egbert, Hanson-Smith, and Chao (2007), based on a review of the literature, proposed 8 conditions for optimal technology-supported learning environments. These conditions are shown in Table 1, next to some of the techniques for flipped instruction noted in the literature that meet each condition.

Table 1 shows that there is definitely theoretical grounding for the flipped instructional strategy, as each of the eight conditions of optimal learning environments is addressed in some way by the strategies for flipped instruction. Similarly, the environment conditions and flipped strategies are in accord with many of the guidelines and indicators in Lin's (2012) task engagement model, shown in Figure 1. According to Lin (2012), engagement sustains students' focus on learning activities and tasks.

Table 1. Links between theory and flipped instruction

Learning Environment Condition	Flipped Instruction Strategy
1. Learners have opportunities to interact and negotiate meaning.	Teacher as tutor; focus on discussions where students interact and negotiate meaning
2. Learners interact in the target language with an authentic audience.	Increased student-student and teacher-student interaction about important questions
3. Learners are involved in authentic tasks.	Activities are meaningful to students; connects to students by using technologies that students use outside of school
4. Learners are exposed to and encouraged to produce varied and creative language.	Multiple information sources for exposure to content and language, resources are multimodal and multimedia; creative activities lead to a variety of outputs
5. Learners have enough time and feedback.	Just-in-time feedback in class while doing tasks, immediate feedback online, more time in class to work deeply with content
6. Learners are guided to attend mindfully to the learning process.	A focus on learning, not just behaving in a "school" way; just-in-time instruction that supports mindfulness
7. Learners work in an atmosphere with an ideal stress/anxiety level.	Learners choose where and when to participate in the direct instruction; learners control the pace of their learning to reduce anxiety
8. Learner autonomy is supported.	Self-pacing of direct instruction; students have choices of readings, resources, and projects

Figure 1. Model of task engagement adapted from Lin (2012)



Flipped instruction can promote task engagement because students have opportunities to receive more help from teachers and peers than in traditional teacher-centered classrooms and to focus on authentic tasks. This might help to create eustress in the learning environment, in which interaction and collaboration are paramount. Moreover, multimodal tasks and multimedia are provided in the flipped classroom to meet individual needs; this is important to matching task challenge to student abilities and supporting students in taking risks. In other words, the links among these theoretical models and strategies means that flipped instruction may help to create optimal learning environments and engaging tasks.

Although there appears to be a reasonable assumption that flipped instruction should support learning, that assumption has yet to be tested. Aside from the plethora of anecdotes available online, little empirical research has been carried out on flipped classrooms to date, and that which has relies almost entirely on student satisfaction and other self-report data (see, for example, Bergmann & Sams, 2012; Foertsch, Moses, Strikeweda, & Litzkow, 2002; Strayer, 2007; Kim, Byun, & Lee, 2012; Lage, Platt, & Treglia, 2000; Mazur, 1991). In general, these results show that students in flipped contexts value having some autonomy in working through the direct instruction and appreciate extra focus on understanding during class time. Although many of the reports promote flipped instruction as a panacea, others (e.g., Foertsch, et al, 2002; Lage, Platt, & Treglia, 2000; Strayer, 2007) note that students who are more dependent on peers and teachers and those who do not work well independently may find the flipped model to be more challenging. Of course, as with any instructional strategy, how it is implemented will affect the outcomes.

FLIPPED INSTRUCTION IN CALL

Flipped instruction has been implemented in a variety of higher education settings, including courses such as Introduction to Physics (Mazur, 1991), graphics design (Baker, 2000), Principles of Microeconomics (Lage, Platt, & Treglia, 2000), engineering (Foertsch, et al, 2002), educational technology (Shimamoto, 2012), and Introduction to Statistics (Strayer, 2007). As flipped instruction models increase in popularity, an increasing number of instructors of varying disciplines are exploring this strategy as a part of their own classroom instruction. However, as noted above, there is little research in general on this model and, more specifically, there is a noticeable absence of work exploring flipped instruction in the field of language learning. There may be several reasons for this scarcity: a lack of awareness of this instructional method within the language education community, limited technical support for language teachers, an emphasis on creative language use that is hard to support with flipped instruction, programs that follow rigid curricula.

Regardless of the reasons for this shortage of published works exploring flipped instruction in the language classroom, extant research and anecdotes appear to support the notion that the language classroom may be a good fit for flipped instruction. This is because the flipped instruction models innately contain elements of optimal language learning environments and task engagement. As can be seen in Table and Figure 1 above, the strategies for flipped learning naturally align with research-based evidence of ideal language learning environments. Based on the presence of these connections, the question arises as to whether or not the flipped model would indeed be beneficial when implemented in the language classroom. This line of questioning leads us to begin exploring flipped instruction strategies through the development and description of a Mandarin Chinese language course following the flipped model.

Description of a Flipped CALL Classroom

As part of a three-credit flipped ELL methods course for undergraduate elementary education majors at a university in the U.S. Pacific Northwest, a set of Chinese language lessons in 7 one-week units was developed. The purpose of these lessons was not only to gain elementary proficiency in Mandarin but also to help the teacher education students learn about and empathize with language learners and apply insights they gained to their teaching. Over four semesters, more than 200 teacher education students participated in the flipped Chinese instruction.

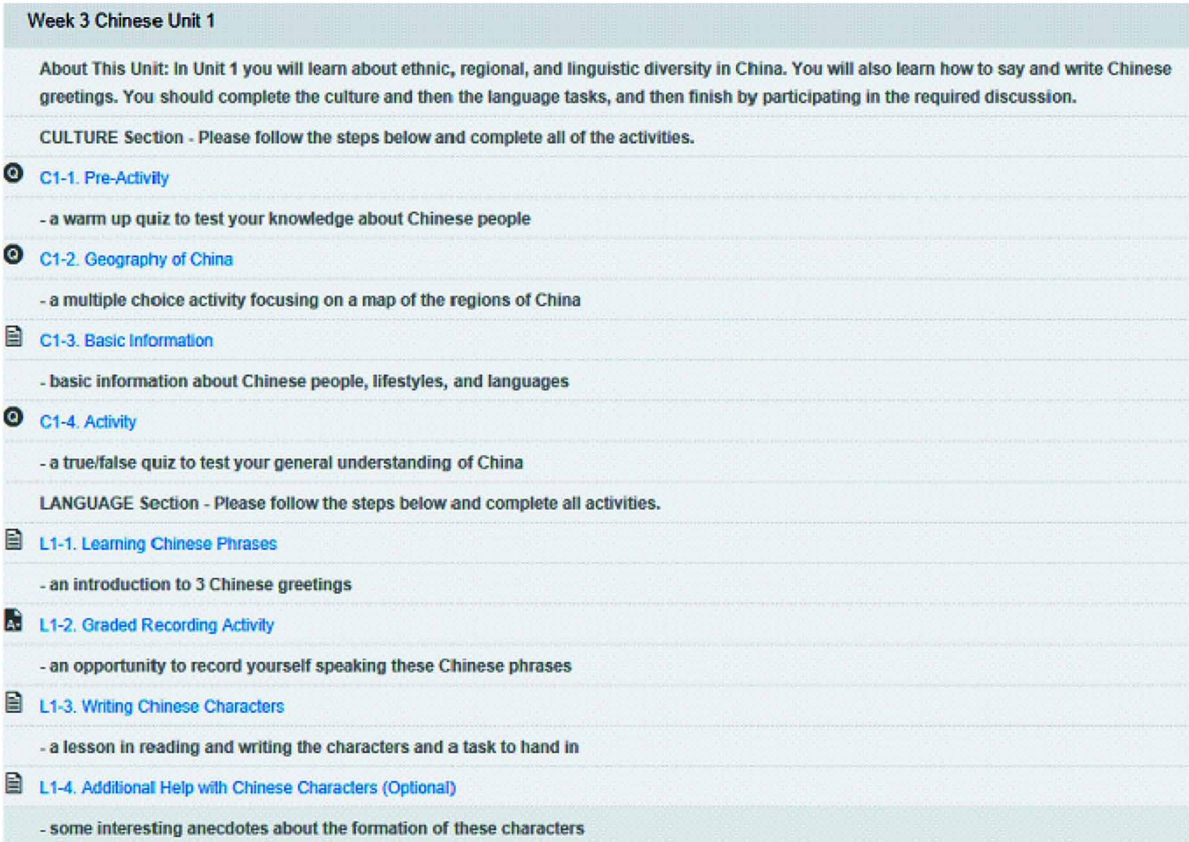
The Chinese lessons were designed based on the optimal language learning conditions noted in Table 1 and on principles for engagement, incorporating flipped instruction strategies. In this flipped classroom students completed most of the direct instruction aspects of the Chinese course – vocabulary, writing, speaking, listening – outside of the classroom. In a regular teacher-centered language classroom, the direct instruction is provided in class by the instructor. In the flipped classroom, all direct instruction was expected to be completed before the start of class; in other words, students were to listen to the character pronunciations, watch the culture videos, read, and review the writing for the week before they came to class. This allowed for the designated class time to be used for discussion, review, and practice of the language and concepts learned that week. Because they had class time for review and practice, students were able to receive immediate feedback in areas in which they were struggling, and their successes could be reinforced.

The Chinese lessons were created in Moodle, a popular LMS. Overall there were 7 units, which each included language, culture, and discussion sections. The course was designed for students to complete one unit per week for each of the 7 units; the content for the first unit of the course is shown in Figure 2. The same types of tasks are repeated in the other units.

In the language section, students experienced Mandarin language learning by completing different language learning activities that involved listening to, reading, speaking and writing Chinese words and phrases. Students used a recorder to record specific words and could click graphics and other information to help them understand the characters. Each unit also contained a section on a particular aspect of Chinese culture. For example, unit 3 introduced the education system in China and compared it to the American system. In each culture section, students completed an online pre-activity to activate background knowledge on the unit theme. For example, the screen shot in Figure 3 shows a pre-activity in a unit on the diversity of China in which students were to mark which of nine different pictures showed a Chinese person. Students then used videos and readings to learn about cultural issues that related to the given week's theme, followed by a brief online quiz testing their understanding. At the end of each unit, students responded in an online discussion forum to a scenario that related to the unit theme. Students responded based on their developing understanding of Chinese culture, incorporating knowledge from the ELL methods part of the course and other courses from their teacher education program.

Because there was not an effective technology we could find that could evaluate students' Chinese character writing, students turned in their writing to the Chinese lesson facilitator--a native Mandarin-speaking graduate student-- who graded it in class and returned it to students. Students could then ask any questions they had about their writing during breaks in class activities or after class. Also, if they had questions about the Chinese culture or language activities, they sent

Figure 2. Contents of Unit 1 of the Chinese mini-course

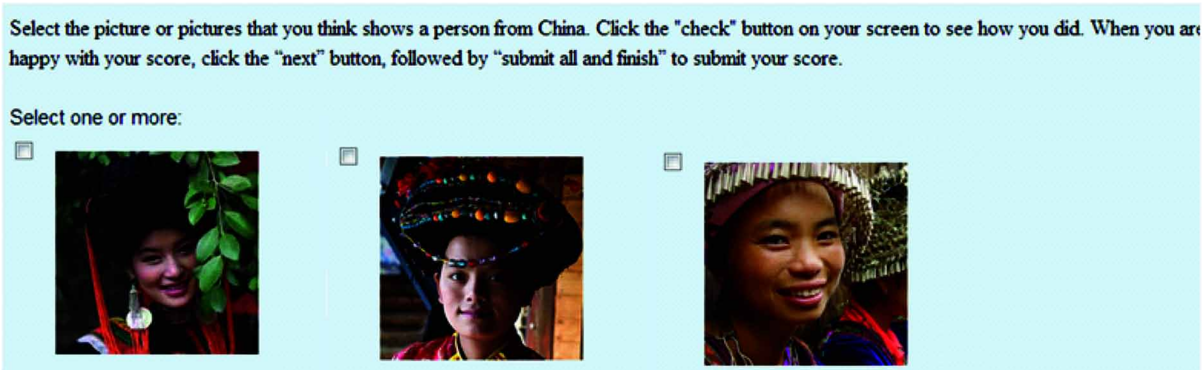


messages to the facilitator via the Moodle or email; they could also ask questions in class. In class, a native Chinese speaker reviewed the vocabulary. While reviewing the vocabulary, students could repeat after the instructor and work with peers for pronunciation practice. Then, if students had not finished their weekly vocabulary recording before class, they could record their audio with the facilitator's help. The facilitator also discussed culture issues with the students.

Students were obviously not expected to become fluent in Mandarin Chinese language and culture within 7 weeks, but, upon the completion of the final module, students were able to hold basic, classroom oriented conversations in the target language. They were able to make connections between American and Chinese perspectives on education and learning, and they began considering how these connections might be applied to ELLs of different cultural backgrounds, beyond Chinese. The inclusion of the flipped strategies seemed to make this goal a possibility, as almost all of the students in the course noted that they had learned something useful. For example, one student commented

I have learned valuable lessons through learning a second language that I would not have learned if I were just to read about it in a textbook. I have learned that it can be very frustrating as a student who wants to do well but simply does not understand the material.

Figure 3. Part of a pre-activity from the Chinese Moodle, "Select the picture or pictures that you think shows a person from China"



Videos of pronunciation could be watched over and over, and some students commented in this way:

I found the videos very helpful when learning the phrases and recording them. I felt that I put a lot of effort into trying to pronounce the phrases correctly in my recordings...

However, not all students were pleased with having the direct instruction outside of class. One student noted that

The Moodle was not beneficial to all learning styles.

Students also liked the overview in class, noting that

it allowed me to find the correct pronunciation of a word in person rather than using the YouTube clips in Moodle, which sometimes did not help.

While several students made comments such as

I felt like doing moodle weekly was a great way to start learning Chinese, but practicing it only once a week didn't allow anything to sink in.

A number of students commented that since they could spend as much (or as little) time as they wanted with the online direct instruction piece, they did not get as much from it as they would if they were forced by a face to face instructor to spend more time. In addition, although some of the students claimed that all of the language pieces needed to be face to face, none of the students complained about the cultural information and activities being online (with a brief discussion of them in class).

CONCLUSION

The idea of pursuing flipped instruction in this course is that increased engagement by teacher education students may lead to more effective learning for all their future students, including their English language learners (ELLs) and others at-risk (Green, 2011; Lin, 2012). In addition, by approaching the inclusion of a language learning component into an ELL methods course for undergraduate teaching majors by implementing elements of flipped instruction, we found that we were able to accomplish things that would otherwise be unattainable. Language learning takes time and commitment, especially when considering the learning of Mandarin Chinese by native speakers of English. Due to the time constraints of the ELL methods course and the wide array of content to be covered, including a language-learning component may otherwise have been impossible, at least on the level presented here. Through the use of the Moodle and flipped strategies, the students had opportunities to be involved with authentic language learning materials in the form of audio, text, video, and graphics. Students were able to discuss topics outside of class via the online discussion board, and they were able to learn and practice at times they deemed appropriate rather than being restricted by in-class time restraints.

Much like the learners in Strayer (2007), who struggled with the change in pedagogy, the teacher education students in the Chinese language flip had varied experiences in this use of CALL. Though some felt interested and excited about the Mandarin course and the presentation of its materials, others struggled with particular aspects, such as technical compatibility or the amount of 'homework' they were expected to complete. Some students expressed a desire to move more of the course content to the in-class portion of the course. It is apparent that flipped instruction will not necessarily work for all students in the same way, any more than any other teaching strategy. However, this incorporation certainly changes the traditional language learning classroom, and there are some clear benefits.

Implications of Flipping in CALL Classrooms

As outlined above, the flipped model may have some benefits for language learning, and it can also help students acquire technology skills in a fully integrated way that they might otherwise not use or be exposed to in class, such as using recording software, instructional video, learning management systems, etc. It can also allow time for course activities that might otherwise be forced out due to time constraints in a traditional student-centered classroom.

The exploration of the flipped instruction model suggests that much of the idea behind flipped instruction is not new, and teachers who have worked for years to create student-centered language classrooms should find this apparent. What sets the flipped model apart from traditional student-centered instruction is the incorporation of technology that supports the resource-rich, teacher-as-guide strategies that many teachers already use to engage their students in optimal learning environments.

Overall, our experiences over four semesters have led us to believe that it is not about whether the classroom is flipped or not, but whether the flip meets the needs of the target students.

Because it appears to be theoretically sound in general does not mean that it should be implemented just because the technology is available. Every field has different needs, and it is unclear as of yet if this teaching strategy will meet the needs of the CALL classroom; future exploration may help us to decide.

REFERENCES

Baker, J. W. (2000). The "Classroom Flip": Using web course management tools to become the guide by the side. In J. A. Chambers (Ed.), *Selected Papers from the 11th International Conference on College Teaching and Learning* (pp. 9-17). Jacksonville, FL: Florida Community College at Jacksonville.

Bates, S., & Galloway, R. (2012). *The inverted classroom in a large enrolment introductory physics course: A case study.* Retrieved October 8, 2013, from http://www.heacademy.ac.uk/assets/documents/stemconference/PhysicalSciences/Simon_Bates_Ross_Galloway.pdf

Bergmann, J., & Sams, A. (2012). *Flip your classroom: Reach every student in every class every day*. Eugene, OR: International Society for Technology in Education.

Chin, C. (2002). Student-generated questions: Encouraging inquisitive minds in learning science. *Teaching and Learning*, *23*(1), 59–67.

Egbert, J., & Hanson-Smith, E. (Eds.). (2007). Call environments: Research, practice, and critical issues (2nd ed.). Alexandria, VA: Teachers of English to Speakers of Other Languages, Inc.

Foertsch, J., Moses, G., Strikweda, J., & Litzkow, M. (2002). Reversing the lecture/homework paradigm using eTEACH web-based streaming video software. *The Journal of Engineering Education*, *91*, 3.

Green, G. (2011, August 30). *Why flip? The flipped classroom*. Retrieved October 10, 2013, from http://www.youtube.com/watch?v=Sqs60QUAALY&feature=youtu.be

Kim, E., Byun, H., & Lee, O. (2012). *Course redesign using flipped instructional model*. Retrieved October 8, 2013, from http://icome.bnu.edu.cn/sites/default/files/Full_Paper/Parallel%20Sessions/8.20%20afternoon%20Parallel%20Sessions%201/Mini%20Meeting%20Room%EF%BC%88Floor%203%EF%BC%89/5-Course%20Redesign%20using%20Flipped%20Instructional%20Model.docx

Lage, M. J., Platt, G. J., & Treglia, M. (2000). Inverting the classroom: A gateway to creating an inclusive learning environment. *The Journal of Economic Education*, *31*(1), 30–43. doi:10.1080/00220480009596759

Lin, T. (2012). *Student engagement and motivation in the foreign language classroom.* Unpublished doctoral dissertation, Washington State University, WA.

Martin, J. (2011, November 8). *Reverse instruction or flipped instruction: My edleader 21 Ignite session on video.* Retrieved October 8, 2013, from http://21k12blog.net/2011/11/08/reverse-instruction-or-flipped-instruction-my-edleader21-ignite-session-on-video/

Mazur, E. (1991). Can we teach computers to teach? *Computers in Physics*, *5*(1), 31–38. doi:10.1063/1.4822968

Shimamoto, D. (2012, April). *Implementing a flipped classroom: An instructional module*. Paper presented at the Seventeenth Annual TCC Worldwide Online Conference, HI. Retrieved October 8, 2013, from http://scholarspace.manoa.hawaii.edu/bitstream/handle/10125/22527/ETEC690-FinalPaper.pdf?sequence=1

Strayer, J. F. (2007). The effects of the classroom flip on the learning environment: A comparison of learning activity in a traditional classroom and flip classroom that used an intelligent tutoring system. Unpublished doctoral dissertation, The Ohio State University. Retrieved October 8, 2013, from http://etd.ohiolink.edu/

This work was previously published in the International Journal of Computer-Assisted Language Learning and Teaching (IJ-CALLT), 4(2); edited by Bin Zou, pages 1-10, copyright year 2014 by IGI Publishing (an imprint of IGI Global).

Chapter 83
The Future of Curriculum Development in Distance Education

Figen Kılıc
Mersin University, Turkey

ABSTRACT

Today, extremely fast developments take place in science and technology. These changes and developments reflect upon all systems and give rise to changes in some concepts and processes. Lifelong learning is one of the concepts affected by these changes. Educational institutions are considered to be responsible for spreading knowledge through e-learning, virtual university, Web-based education, distance education, which offer professional development. Therefore, distance education institutions have an important place in the education system of the future. However, innovations and developments have to be followed closely and operationally used for adaptation to the education system of the future within the distance education system as well. A scientific and realistic way of adapting to these developments is possible only if program development efforts are constant. Looking from this framework, teaching design, internationalization, entrepreneurship have given rise to differentiation in the program development of distance education. This is explored in this chapter.

INTRODUCTION

With rapid advance of information and technology in today's world, learning-teaching environments, methods and techniques have begun to differ. Learning is an inherently social activity and requires a well arranged, strong content. Learning experiences can be possible not only through content but also online communities and networks. Besides, difference in space and time, rapid increase in population and differing needs of the increasing population, rapid change in the knowledge learnt are among the realities of today. Therefore curriculum development efforts are advanced in line with these new developments and curriculum development concept has started to be frequently used in the distance education practices. Program development studies are processes which continue constantly and have an interaction between the items. Thus, it can be

DOI: 10.4018/978-1-4666-8246-7.ch083

said that program development process is a study addressing those principles and activities utilized in order to realize the objectives covered by the program in a sound, effective and realistic manner in a manner that has been put into practice (Varış, 1996). Since there is a positive correlation between realization of the education objectives designed and carrying out the education activities within scope of a program, elements that affect the result should be considered within wholeness of a system and should be developed consistently with one another in order for changes in behavior expected by way of education to take place (Sezgin, 2000). Practices in the distance education which began with learning by mail and continued with radio, video conference, teleconference, computer and Internet use have changed with the advances and developments in the advances and developments at mass communication means. On other words, education programs will constantly renew themselves and develop.

This part has focused on how program development studies can be shaped within framework of lifelong learning under the light of the new knowledge and technological developments.

BACKGROUND

Lifelong Learning and Reflections on Life

Rapid change in information and technology causes individuals to feel the need for lifelong learning, and to meet such needs, they need to have certain knowledge, skills and attitudes within "lifelong learning" skills. European Commission (2007) describes such knowledge, skills and attitudes as "proficiency of communication in mother tongue," "proficiency of communication in foreign languages," "basic competencies in mathematical thinking and science and technology, " "digital competence," " proficiency of learning to learn, " " awareness of becoming a social citizen " as well as "cultural consciousness and adequacy of expression " . When looking separately at these skills specified within framework of lifelong learning, ability to orally express the emotions, views and facts in the mother tongue and ability to use the language effectively at the social and cultural environments from a linguistic point of view is defined as proficiency of communication at the mother tongue (Candy,2003) while proficiency of communication at the foreign languages describes ability to express the emotions, views and facts in a foreign language verbally and in writing, ability to use the language in the social and cultural environments effectively and have the ability of intercultural perception skill (Bruce, 1999). It is also specified that mathematical thinking and digital competence is effective use of data communication technologies, effective use of computer in acquisition, production, evaluation, presentation of the knowledge, communicating via Internet; competence of learning to learn is individuals' taking on responsibility of learning and ability of realizing their self-learning ; consciousness of being a social citizen is realizing one's responsibility, entrepreneurship is putting the ideas into practice, taking risks, cultural consciousness and expression proficiency is explanation of emotions, views and ideas related to a group of media including music, painting, literature and visual arts (Wain, 2000; Walters and Walters, 2001). When looking from the perspective of definitions made, attitudes, behaviors and views expected from the individuals within scope of the lifelong education competencies clearly indicate clues as to what might be expected from the education system. Also, especially education of individuals who can think critically, solve problems, make independent decisions, work cooperatively, can be creative and learn all life long is considered important from functions of education. When looking from this framework, educational institutions are considered to be responsible for spreading the knowledge through means such as e-learning, virtual university, Web based education, *distance* *education* which offer professional development. Also, as suggested by Çakın (1998), education institutions should be places where objective is making students to acquire skill of questioning, becoming creative and constant learning, not an institution where existing knowledge is transferred to students through a rigid discipline. In such case, education programs based on *lifelong learning* skills is required (Romuald, 2004; Viscent, 2006 akt. Budak, 2009). Those individuals who are within *lifelong learning* process may be willing to use a flexible and constant education method. Traditional education model may be insufficient in creating a constant professional and/or non-professional learning program aimed at development of the individuals. Acquisition of knowledge for one time only within traditional education system, concentration on knowledge learnt from the books, nadequacy of the communication and information technologies, negative perception against learning due to obsession about success, failure to pay attention to individual differences may be cited among the inadequacy of the traditional education models .

It is observed that, at the national level, institutions offering *lifelong learning* opportunity operate at different names such as widespread education, adult education, external education, on-the-job education, and apprenticeship education. Recently, it is likely to add e-learning which is frequently discussed and partially applied to such list (Budak, 2009). Because problems such as distance, place and time inconsistency might appear in the vocational and/or non-vocational learning process of target audience. Clear and external learning method may be utilized in order to get rid of the problems that arise. In this context, components of lifelong learning may be determined as formal learning, informal learning and unofficial learning. Formal Learning is a type of learning where institutions are structured from perspective of learning targets, time and learning support and documented as a result. Meeting learning requirements of the institutions at every phase of life through traditional methods may not be possible. Because there may be obstacles before participation of individuals in education process. Therefore, it may be necessary to offer more flexible structures to the individuals in order for formal learning method to be possible. The said flexibility may be formed through open learning opportunities. Also, external learning opportunities may prevent the obstacles within learning process of the individuals. Therefore open and external learning facilities need to be put into practice before one can speak about formal learning method. To sum up, change requires *lifelong learning* and lifelong learning requires open and external learning. However, there is one issue we constantly focus on, that is, science and technology constantly advances and education institutions should enable the individuals to keep up with such advances and they should educate new generation individuals and keep them equipped with certain skills.

What Should Education of Future Be Like?

Basic objective of education is transferring the culture, values and traditions of the society as well as knowledge accumulation to the next generations. In an era of information, change of old values and standards is inevitable. When looking from this perspective, it is possible to make some assumptions about how education of future should look like. Educationists, economists and futurists are closely interested in this issue. In his article entitled "Future of Education," Futurist Thomas Frey (2010) from Da Vinci institute discussed this issue under 8 main titles; also, Anderson (2010) expressed his opinion on this matter through his blog. Many different comments can be found in the local and international press in connection with this matter. Below there is a discussion about what awaits us, the educationists, in the future by taking the foregoing information as the starting point.

1. **Changing Classes:** Face to face is an important element of learning. Classroom environment is extremely important form this perspective. However, multiple-communication media occupy an important place in people's lives and personal careers. In future life, business, entertainment and education will be intertwined. Therefore, school time understanding will be replaced by a more flexible time, in other words, education environments that are part of the life for 24 hours in seven days of week will be required. Today, external education is seen as a new door opened for those students who failed to complete their education due to some reasons and are willing for a second chance (Koustourakis et al. 2008). Owing to new applications using the space and time more flexibly, *distance education* which is in the process of handling face to face communication with blended learning is a precursor of a new era that will shed light upon several problems. Learning environments developing in connection with technology give rise to expectations about Web based learning and a rise in quality of education (Grant and Cheon, 2007).

   Changes are expected not only the class environments but also in the physical structure of the schools. Schools will offer "Computer Assisted Education" and ensure that "Web Libraries" are widespread. It seems that education at virtual classes which have been introduced but will take a longer time for spreading will cause a change in the concept of school. Support duties fulfilled by the courses and private tutors is observed to be fulfilled by the newcomer online websites. Besides, some learning method obstacles encountered by the students at the Web based teaching and traditional teaching over the computer networks will be eradicated and a more original education environment will come into being. As suggested by Kısakürek (2011), at a study conducted by the economist magazine with a sample of 289 persons, 2/3 of the participants state that technological innovations will affect teaching methods within the next 5 years.
2. **Changes in Sectors:** In today's education system, firms offering transportation service, firms producing school uniforms, catering companies and even contractor companies will be needed less and less. Consumption of stationery materials will drop and education software will grow in number (Şaşmaz, 2013). The course books used currently are quite thick. The printed course materials will also disappear. Since the 19th century, course books are used in order to cover the course content. Therefore, they need to be updated constantly. New technologies will offer browser-based content instead of course books (http://www.davinciinstitute.com/papers/). Further, owing to close relations of school-university-industry, establishment of schools educating their own personnel and workforce is seen likely. For instance, IBM will open its online school that will train its own personnel.
3. **Transition from Teaching to Learning:** Technological innovations affect the teaching and learning styles. Sophisticated teaching – management systems, benefits of cooperating with various research partners in the world are some of the benefits derived from changed forms of education institutions among others (http://www.nmc.org/pdf/Future-of-Higher-Ed-(NMC).pdf Also, traditional classes concentrate on "memory" and "knowledge". New education approaches, however, seek for an answer to the question "how can we handle the multi-dimensional problems?" by using the new technologies. One of them is the individualization of teaching. *Distance education* enables the individual to get educated in line with one's own targets and one's

own pace (Holmberg, 1996). According to Wedemeyer, *distance education* consists of four components such as teacher, student, e-learning system and content. Learning takes place as a result of students activities and it is important that content is accessible within framework of the student (Akt: Gülbahar, 2009, 54). *Distance education* is the natural result of the societal transformation, yet it must get rid of its limitedness so that it can be effective in teaching and is long lasting. It should achieve this objective by conducting studies aimed at solving the problem of lack of "eye contact based interaction" which is the most important feature of the face to face education (Gokool-Ramdoo, 2008). These studies may be possible if connection of the student with the learning environment and teaching materials is strengthened. Development of lifelong education understanding built on the basis of constructivist approach and social networks, rapid change and spread of knowledge has prepared a foundation for formation of this theory. According to principles of the social constructivist theory (Bronack et al. 2006);

- Learning is participative,
- Information is social:
- Activities shared improve the learning,
- A beneficial information base appears through effective sharing with the others,
- Students develop their practices according to society they live in.

According to the theory of connectionism developed based on these principles, basic variables affecting the persons and institutions today include societal changes, technological developments, globalization;, rapid spread of information and centralization (Doğan, 2011). Connectionism that affects the *distance education* understanding with the opinion reading as "learning takes place in the process of combining the knowledge sources " focuses on importance of generation of complete, up-to-date and sharing information (Anderson and Dron, 2011). Also, students of the new era will have to educated within a system where they will study and learn on their own. Students will have to find, use and generate the information, when necessary. Learning will take place by doing and experiencing, experiments will take place through simulations at many courses and artistic trips be organized for the art classes. For instance, virtual tours to museum of modern arts located in New York may be organized when students are learning about the modern painters. We will become capable of learning things by practicing which we cannot learn by experiencing through other means.

4. **Qualifications of the Students Educated will Change:** The student must the person who is learning constantly and renewing oneself because information evolves constantly. The student will improve his researching features, and will have to have a critical thinking ability in order to find the correct piece of information among the tons of information. Critical perspective will improve, and learning will become hyper individualized owing to the students who are able to decide when they will learn what (http://www.davinciinstitute.com/papers/). Also, business life and academic cooperation will increasingly become a part of the university life. Institutions must employ advanced technologies in order to increase their partnership and collaborations (Kısakürek, 2011). Therefore, individuals with *lifelong learning* skills will have to be raised so that well-trained workforce can be recruited by the institutes and institutions.

As can be seen here, several changes are expected to take place in the new generation education. Of course, these cannot be expected to take place in a very short time. However, as a requirement of the new information and technology era, infrastructure, technical equipment, understanding and programs have to be customized to this approach. In such case, development of *distance education* programs, one of the most widespread examples of the new generation education understanding, is needed. Below a discussion about future of program development studies in *distance education* can be found.

MAIN FOCUS OF THE CHAPTER

As an alternative to the traditional campus based structure, distance education becomes effective as an education approach rapidly developing within the new world order owing to its technology based course structure. A major part of society and educationists approach to *distance education* and evaluation of programs offering *distance education* with an increasing interest. The most important reason of this is improving quality of the *distance education* program (Kaya, 2002).

Increased interest and requirement for *distance education* in the world has paved the way for *distance education* programs at several universities. Through the historical process, these studies are currently at the stage of adaptation and development, and *program development* studies are ongoing. Although *distance education* is at the stage of crawling, it is seen as an education model and attracts attention (Boon et al. 2005). Number of programs offering *distance education* is being increased at several universities in order to meet the increasing demand for *distance education* without conducting program assessment and development studies. At this point, the following question comes to one's mind: Is the education quality increasing in parallel to the quantitative increase in *distance education* programs? Juran defines the concept of quality as "suitability for use" (Aktaran: Ensari, 2003: 1). Does *distance education* meet the expectations in this regard? In order to answer these questions, current status of the *distance education* programs needs be studied.

How Do Education Programs Adapt to Education of Future?

Rapid changes in knowledge and technology change the world order and education programs adapt themselves to such changes, and offer extensive opportunities to the individuals within scope of *lifelong learning* concept. Therefore, given the dimensions comprising the structure of the education programs which are constantly in interaction with one another, evaluation and development of each dimension will differ in line with the developing knowledge and technology. Since *distance education* practices have increased today, several dimensions such as general objectives, who will receive the program, time, learning space, content and arrangement, method, social activity and communication which are dimensions of the education programs have been affected by these dimensions (Kılıç, 2011). Objective of schools is educating the group, not the individual and accordingly, education programs have been established with curriculum. Therefore, education programs need to adapt themselves to the new societal order of today. Each school must renew the education programs in order to educate the workforce required by the information and technology era. This study discusses what can happen with regards to the changing processes of the *curriculum development* studies at *distance education* applications.

It is known that education programs have several interconnected dimensions which require them to be assessed and developed separately and together. These are:

- Objective and function of the institution where program is to be developed;
- General objectives of the program;
- Who will receive the program;
- When program will be given;
- Teaching space;
- Learning field;
- Gains;
- Determination of introduction behaviors;
- Content and activities;
- Criteria to be applied in selection of lecturer;
- Time, detailed timing;
- Strategy, method and techniques;
- Teaching objectives to be used;
- Support activities;
- Social activities;
- Cost /benefit;
- Assessment; and
- Development program (Varış, 1996).

When looking at the nature of *distance education*, changes in these processes are inevitable.

When looking at the basic theories affecting the *distance education*, we encounter "Autonomy and Independence Theory" paying attention to individualization of the education, "Industrialization Theory" focusing on the issue of arranging the teaching structure in order not to lose learner centers structure and "Interaction Communication Theory " which defends that *distance education* understanding containing emotions like possession, cooperation and empathy can be effective and "Adult Education" which combines these three theories and connects the *distance education* with the target audience (Andragogy) . General thought of *distance education* is offering education service to each demanding student regardless of the time and space restriction and not discriminating against the students. Target audience of the *distance education* is generally composed of adult students (Ghani et al. 2008) and basic features of adult learning need to be used when preparing the *distance education* programs, and adults are ready to learn (Okçabol, 2006:53). An adult who is ready to learn develops self-learning by directing himself. Such feature of the adults is one of the basic elements of the *distance education*. Besides, detection of the features of the learner in the *distance education* is caused by the "learner centers" structure of it. APA (1997) groups the principles of the learner centered approach under four titles:

- **Cognitive and Supra-Cognitive Factors:** Nature, targets of learning process are structuring of information, strategic thinking, thinking about thinking and learning context (culture, technology and environmental factors).
- **Motivating and Emotional Factors:** Emotional effects on learning, internal motivation in education are effects of motivation on learning effort.
- **Developmental and Social Factors:** Effects of physical, mental, emotional and social development and interpersonal communication on learning.
- **Factors Based on Individual Differences:** Effects on learning which arise out of individual differences.

Such features of the learners are very important in order for *distance education* to achieve its targets. Therefore, in line with the basic principles of the adult education and learner centered structure, importance should be attached to arrangement of *distance education* programs which are satisfactory from communication perspective, interesting, increasing motivation, containing elements-examples from life, are professional career oriented and care for criteria of putting into practice and are learner oriented .

Apart from the said features of one education program, some other principles need to be taken into consideration. These principles are important in ensuring that education and teaching objectives are realized and students are motivated for the programs. Ragan (2009) lists the principles of an effective *distance education* as follows:

- Show and teach;
- Apply activity oriented course management strategies;
- Base the course activities on the examples;
- Plan lack of plan;
- Ask for feedback;
- Think without writing (before starting the dialogue);
- Advance the developments shown with support;
- Safety and confidentiality;
- Keep quality important; and
- Provide open (Internet) connection.

Given the foregoing features, precautions have to be taken against the limitedness of *distance education* such as lack of face to face education, failure to establish eye contact which appears as problems (Hawkins et al. 2011). Today, second life applications introduced by many universities seem to make students feel like they are in a classroom and eradicate limitedness of the *distance education*. Potential users of the Second Life platform where *lifelong learning* activities can be effectively carried out and individual learning can take place are primarily *distance educationists* (Salmon, 2009). Learning may be rendered more efficient with course contents developed by taking into consideration suitable learning and communication principles. In this way, platform configured by using advanced technology tools within framework of *distance education* methods may offer chance of practice to the learners with a content where interest of learner is kept constant and live. Correct adaptation of the practices to the mass oriented virtual technologies may increase the social communication and interaction oriented educational use of the platform in a positive way (Canberk, 2011). Second Life which is an exact reflection of the real world brings distance learners together at a social platform. Similarly, it is important to offer room simulation practices and interactive designs in the teaching design. Video tape records, e-mails, audio conference systems, video conference systems and Web pages are the methods frequently used at the Web based education. Multimedia technologies chosen by the lecturers for different learning environments are used as learning-teaching tool; simulations, analogies, vivid footage and high quality sounds render learning status realistic and may help learner to learn by discovering (Sezgin, 2009). In other words, arrangement, design of Web pages, presentation, continuity and function of information can be possible by choosing and using the same in accordance with the objectives and gains of the program (Kılıç, 2011). Since the teaching variables such as assuring active participation in the education environment through arrangement of the content at the education environment, learner and teacher being at the same environment, feedback, correction, clue, repetition and emphasis can be used through the process, arrangement of e-learning environments by keeping quality, safety and confidentiality at the top plays an important role in terms of keeping the learner motivated.

Education environment where information transfer comes into being and student interacts with the subject have gained different meanings through *distance education* and have turned into materials that can be chosen depending on preference of users owing to computer software . It is possible to share the information with students at the learning environment through applications such as e-books, e-television, e-exercise, e-test, e-consulting, e-audio book by using digital multimedia technologies. As can be seen here, books, tests that have been traditionally used face us in the education of future in a different format. Apart from these changes that are expressed in general, and the question "what should basic elements of a *distance education* program be?" should be answered. Varış (1996) stresses out that there must be 4 basic elements of one education program. These are:

- Objectives;
- Content;
- Learning-teaching process; and
- Evaluation.

When looking at the *distance education* programs, social and support activities need to be added to the foregoing elements. It is discussed below what these elements should cover in the *distance education* program and how they should be shaped in the future.

Objectives

Objectives are composed of replies given to the question "why?" in the education program. Objectives of *distance education* should be arranged in accordance with the framework of the *distance education*. It is important to know the characteristics of the target audience. Sarwar et al. (2008) have stated that questions of which answers need to be sought in order to establish the characteristics of the learner. Of the target audience:

- Are business and living conditions suitable?
- What is their level of education?
- Why do they know about the classes included in the program?
- Do they have any experiences about *distance education*?
- What technological facilities do they have?

Detection of the foregoing characteristics stems from learner characteristics of the *distance education* applications. The fact that *distance education* is preferred mostly by the adults is, difference in their preliminary knowledge, and their ability to use the technology vary to a great extent . Now, individuals are in the *lifelong learning* process. Learners willing to gain different specializations in different fields will be in need of flexible education programs meeting their various requirements, especially in the adulthood period.

Lecturers should establish their course targets in a manner that will be meaningful for learners and in a way that they can use the same in their living spaces. Objectives should be established on a structure focusing on a clear and certain purpose (Kyrish, 2004, Murphy, E. and Rodriguez-Manzanares, 2009 Akt: Tırnovalı, 2012). This will ensure that learners will be able to internalize the objectives regardless of their age and preliminary information. One of the most important elements in determining the objectives is requirements of the society and individuals. Therefore, given the fact that we will shift to an era of specialization or a hyper- individualized era, objectives will have to be re-structured within framework of flexible and *lifelong learning* skills.

Content

Content in the *distance education* is a separate field of research. It is the most effective program element from several perspectives ranging from motivation of the student who interacts with the course objectives without an intermediary for the course and student's having the gains stipulated by the objectives (Tırnovalı, 2012). Content design differs from the face to face education due to its nature. In order to ensure that content elements used comply with the system, educationists are in the quest for effective methods (Lindeman and Varvel, 2005). One of the items educationists giving classes at the *distance education* need to pay attention to while establishing content of course is "objectives of teaching, requirements of learner, the highest frequency of use, and compliance with the learning materials suitable for the conditions of learner " (Smyth, 2005 Akt: Tırnovalı, 2012). Also, a teacher who can design content at macro and micro level and can ensure that learners access to the information contained in the content. Content contains several elements which require that knowledge be arranged in the mind. At the stage of arranging the information, content to be learnt needs to be chosen in the first place. Choosing and arranging the content is important in that it facilitates the learning (Kılıç, 2007). Explanations, examples used in the arrangement of the content, content's being either abstract or concrete are important in terms of forming a meaning. Provision of explanations within a text is concretize the information. Concrete texts are texts that contain presentation and explanation of concept and principle examples. Mayer (1989) suggests that a concrete content provided with explanations is more comprehensible than an abstract content and improves the learning outputs. Examples have an indispensable place and importance in rendering the content more comprehensible. Examples should be used in concretizing and understanding a subject. Because examples support structuring of the inductive knowledge. Students utilize the examples in structuring the information and form the main idea by combining the same with the individual experiences. Extremely abstract subjects, underlined concepts and principles are better learnt than those subjects presented in an abstract manner (Beishuizen et al., 2003). When looking from this perspective, design of content is of paramount importance in the *distance education*. Creation of interactive software along with the technologic advances, preparation of a content providing means of accessing to information in today's world where we can access to technology through a single button.

Learning-Teaching Process

Learning –teaching process is connected with how content should be transferred to the students. Education environment where information transfer comes into being and student interacts with the subject have gained different meanings through *distance education* and have turned into materials that can be chosen depending on preference of users owing to computer software . It is possible to share the information with students at the learning environment through applications such as e-books, e-television, e-exercise, e-test, e-consulting, e-audio book by using digital multimedia technologies. Designs at the learning environment where learning takes place helps information to be structured (Kılıç, 2011). Today, *distance education* uses video band records, e-mail, visual e-mail, automatic e-mail list server (Listserve), Web pages, bidirectional video and audio conference systems as well as Internet video conference system (White pine cu-seeme) (Olivet Nazarene University Information Technology, 2009). Now, these systems will have to be updated in technology of future. Therefore, systems such as Room system, Rollabout System and Desktop System will become more widespread. As suggested by Tırnovalı (2012) by referring to Shih, arrangement of learning environments such as learning based on analogy, coincidental learning, reflective learning, situation based learning and discoverer learning will be important. Based on the individualization of the teaching, learning by doing-experiencing is seen important in line with interest, expectation, pace and development level of every learner. Therefore, students will be able to carry out experiments in an interactive mode, will be able to participate in the environment through simulations, and will become more active owing to activities such as preparation of project, solving puzzle.

Students are the ones that need to be active in the learning –teaching environment. Increased importance of technology on the teaching applications ensures that group processes are spread towards not only the physical areas but also online groups, virtual though. As constructivist learning groups, power of e-mail and computer conference lies in its capacity of supporting cooperation and conversation. By using these instruments, groups may work together in resolution of problems, may discuss about their comments, and may come together at the other educational activities such as modeling and directing. During computer conference, students may interact and discuss with specialists and peers within a social arrangement process. Sharing of information through electronic media also helps processes and strategies aimed at solving the collective and individual problems to be mutually shared with the other online student. Activities such as formation of questions, summarization of content and explanation of important items may be carried out effectively in online mode. E-mail, computer conference and news groups support development of the discussion communities and groups with similar interests. Online databases may help the information to be structured. Also, thousands of news networks, databases and electronic bulletin systems support the individual centered discovery of the information. What is important in structuring the information is the objective oriented behavior demonstrated by the student while researching the database. Cognitive tools, also known as mental tools, (databases, semantic networks, specialists systems, computer conference, multiple-media/hyper-media, computer programs and micro world learning environments), are the tools facilitating cognitive processing. Use of these tools by the students will ensure that their own learning and meaning formation processes are facilitated and will give rise to interactive lives.

Evaluation

Evaluation is a process of concluding about the education process and conclusion. In this process, level of student gains, detection and resolution of problems that occurred during the process are related to evaluation process. Several principles should be taken into consideration in the course of evaluation at *distance education*. Student, teacher, officials, technological materials, courses, software are important elements of evaluation. These items should be taken into consideration and continuity should be assured while carrying out an evaluation.

Throughout the evaluation process, measurement and evaluation studies related to product and process should be included. Therefore, instead of traditional measurement – evaluation tools (open ended essay and multiple choice tests), concept maps, rubrics, rating scales, portfolios, projects, tests etc.. should be used, they should ensure that students are evaluated in the process, and enable them to measure their meta-cognitive skills, creativities, entrepreneurships .

Social and Support Activities

Social and support activities cover the process when communication takes place among the community composed of students, lecturers, technical and administrative personnel and students can receive information, technology, psychological support, financial support etc . Social communication with *distance education* generally takes place through social networking sites. *Distance education* institutes are responsible for establishing media aimed at providing such type of communication. There are other media which students create tı communicate with one another apart from these official networking sites. There are differing views on at what level face to face interactions of individuals in the system should be or importance of face to face interview. Where face to face interview is not possible, isolation problems may arise within the group (Dolan, 2011). These types of activities are important in terms of students' feeling themselves as part of a group, their willingness to cooperate, realization of their teaching objectives and motivation of students. Therefore, apart from services provided via system, organizing of social environments where students can communicate face to face, utilization of applications such as second life for social and support purposes not only for courses is recommended .

SOLUTIONS AND RECOMMENDATIONS

When looking at studies conducted in connection with *distance education*, it is seen that studies used to deal with historical process to a great extent in the early 1990s, over the years spreading of *distance education* efforts, motivation of students and determination of existing situations became the main concentration. However, it is observed that, following 2000s, efforts were concentrated on teaching design in the *distance education*. More specifically, although issues such as quality of services, perception and effect on success have been frequently examined in the *distance education, curriculum development* studies are not frequently encountered in the *distance education*. Tırnovalı (2012) has created an infrastructure which will provide data for *curriculum development* studies during the thesis he prepared in Turkey. However, from a general perspective, it is a reality that studies aimed at improving *distance education* programs are so small in number and these have to be constantly updated within framework of rapidly developing knowledge and technology. When looking from such point of view, it is observed that there is a need for program evaluation studies aimed at developing *distance education* programs and experimental studies connected with the applications.

In line with recommendations by *curriculum development* specialists, it is obvious that studies as to how *distance education* programs should be updated today and in the future and what awaits the specialists will be of paramount importance. It is recommended that *curriculum development* studies be conducted from a futurist approach and assumptions and implications mentioned in the chapter should be taken into consideration.

FUTURE RESEARCH DIRECTIONS

Under the light of information discussed in this chapter, it is predicted that, in this era we have entered into hyper specialization period, part of the *curriculum development* specialists will go for *curriculum development* studies at *distance education*. In such case, carrying out of the program evaluation studies at *distance education*, adaptation to future education systems as soon as possible, and conducting scientific studies seem to be important. It is for sure that these changes taking place in the information and communication technologies may give rise to effective changes in the communities. Given the fact that learning speed will be increased by 10 folds, a rapid change in today's education –teaching periods will be inevitable. If we consider the fact that students who will step into business world in the future will have to have 10 times more knowledge and experience than what is present today, important of the studies to be conducted is increasing more and more. Rich learning experiences have become important concepts after teaching designs following digital course books; *lifelong learning* skills through technological literacy; innovations in the qualities of lecturers and internationalism and innovative teacher concept, different skills sought in the diploma during recruitment and promotions. Therefore, it is recommended that researchers focus on these concepts.

CONCLUSION

When looking at the applications in *distance education* field, it is possible to say that developments and changes have taken place in the *distance education* processes over the time. New learning approaches where learners are at the center of learning process and have a say in decision making related to learning process is one of these applications. Therefore, while designing *distance education* environments, the said new learning approaches and tendencies of learners should be taken into consideration (Görü, 2011).

To conclude, several futurist educationists agree on *the future of education*. Individualization of education, radical changes in class environments, means of accessing to knowledge and characteristics of teachers are included in these values. However, an operational process is required which is carrying out the *curriculum development* studies. Program development is an inherently long process. Therefore, process in *distance education* applications will be hard and long. Examining relationships between *curriculum items* and each item individually and revealing the whole of dynamic relations, bringing together technological developments of the era and information related to learning-teaching theories require a team that is equipped with technique and knowledge (Kılıç, 2011). Assuring effective and efficient learning at the virtual class environments where educational results derived from information laid down and technology are used together, balancing the finance, increasing participation and constant update of information gained appear to be important . When studies conducted in Turkey and world are examined, it is observed that they address the *distance education* in terms of evaluation of historical, features of teaching inputs, design of teaching and characteristics of teaching outputs . It is thought that applications will further develop and will move towards different learning environments due to reflection data gained upon applications, their levels of affecting efficiency and constant development studies.

REFERENCES

Anderson, J. (2010). *How teachers & classrooms will need to change in our hyperconnected age*. Retrieved from http://www.britannica.com/blogs/2010/01/how-teachers-classrooms-will-need-to-change-in-our-hyperconnected-age/

Anderson, T., & Dron, J. (2011). Three generations of distance education pedegogy. *International Review of Research in Open and Distance Learning*, *12*(3).

Atıcı, B., & Gürol, M. (2001). *Uzaktan eğitimin uzaktan öğrenme anlayışına dönüşmesinde www'in etkisi*. Ankara: Bilişim Teknolojileri Işığında Eğitim. Retrieved from http://perweb.firat.edu.tr/personel/yayinlar/fua_39/39_28118.doc

Avrupa Komisyonu. (2007). *Directorate-general for education and culture: Key competences for lifelong learning European reference framework*. Brussels, Belgium: EC Lifelong Learning Programme. Retrieved from http://ec.europa.eu./dgs/educationculture/pub1/pdf/II-learning/keycomp_en.pdf

Beishuizen, J., Asscher, J., Prinsen, F., & Elshout-Mohr, M. (2003). Presence and place of main ıdeas and examples in study texts. *The British Journal of Educational Psychology*, 73. PMID:14672145

Bronack, S., Riedl, R., & Tashner, J. (2006). Learning in the zone: A social consructivist framework for distance education in a 3-dimensional virtual world. *Interactive Learning Environments*, *14*(3), 219–232. doi:10.1080/10494820600909157

Bruce, C. (1999). *The seven faces of information literacy*. Adelaide, Australia: Auslib Press.

Budak, Y. (2009). Yaşam boyu öğrenme ve ilköğretim programlarının hedeflemesi gereken insan tipi. *Gazi Eğitim Fakültesi Dergisi*, *3*, 693–708.

Çakın, İ. (1998). Üniversitelerimizin bilgiye erişim ortamları: Genel değerlendirme. *Hacettepe Üniversitesi Edebiyat Fakültesi Dergisi*, *75*, 37–67.

Canberk, N. G. (2011). Bir e-öğrenme platformu olarak second life: Türkiye örneği, Türkiye'de e-öğrenme: Gelişmeler ve uygulamalar-II. İstanbul.

Candy, P. C. (2003). *Lifelong lerarning and ınformation literacy: Report for U.S. national commission on libraries and ınformation science and national forum on ınformation literacy*. Retrieved from http://www.nclis.gov/libinter/infolitconf&meet/papers/candyfullpaper.pdf

Doğan, M. E. (2011). Enformasyonel iş gücü için yeni bir öğrenme yaklaşımı: Bağlantıcılık. In *Akademik bilişim kongresi*. Malatya: İnönü Üniversitesi.

Dolan, V. (2011). The ısolation of online adjunct faculty and its ımpact on their performance. *International Review of Research in Open and Distance Learning*, *12*(2).

Economist. (2008). The future of higher education: How technology will shape learning. *The Economist Intelligence Unit 2008*. Retrieved from http://www.nmc.org/pdf/Future-of-Higher-Ed-(NMC).pdf

Gokool-Ramdoo, S. (2008). Beyond the theotical ımpasse: Extending the applications of transactional distance theory. *International Review of Research in Open and Distance Learning*, *9*(3).

Görü, T. (2011). Türkiye'de e-öğrenme uygulamalarına. Esnek Bir Bakış, Türkiye'de E-Öğrenme: Gelişmeler ve Uygulamalar-II. (Ed: Demirci, B.B., Yamamoto, G. ve Demiray, U.), ss:13-24, İstanbul.

Grant, M. M., & Cheon, J. (2007). The value of using synchronous conferencing for ınstruction and students. *Journal of Interactive Online Learning*, *6*(3), 1541–4914.

Gülbahar, Y. (2009). *E-öğrenme*. Ankara: Pegem Akademi Yayıncılık.

Holmberg, B. (1996). On the potential of distance education in the age of ınformation technology. *Journal of Universal Computert Science*, *2*(6), 484–491.

Kaya, Z. (2002). *Uzaktan eğitim uygulayıcıları için program değerlendirmenin önemi*. Uluslararası Eğitim Teknolojileri Sempozyumu.

Kılıç, F. (2007). *Mikro Düzeyde İçerik Düzenleme Stratejilerinin Kavramların, Genellemelerin Öğrenilmesine ve BiliŞsel Esnekliğe Etkisi, Çukurova Ünv*. Adana: Sos. Bil. Enstitüsü, Yayımlanmamış Doktora Tezi.

Kılıç, F. (2011). Türkiye'de e-öğrenme uygulamalarında program geliştirme çalışmaları. Türkiye'de E-Öğrenme: Gelişmeler ve Uygulamalar-II. (Ed: Demirci, B.B., Yamamoto, G. ve Demiray, U.), ss:149-160, İstanbul.

Kısakürek, M. A. (2011). Çağdaş Gelişmeler Işığında Eğitim Bilimleri, 1. Uluslar arası Eğitim Programları ve Öğretim Kongresi, Anadolu Üniversitesi, 05-08 Ekim, Eskişehir.

Koustourakis, G., Panagiotakopoulos, C., & Vergidis, D. (2008). A contribution to the Hellenic Open University: Evulation of the pedegogical practices and the of ICT on distance education. *International Review of Research in Open and Distance Learning*, *9*(2).

Lindeman, M., & Varvel, V. E. (2005). Online course as learning scripts: Using storyboards in online course design. In *Proceedings of 20th Annuel Conference an Distance Teaching and Learning*. Retrieved from http://www.uwex.edu/disted/conference/

Mayer, R. E. (1989). Models for understanding. *Review of Educational Research*, *59*(1). doi:10.3102/00346543059001043

Olivet Nazarene University Information Technology. (2009). Retrieved from http://media.olivet.edu/distance/methods.html

Salmon, G. (2009). The future for (second) life and learning. *British Journal of Educational Technology*, *40*(3). doi:10.1111/j.1467-8535.2009.00967.x

Sarwar, M., Anvar, N., & Yousuf, I. (2008). Perceptions of course coordinators and course writers for developing distance learning material. *Turkish Online Journal of Distance Education, 9*(2).

Şaşmaz, S. (2013). *Gelecekte eğitim sistemi*. Retrieved from http://www.egelifuturistler.com/index4.php?sayfa=dp&pc=28

Sezgin, S. İ. (2000). *Mesleki ve teknik eğitimde program geliştirme*. Ankara.

Tırnovalı, A. (2012). *Uzaktan Eğitimde İnternet Tabanlı Eğitim Programlarının Temel Boyutlarına İlişkin Görüş ve Öneriler*. Mersin: Yayımlanmamış Doktora Tezi, Mersin Üniversitesi Eğitim Bilimleri Enstitüsü.

Varış, F. (1996). *Eğitimde program geliştirme: Teoriler-teknikler*. Ankara: Alkım Yayınevi.

Wain, K. (2000). The learning society: Postmodern politics. *International Journal of Lifelong Education*, *19*(1), 36–53. doi:10.1080/026013700293449

Walters, S., & Walters, K. (2001). Lifelong learning, higher education and active citizenship: From rhetoric to action. *International Journal of Lifelong Education*, *20*(6), 471–478. doi:10.1080/02601370110088445

ADDITIONAL READING

Amiotte, S. Ve Wheeler, S. (2005). The Death of Distance: Documetting the Effect of Distance Education in South Dakota, *Turkish Online journal of Distance Education*, ISSN: 1302-6488, 6(1).

Birkök, M. C. ve Vuranok, T.T. (201). Uzaktan Eğitim ile Bilgi İhtiyacının Karşılanması: Bir Üniversite Programı Önerisi, *Uluslararası İnsan Bilimleri Dergisi*, ISSN: 1303-5134, 7(2).

Garrison, D. R., Anderson, T., & Ve Archer, W. (2004). Criticak Thinking, Cognitive Presence and Computer Conferencing in distance Education. *American Journal of Distance Education*, *15*(1), 7–23. doi:10.1080/08923640109527071

Parker, A. (2009). *Is The World Truly Ready For Distance Education?* Proceeding of Society For Information Technology and Teacher Education International Conference.

Ragan, L. C. (2009). *Principles of Effective Online Teaching: Best Practices in Distance Education, Faculty Focus Special Report*. Manga Publication.

This work was previously published in a Handbook of Research on Emerging Priorities and Trends in Distance Education edited by T. Volkan Yuzer and Gulsun Eby, pages 261-275, copyright year 2014 by Information Science Reference (an imprint of IGI Global).

Chapter 84
Service Science in Higher Education:
Productization of Offshore Programs in Transnational Education

Pi-Yun Chen
Shu-Te University, Taiwan

Ming-Hsiung Hsiao
Shu-Te University, Taiwan

ABSTRACT

One of the forms in service innovation for universities in Taiwan is to develop transnational education such as offshore programs where the existent programs were re-innovated by providing new service processes including improved delivery or distribution methods. This study examined how the universities adopted this form of innovation and examined how they productize their offshore programs, corresponding to the four productization practices: specifying, tangibilizing, systemizing and standardizing, in terms of program design, curriculum design, teaching and learning, assessment, and administration. By these productization practices, students and partner universities can have a clearer picture and better understanding of the programs, and the host universities can cut down the administration cost and achieve better efficiency and cost-benefit. This study can be seen as a pioneering study which applies the service science philosophy to redefine higher education and reformulate the process of the service innovation such as offshore program implementation by the productization practices.

1. INTRODUCTION

Service science was coined by U.S. Council on Competitiveness in 2004, emphasizing the importance of the integration among human resources, investment and infrastructure, especially in innovative business process design, organization and management in the service sector (Hidaka, 2006). This idea was further elaborated by IBM who proposed the term 'SSME (service science, management, and engineering)' as an interdisciplinary approach to the study, design, and implementation

DOI: 10.4018/978-1-4666-8246-7.ch084

of a service system (Paulson, 2006; Al-Badarneh, et al., 2013). Service science is a new discipline to innovate services and service systems with scientific methodology (Kim, 2009). According to Paton and McLaughlin (2008), 'service science is an emerging discipline that aims to combine fundamental science and engineering theories, models and applications with facets of the management field, particularly knowledge, supply chain and change management, in order to enhance and advance service innovation'.

Service science is emerging as a new and exciting paradigm in response to the world's shift from a manufacturing to a service economy (Zhang, et al., 2012). Although service science is interdisciplinary, in the field of education, higher education in particular, no literature has been found to investigate how service science is applied to the education sector. The main reason for this may be that 'education' or 'higher education' is not seen as a 'product', nor a 'service'. Traditionally, there are two main goals for a university to achieve: to create knowledge by research and to disseminate knowledge by education. That means 'knowledge' is the most important product/service for higher education which provides the context for all learning, and is the primary focus of individual courses. In some cases, higher vocational education for example, such a knowledge creation and dissemination can also be referred to the skill training.

A basic question is who are the customers of higher education? According to Kanji and Tambi (1999), customers of higher education can be divided into different groups of actors such as current students, potential students, employees, employers, government and industry. Reavill (1998) identified twelve stakeholders, including students and employers, who contribute to or benefit from higher education. Actually, literature has revealed that students and employers are the most important stakeholders in higher education and are the primary customers for a university, in that universities provide students with 'knowledge' and employers with 'educated students'.

Then what is the production process in higher education, or, to be more specific, how universities turn their input into output? In the field of education, Jauch and Orwig (1997) proposed two educational models describing such a production process in higher education: the teaching model and learning model. In the teaching model, teachers act on students to "transmit" knowledge (production process) and turn the students (input) into educated persons (output), while in the learning model, the learners interact with "guide" and educational materials (production process), and turn students (learners), with the aid of faculty and educational material (input) into educated persons (output). However, doing education is different from manufacturing product after all. Applying the principles and philosophies in the manufacturing industry or even in the service industry to the education one can be ill suited.

This study tries to examine how universities apply the principles and philosophies in the industries to higher education, especially when a new philosophy, service science, emerges as a scientific discipline which seeks to bring together knowledge from diverse areas to improve the organization's operations, performance, and innovation. In Taiwan, most universities are facing the challenge in the shortage of domestic students and are making every efforts to seek out for the possible sources of students from mainland China and other Asian countries. One of the opportunities is to develop transnational education such as offshore programs where the existent programs were re-innovated by providing new service processes which involve significant changes in the roles of staff, faculty, technology, strategic partners, and/or students.

The purpose of this study, therefore, is to examine how universities in Taiwan adopted this form of process innovation in the development of their transnational education, and how they adopt the 'service science' philosophy to productize their offshore programs in order to achieve better cost-benefit in management. The remainder of the paper is organized as follows. In the next section, it discusses the logic, principles, and philosophies in service science by reviewing some relevant literature. It is followed by a section describing how the service science philosophies can be applied to higher education. In section four, it discusses how universities in Taiwan develop their transnational education as a form of service innovation. Finally, it gives a summary and draws the conclusions in section five.

2. LOGIC, PRINCIPLES, AND PHILOSOPHIES IN SERVICE SCIENCE

2.1. Service-Dominant vs. Goods-Dominant Logic

In service science, Lusch et al. (2008) suggested that an emerging logic of value creation and exchange called service-dominant logic (S-D logic) is a more robust framework than the traditional goods-dominant logic (G-D logic) to achieve a service-centered conceptual foundation. According to Lusch et al. (2008), one of the primary tenet of S-D logic is ‘an understanding of value as a collaborative process between providers and customers, rather than what producers create and subsequently deliver to customers’. S-D logic reminds business to recognize that customers are co-creators of their own value, so the strategic role of any business must be to support its customers’ value creating processes (Ballantyne, et al., 2011).

S-D logic was not originally proposed as a new theory but as a ‘counter paradigmatic’ challenge to the G-D logic of marketing (Vargo & Lusch, 2008). Traditionally, G-D logic is to maximize profit through the efficient production and distribution of goods which is, mostly, standardized, produced away from the market, and inventoried till demanded. S-D logic, on the other hand, emphasizes the role of customers who are recognized as an active co-creator of knowledge and service value (Novani & Kijima, 2012). Even so, however, the ultimate goal of S-D logic is still to maximize profit, which is done through the creation of the customer value.

Although Vargo and Lusch (2008) proposed such a new logic, Wright and Russell (2012) still raised some philosophical challenges to the S-D logic paradigm. In the study discussing the appropriateness and effectiveness of the S-D logic compared to other logics and its operational measurement, Sweeney (2007) also reported some challenges and difficulties in operationalizing the S-D logic. In a sense, we agree that intangible processes, skills, knowledge and abilities emphasized by the S-D logic are more difficult to imitate and can create more customer value. However, since all these benefits are difficult to measure, it also implies more risks and is more difficult to realize.

2.2. Service Innovation

According to Grönroos (1992), there are four basis characteristics of services which differentiate services from goods: intangibility, inseparability, heterogeneity and perishability. First, traditionally services have the intangible nature which make it distinctive from physical products (or goods). Second, in most cases, services are produced and consumed at the same time, or inseparably, where customers participate in the service production process. Third, services involve a considerable amount of human activity and rarely adhere to a predefined process (Bouwman & Fielt, 2008). Compared with physical products which generally rely on modern production lines to ensure that they are produced consistently in quality, services are highly variable in quality; i.e., with high heterogeneity, as they depend on who provides them as well as when and where they are provided (Liu & Wei, 2003). Finally, because services cannot be stored or inventoried, if there are not sufficient resources available to support customers’ demand for services, they will leave dissatisfied. These characteristics of services make it difficult for the staff in the service industry to describe or present their 'product/service' precisely for their customers.

The concept of innovation was first emphasized by Schumpeter (1934) by arguing that innovation can create wealth through fulfilment of customer needs. Schumpeter (1934) also reported that innovation covered five different types: new products, new methods of production, new sources of supply, exploration of new markets and new ways to organize business. In more recent literature, innovation is widely recognized as those going beyond the product or service itself, and beyond the organization and market. Today, innovation also emphasizes the supporting role information and communication platforms and architectures play in the entire supply chains. As Dominguez-Péry, et al. (2013) defined, innovation can be seen as the combination of creativity and implementation, and can be related to changes in various dimensions.

For service innovation, Yen, et al. (2012) defined it as the practices to create value for customers, and other business stakeholders such as employees, business owners, and partners, through new and/or improved service offerings, service processes, and service business models. In the past, the focus of innovation has especially been on technology-driven innovation in the manufacturing sector. Later, as the service sector became so important that service quality was emphasized across all sectors, service innovation began to receive intense attention. Nowadays, the focus is increasingly on the complexity and multidimensionality of modern services and manufacturing (Bouwman & Fielt, 2008).

Riddle (2008) proposed that there are three different types of service innovation from the view of supply chain management (SCM): (1) Changes to the service itself, or what is being offered to the customers; an innovative service/product that did not exist before is a typical case. (2) Changes to the service delivery process, or how the service is being provided; a new online channel for selling an existent product/service sold offline before is a typical case. (3) Changes to the organizational and managerial structure, or how service provision is supported; an ERP implementation which improves the efficiency of operations and/or customer satisfaction without any changes in the service itself or the delivery process is a good example.

Service innovation emphasizes the importance of innovation in service, where service is nowadays seen as the fundamental basis for exchange where all the value of products, including tangible goods and intangible services, is created through the 'service' that is provided for customers (Vargo & Lusch, 2004). Many physical products, such as video games, which are homogeneous in quality, are purchased actually for intangible benefits, such as entertainment, which are heterogeneous depending on users' experiences and perception. Such a philosophy can also be applicable to higher education, where students receive lecturing, teaching material, and learning environment with homogeneity in quality, but heterogeneous in their perception and learning outcomes.

2.3. Productization vs. Servitization

In the field of service science, the 'productization of the services', a counterpart of the 'servitization of the products', is often used to associate tangible features with intangible service offerings. For example, providing customers with brochure makes the service more "real"; establishing a fixed price reduces the risk of runaway costs; identifying the actual names of people who will do the work adds credibility (Radford, 2004). According to Jaakkola (2011), productization is used to translate the abstract service and its creation into concrete exchangeable objects and controllable processes through a series of productization practices including specifying, tangibilizing, systemizing and standardizing.

'Servitization' of the products coined by Vandermerwe and Rada (1988), on the other hand, is widely recognized as the process of creating value by adding services to products. Now service offerings have been extended over time to include more value added service propositions like training, system integration and consulting, and even offering customized solutions to customers. A key feature of servitization strategies is the strong customer centricity where customers are not just provided with products but with more tailored "solutions" (Baines, et al., 2009). The primary objectives of servitization are to satisfy customer needs, enhance the firm's performance, and achieve competitive advantages (Marks, et al., 2011). However, servitization generally brings about higher cost. If all these positive sides of servitization cannot be turned into monetary profits properly, then servitization can generate severe risks and raise significant challenges for product companies.

Nowadays, it is generally agreed that manufacturing industry needs 'servitization' to make their products more customized to meet different consumers' needs, while service industry needs 'productization' to make their services more standardized to help consumers understand the services. For higher education institutions such as universities which mainly deliver knowledge and provide educated students, a productization of knowledge delivery to help students understand it and a productization of educated students to help employers understand the manpower seem necessary.

3. SERVICE SCIENCE IN HIGHER EDUCATION

Most principles and philosophies in the management field are developed for either the service or product industry. Jauch and Orwig (1997) claimed that the implementation of Total Quality Management (TQM), which is widely adopted in the industries for quality management, into the academic function of teaching in higher education is so problematical that it should not be adopted into the academic activities of higher education settings. Although this argument was later critically challenged by Mullin and Wilson (1998), and still many authors argue that the principles of TQM can definitely contribute to the improvement of education (Sindwani, et al., 2011), it is still generally believed that higher education in itself has its unique characteristics in nature which are different from service and product (Agrawal & Sharma, 2014).

What a university provides for their customers is not easy to define. It provides students with knowledge and employers with educated students and/or skilled manpower. Both 'knowledge' and 'educated/skilled manpower' are intangible, inseparable in production and consumption, heterogeneous with high variation in quality, and cannot be inventoried. In this regard, higher education seems more like 'service' than 'product', and should have more S-D logic than G-D logic. To attract students to join the universities and employers to hire the educated students, therefore, universities should make efforts to 'productize' their services; i.e., higher education, for their customers to better understand them.

As Mullin and Wilson (1998) reviewed, the current higher education system has been defined as a reputational and resources model, and as the course-credit-completion model as well, based on assumptions intended to make administration easier, not to improve learning effectiveness. Mullin and Wilson (1998) also compared the differences between the course-credit-completion "quantity model" and an alternative continuous process improvement "quality model" on eleven criteria: (1) organizational principle, (2)involvement, (3)content knowledge, (4)curriculum, (5) co-curricular learning, (6)assessment, (7)teaching methods, (8)feedback, (9)faculty responsibility,

Table 1. Productization of higher education

Criteria	Productization (Specifying, Tangibilizing, Systemizing, and/or Standardizing)
(1) Organizational principle	Explicitly define the student basic abilities for each disciplines (***Specifying***).
(2) Involvement	Mechanism systematically provides information and feedback from various constituencies. Faculty, students, alumni, and employers participate in curriculum design (***Specifying***).
(3) Content knowledge	Content knowledge takes different forms to exhibit; e.g., certificates, skill competition (***Tangibilizing***).
(4) Curriculum	Curriculum is the "end," as well as the 'means" for the learning process. Syllabus is clearly defined and published, mostly online (***Tangibilizing***).
(5) Co-curricular learning	Out-of-class activities are taken for skill development (***Specifying***).
(6) Assessment	With the aid of the administrative information system, assessment of students' learning performance and professors' teaching quality are critically evaluated by unified criteria (***Standardizing***), and can be made systematically throughout, not only at end of, the learning process (***Systemizing***).
(7) Teaching methods	Professors teach with the aid of online resources, and communicate with students by email or other forms of ICT (Tangibilizing). Students are able to be more active than passive in communications (***Tangibilizing***).
(8) Feedback	Administrative information system provides systematic mechanism for effective use of students' feedback (***Systemizing***).
(9) Faculty responsibility	Faculty responsibility is for the courses taught and meet the standard by the universities (***Standardizing***).
(10) Faculty development	Faculty development and scholarly activity are separate products of faculty effort, clearly defined by rules (***Specifying***).
(11) System input and outputs	Inputs are number of Ph.D., faculty to student ratios, etc. Output measured by percentage of students graduated (***Tangibilizing***).

(10)faculty development, and (11)system input ad outputs.

In a sense, all these models can be seen as a productization mechanism trying to specify, tangibilize, systemize and standardize the 'higher education'. Today, the universities in Taiwan take even more strict measures to 'productize' the higher education, and a large part of the productization is done by resort to ICT (information and communication technologies). Table 1 illustrates some idea about the productization mechanism in higher education according to the eleven criteria from Mullin and Wilson (1998) corresponding to the four productization practices: specifying, tangibilizing, systemizing and standardizing.

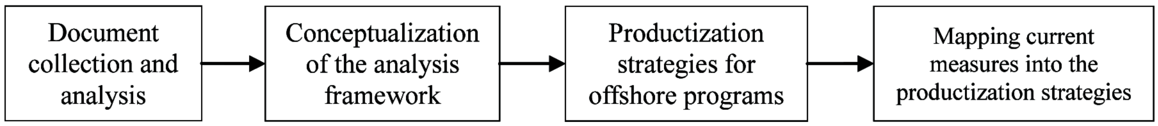
4. AN TRANSNATIONAL EXPANSION FOR SERVICE INNOVATION

4.1. Methodology

This study adopts the documentary research method by using the outside sources from the Ministry of Education (MOE), Taiwan, to conceptualize our analysis framework and derive the analysis results. Most of our documents come from MOE, the official supervisory authority for universities' offshore programs in Taiwan, and from a number of universities who are considered successful in the development and implementation of offshore programs.

Based on MOE's regulation and universities' administration on offshore programs, we first built an analysis framework where the primary process for the development and implementation of offshore programs was extracted and conceptualized.

Figure 1. Research procedures



Second, by reviewing literature on service science, we derived some important strategies which can be adopted by universities to productize their offshore programs. Third, from what have done currently for the management of offshore programs by the universities in Taiwan, we mapped their measures taken into the corresponding strategies with respect to each steps in the development process. Figure 1 summarizes and illustrates our research procedures described above.

4.2. Transnational Education and Offshore Programs in Taiwan

Transnational education refers to those programs and courses "in which the learners are located in a county that is different from where the awarding institution is based" (UNESCO, 2007). Along with the recent innovations in information and communication technologies, the international mobility of programs and institutions on a large scale since 1990s has become a special phenomenon while student mobility is continuing to grow in international higher education. As a form of academic mobility and market driven educational activity, many have found that transnational education is following the same pattern as international student mobility where highly developed nations, such as the major English speaking countries, the UK, USA and Australia, are still the primary and key providers of the transnational education service.

The innovative nature of transnational education is manifested not only in the breakthrough in the philosophy, strategic development plan and institutional operations, but also in the cooperation models between the institutions across the nations and the emergence of new delivery modes of transnational programs. According to Alam et al. (2012), there are five popular modes widely used in transnational education: (1) branch campus, (2) franchising or partnership, (3) articulation or twinning, (4) distance or virtual education, and (5) study abroad. Distance education and branch campus are operated with more autonomy and independence of the awarding institutions, whereas partner-supported delivery requires various levels of involvement of local partners who provide a range of services for the implementation of transnational programs.

Transnational higher education is observed to have grown significantly in various forms, including offshore and branch campus in other countries and collaborative degree programs with universities and business enterprises abroad. Arguably, the UK and Australia are the two countries that have moved to exploit the international demand for educational service through the pursuit of a variety of strategies for program delivery (Poole, 2001).

The 'partner-supported delivery' mode is the one worth mentioning in this study. Under this mode, a provider from the offering country authorizes a partner in other country to deliver its courses and programs. Despite being considered more cost-effective, this mode poses some financial and reputation risks due to local partner's financial and other shortcomings (Alam et al., 2012). Partner-supported delivery depends more heavily on partnership with various kinds of service that often include face-to-face teaching, physical facilities and administrative support locally (McBurnie & Ziguras, 2007). An offshore program is often adopted as a form of cooperation in this mode that refers to the arrangement in which a local education provider is authorized

Table 2. Number of students registered in offshore programs in Taiwan

Year	Vietnam	Malaysia	Other Nations	Total
2007	62 (65.3%)	17 (17.9%)	16 (16.8%)	95 (100%)
2008	202 (77.7%)	46 (17.7%)	12 (4.6%)	260 (100%)
2009	348 (82.7%)	34 (8.1%)	39 (9.2%)	421 (100%)
2010	591 (93.4%)	28 (4.4%)	14 (2.2%)	633 (100%)
2011	583 (92.5%)	47 (7.5%)	0 (0.0%)	630 (100%)
2012	536 (90.7%)	47 (8.0%)	8 (1.3%)	591 (100%)
Total	2,322 (88.3%)	219 (8.3%)	89 (3.4%)	2,630 (100%)

Source: MOE, http://www.edu.tw/statistics/index.aspx

to offer the foreign courses and training under the conditions set out by individual contract.

From the perspective of service science, developing 'offshore programs' can be seen as a form of service innovation which enables universities to reshape their current programs and export them to other countries for new customers. This appears to be more critical in the context of Taiwan as many universities, public or private alike, have been facing serious shortage of student recruitments resulting from the decreasing birth rate since late 1990s, in addition to the reduction of government subsidies to universities. Many universities in Taiwan have adopted this form of innovation and have implemented offshore programs in some Asian countries such as Vietnam and Malaysia.

Table 2 shows that the number of students registered in offshore programs in Taiwan has risen for the past few years, where those of Vietnam and Malaysia account for more than 90%. By developing offshore programs, the transnational education of the universities in Taiwan is not only an approach or a path to internationalization, but also a survival solution for their sustainability.

4.3. Productization of Offshore Programs

Productization is very important for offshore programs to be successful. Due to the barriers arising from distance, and the differences in culture, and social and educational system between host universities and partner universities, it is not easy for students and partner universities to fully understand the offshore programs which they are going to participate in. By specifying, tangibilizing, systemizing, and/or standardizing the programs, students and partner universities can have a clearer picture and better understanding of them. For the host universities, productization also enables them to cut down the administration cost and achieve better efficiency and cost-benefit, which are crucial for the host universities' survival under adverse circumstances in the competitive higher education market.

Table 3 illustrates some productization measures that host universities generally take to implement their offshore programs, which corresponds to the four productization practices: specifying, tangibilizing, systemizing and standardizing, according to the program implementation process which mainly includes procedures such as: (1) program design, (2)curriculum design, (3)teaching and learning. (4)assessment, and (5)administrative support. In 'program design', the host universities need to decide what programs should be exported to or be implemented in other countries with the support from partner universities. To achieve cost-benefit, programs are mostly duplicates of those existent on home campus of the host universities, a form of standardization. By standardization, the programs can be implemented repeatedly by

Table 3. Productization of offshore programs

Process	Productization (Specifying, Tangibilizing, Systemizing, and/or Standardizing)
(1) Program design	• Programs are mostly duplicate of those existent on home campus of the host universities, and can be implemented repeatedly by cooperating with different partner universities in the same countries (***Standardizing***).
(2) Curriculum design	• Curriculum can be reproduced and be transplanted to other programs by cooperating with different partner universities in the same countries (***Standardizing***). Syllabus is clearly defined and published, mostly online on the website (***Tangibilizing***).
(3) Teaching and learning	• Professors teach with the aid of online resources, and communicate with students by email or online chatting through universities' e-learning website (***Tangibilizing***). Students are able to be more active than passive in communications (***Tangibilizing***).
(4) Assessment	• With the aid of the administrative information system, assessment of students' learning performance and professors' teaching quality are critically evaluated by unified criteria (***Standardizing***), and can be made systematically throughout, not only at end of, the learning process (***Systemizing***).
(5) Administrative support	• Administrative information system provides systematic mechanism for the program administration (***Systemizing***). Through the system, offshore students can also access and edit their personal e-portfolio with visible information on their studying records (***Tangibilizing***).

cooperating with different partner universities in the same countries. As is widely known, the MBA program is the most popular one which has been implemented offshore.

In 'curriculum design', the curriculum in offshore programs is designed by customization according to the needs of the offshore students, in consideration of possible support from partner universities. Once the curriculum is decided, it can be reproduced and be transferred to the programs by cooperating with different partner universities in the same countries, which is a form of standardization. However, to overcome the barriers arising from distance, language, and culture, syllabus is often clearly defined and published online on the website to make it as tangible as possible. In 'teaching and learning', professors are encouraged to teach with the aid of online resources, and to communicate with students by email or online chatting through universities' e-learning website. By applying these ICTs, students are able to be more active than passive in communications with each other, and with professors as well. In other words, the host universities generally make their efforts to tangibilize the communications between professors and students, in terms of teaching and learning.

In 'assessment', with the aid of the administrative information system in universities, the assessment of students' learning performance and professors' teaching quality are critically evaluated by unified criteria, which is a form of standardization. Moreover, the assessment can be made systematically throughout, not only at the end of, the learning process. Finally, in 'administrative support', universities' administrative information system provides systematic mechanism for the administration of offshore programs. Through the system, offshore students can also access and edit their personal e-portfolio which provides visible information on their studying records throughout the studying years.

5. CONCLUSION

In the context of Taiwan, transnational education is seen as a great opportunity in seeking for alternative source of students as well as financial support. Even with the encouraging policy by the government, however, going international for many universities in Taiwan is actually seen as a survival measure in Taiwan where low birth rate has given pressure on institutional subsistence.

Within such a context, it is important for universities in Taiwan, a non-English speaking country without colonial background nor international initiatives at its establishment, to find their ways to develop transnational education which has long been dominated by Western universities. Therefore, how universities in Taiwan could formulate their own strategies, equip themselves with the needed capabilities to be an education service provider, and then gain their cost-benefit is worth exploring.

This study examined how universities in Taiwan adopted the form of process innovation in the development of their transnational education and examined how the universities productize their offshore programs in terms of program design, curriculum design, teaching and learning, assessment, and administration. For the management of offshore programs, productization is very important process to achieve better efficiency and cost-benefit. The differences between the host universities and the partner universities in educational and social system generally cause difficulties in program management. By specifying, tangibilizing, systemizing, and/or standardizing the programs, students and partner universities can have a clearer picture and better understanding of them and the host universities can cut down the administration cost and achieve better efficiency and cost-benefit.

Service science is an emerging discipline that aims to combine fundamental science and engineering theories, models and applications to enhance and advance service innovation (Paton & McLaughlin, 2008). Most of its principles and philosophies, however, are developed for either the service or product industry. For higher education, no past research has been found to apply the principles and philosophies in service science to this field. This study is considered a pioneering work which applies the service science philosophy to redefine higher education and reformulate the process of the service innovation such as offshore program implementation by productization practices. This becomes the major contributions of this study.

The success of offshore program implementation, however, is subject to many factors other than the program itself. As a non-English speaking country like Taiwan, the language (English) ability of teaching faculty and administrative staff can be an obstacle to the program success. Moreover, the difference in culture and social system between the host universities and the partner universities, and between the teaching faculty and students, often cause unexpected communication problems. How universities overcome all these obstacles to achieve better success remains to be further explored.

REFERENCES

Agrawal, T., & Sharma, J. (2014). (2014). Quality function deployment in higher education: A literature review. *International Journal of Service Science, Management, Engineering, and Technology*, *5*(1), 1–13. doi:10.4018/ijssmet.2014010101

Al-Badarneh, A., Spohrer, J., & Al-Duwairi, B. (2013). A model curriculum for undergraduate program in IT SSME. *International Journal of Service Science, Management, Engineering, and Technology*, *4*(4), 1–18. doi:10.4018/ijssmet.2013100101

Alam, F., Subic, A., Plumb, A., Shortis, M., & Chandra, R. (2012). An innovative offshore delivery of an undergraduate mechanical engineering program in developments. In *Engineering Education Standards: Advanced Curriculum Innovations* (pp. 233–245). USA: IGI Global.

Baines, T. S., Lightfoot, H. W., Benedettini, O., & Kay, J. M. (2009). The servitization of manufacturing: A review of literature and reflection on future challenges. *Journal of Manufacturing Technology Management*, *20*(5), 547–567. doi:10.1108/17410380910960984

Ballantyne, D., Williams, J., & Aitken, R. (2011). Introduction to service-dominant logic: From propositions to practice. *Industrial Marketing Management*, *40*(2), 179–180. doi:10.1016/j.indmarman.2010.06.025

Bouwman, H., & Fielt, E. (2008). Service innovation and business models. In *H. Bouwman, H. De Vos, and T. Haaker, Models Mobile Service Innovation and Business Models* (pp. 9–30). Springer-Verlag. doi:10.1007/978-3-540-79238-3_1

Dominguez-Péry, C., Ageron, B., & Neubert, G. (2013). A service science framework to enhance value creation in service innovation projects. An RFID case study. *International Journal of Production Economics*, *141*(2), 440–451. doi:10.1016/j.ijpe.2011.12.026

Grönroos, C. (1992). *Service Management and Marketing: Managing the Moment of Truth in Service Competition*. Lexington: Lexington books.

Hidaka, K. (2006). Trends in services sciences in Japan and abroad. *The Quarterly Review*, *19*, 35–47.

Jaakkola, E. (2011). Unraveling the practices of "productization" in professional service firms. *Scandinavian Journal of Management*, *27*(2), 221–230. doi:10.1016/j.scaman.2011.03.001

Jauch, L. R., & Orwig, R. A. (1997). A violation of assumptions: Why TQM won't work in the ivory tower. *Journal of Quality Management*, *2*(2), 279–292. doi:10.1016/S1084-8568(97)90008-0

Kanji, G. K., & Tambi, M. B. A. (1999). Total quality management in UK higher education institution. *Total Quality Management*, *10*(1), 129–153. doi:10.1080/0954412998126

Kim, H. (2009). Service science for service innovation. *Journal of Service Science*, *1*(1), 1–7. doi:10.1007/s12927-009-0001-3

Liu, X., & Wei, K. K. (2003). An empirical study of product differences in consumers' E-commerce adoption behavior. *Electronic Commerce Research and Applications*, *2*(3), 229–239. doi:10.1016/S1567-4223(03)00027-9

Lusch, R. F., Vargo, S. L., & Wessels, G. (2008). Toward a conceptual foundation for service science: Contributions from service-dominant logic. *IBM Systems Journal*, *47*(1), 5–14. doi:10.1147/sj.471.0005

Marks, F., Ramselaar, L., Mulder, J., Muller, H., Langkamp, S., & Boymans, C. (2011). *Servitization in Product Companies: Creating Business Value beyond Products*. The Netherlands: Atos Consulting.

McBurnie, G., & Ziguras, C. (2007). *Transnational Education: Issues and Trends in Offshore Higher Education*. Abingdon: Routledge.

Mullin, R. F., & Wilson, G. W. (1998). A violation of assumptions about TQM: A response to Jauch and Otwig. *Journal of Quality Management*, *3*(2), 293–308. doi:10.1016/S1084-8568(99)80118-7

Novani, S., & Kijima, K. (2012). Value co-creation by customer-to-customer communication: Social media and face-to-face for case of airline service selection. *Journal of Service Science and Management*, *5*(01), 101–109. doi:10.4236/jssm.2012.51013

Paton, R. A., & McLaughlin, S. (2008). The services science and innovation series. *European Management Journal*, *26*(2), 75–76. doi:10.1016/j.emj.2008.03.001

Paulson, L. D. (2006). Service science: A new field for today's economy. *Computer*, *39*(8), 18–21. doi:10.1109/MC.2006.277

Poole, D. (2001). Moving towards professionalism: The strategic management of international education activities at Australian universities and their Faculties of Business. *Higher Education*, *42*(4), 395–435. doi:10.1023/A:1012226930654

Radford, J. (2004). Service productization. JB Radford LLC (reproduced by Microsoft Corporation and Epicor Software Corporation).

Reavill, L. R. P. (1998). Quality assessment, total quality management and the stakeholders in the UK higher education system. *Managing Service Quality*, *8*(1), 55–63. doi:10.1108/09604529810199395

Riddle, D. I. (2008). *Service Innovation: Questions & Answers*, Service-Growth Consultants Inc. (retrieved from http://www.servicegrowth.org/documents/Service%20Innovation%20Q%26As.org.pdf)

Schumpeter, J. (1934). *Theory of Economic Development*. Oxford: Oxford University Press.

Sindwani, R., Singh, V., & Grover, S. (2011). Identification of attributes of TQM in an educational institute: A system model. *International Journal of Service Science, Management, Engineering, and Technology*, *2*(2), 48–64. doi:10.4018/jssmet.2011040103

Sweeney, J. C. (2007). Moving towards the service-dominant logic- a comment. *Australasian Marketing Journal*, *15*(1), 97–104. doi:10.1016/S1441-3582(07)70036-8

UNESCO. (2007). *Revised Code of Good Practice in the Provision of Transnational Education. Lisbon: UNESCO*. Retrieved from: http://www.enic-naric.net/documents/REVISED_CODE_OF_GOOD_PRACTICE_TNE.pdf

Vandermerwe, S., & Rada, J. (1988). Servitization of business: Adding value by adding services. *European Management Journal*, *6*(4), 314–324. doi:10.1016/0263-2373(88)90033-3

Vargo, S. L., & Lusch, R. F. (2004). Evolving to a new dominant logic for marketing. *Journal of Marketing*, *68*(1), 1–17. doi:10.1509/jmkg.68.1.1.24036

Vargo, S. L., & Lusch, R. F. (2008). From goods to service(s): Divergences and convergences of logics. *Industrial Marketing Management*, *37*(3), 254–259. doi:10.1016/j.indmarman.2007.07.004

Wright, M., & Russell, D. (2012). Some philosophical problems for service-dominant logic in marketing. *Australasian Marketing Journal*, *20*(3), 218–223. doi:10.1016/j.ausmj.2012.02.002

Yen, H. J. R., Wang, W. K., Wei, C. P., Hsu, S. H. Y., & Chiu, H. C. (2012). Service innovation readiness: Dimensions and performance outcome. *Decision Support Systems*, *53*(4), 813–824. doi:10.1016/j.dss.2012.05.015

Zhang, H., Wei, C. P., & Chau, P. Y. K. (2012). Service science in information systems research. *Decision Support Systems*, *53*(4), 770–771. doi:10.1016/j.dss.2012.05.010

This work was previously published in the International Journal of Service Science, Management, Engineering, and Technology (IJSSMET), 5(4); edited by Ghazy Assassa and Ahmad Taher Azar, pages 1-12, copyright year 2014 by IGI Publishing (an imprint of IGI Global).

Chapter 85
Librarian without Building in an E-Learning Environment:
Needed Skills, Challenges, and Solutions

Jerome Idiegbeyan-Ose
Covenant University – Canaan Land, Nigeria

Ugwunwa Chinyere Esse
Covenant University – Canaan Land, Nigeria

ABSTRACT

This chapter discusses e-learning, its advantages and challenges, the concept of a librarian without a building, and the characteristics and skills of a librarian without a building in an e-learning environment. The chapter empirically looks at the need for an e-librarian in an e-learning environment, the needed skills for such a librarian, and their challenges. Possible solutions to identify challenges are also discussed. The survey method was used for the study; the questionnaire was designed and administered to 138 librarians from Academic libraries in the six geo-political zones of Nigeria. 127 questionnaires were returned and used for analysis. The study reveals that there is a great need for e-librarians in e-learning environments, and that the librarians must possess such skills as high computer literacy, ability to learn fast, teach, and evaluate others. It was also discovered that e-librarians are faced with technical, administrative, financial, and capacity building challenges. Based on these, the authors recommend that e-librarians should be supported at all levels; they should be ready to develop themselves, strive at all cost to acquire more knowledge and skills in order to stand the changing nature of their job. It is also recommended that government agencies that accredit programmes at tertiary institutions should make sure that any institution that offers e-learning must also have a well organized e-library, and a well trained e-librarian must man the library. The study concludes that e-library and e-librarian without building must be recognized and empowered as part of the e-teaching and learning processes.

DOI: 10.4018/978-1-4666-8246-7.ch085

INTRODUCTION

Education is the bedrock of any nation. No nation can develop without proper and effective educational systems. Libraries from the ancient time to present day are always part of any educational system. No educational system can be effective without library as supporting instrument. With the advent of Information and Communication Technologies in education, E- learning platforms have been created to provide students with the opportunity to continue their education and career development without the rigidity and rigorous life of the school system. The creation of the E-learning platforms has placed additional roles on the library and the librarian whose responsibility will now include rendering services to the E-learners. Thus the concept of E- library, Virtual library, and E- librarian, librarian without building come to place.

In the last few decades, the world has gone through significant change in terms of advancements in technology and the information exchange. These advancements in information and communication technology have led to e-learning becoming a focus of global attention. E-learning", in simple terms, is Electronic Learning or any learning facilitated by electronic means which would include computer-based training (CBT) with modules, CD-ROM training, web-enabled, and Internet learning. Advent of E-learning has provided students with an opportunity to continue their education or personal pursue and career development without the rigidity and rigorous life of the school environment. This online format of Learning, offers the students a great deal of flexibility in terms of when they study, how they study, and how quickly they cover and master any given material.

OBJECTIVES OF THE STUDY

The objectives of the study are to find out:

1. Whether there is need for E- Librarian in an E- Learning environment.
2. The skills that would be needed by librarian in an E- Learning environment.
3. The challenges of E-librarian in an E-Learning environment.
4. Prefer solution to the challenges.

BACKGROUND

Over the years, there have been conflicts in the definitions of E-Learning; some authors have explicitly defined e-learning, others have implied a specific definition, but these definitions have materialize, some through conflicting views of other definitions, and some just by simply comparing defining characteristics with other existing terms. Ellis (2004) disagrees with authors like Nichols (2003) who defined e-Learning as strictly gaining access to knowledge using technological tools that are web-based, web-distributed, or web-capable. Ellis believes that e-Learning does not only cover content and instructional methods delivered via CD-ROM, the Internet or an Intranet. Tavangarian, D., Leypold, M. E., Nolting, K., Roser, M., & Voigt, D. (2004), stated that e- Learning is not only procedural but also shows some transformation of an individual's experience into the individual's knowledge through the knowledge construction process. Ellis (2004) and Triacca, L., Bolchini, D., Botturi, L., & Inversini, A. (2004) believe that some level of interactivity needs to be included to make the definition truly applicable in describing the learning experience, even though Triacca et al. (2004) added that e- Learning was a type of online learning. However, some authors have made reference to other terms such as online course/learning, web-based learning, web-based training, learning objects or distance learning believing that the terms can be used synonymously (Dringus & Cohen, 2005; Khan, 2001; Triacca et al., 2004; Wagner, 2001). Clark & Mayer, (2003), states that E-learning can be defined as instruction delivered via a computer that is intended to promote learning.

E-learning is a term that means something different to almost everyone who uses it. Some use it to refer to packaged content pieces and others to technical infrastructures. Some think only of asynchronous self-study while others realize e-learning can encompass synchronous learning and collaboration. Almost all also agree that E-Learning is an effective method that should be blended into current learning mix. So what is e-learning? According to Marc Rosenberg (2001) "E-Learning refers to the use of internet technologies to deliver a broad array of solutions that enhance knowledge and performance. It is based on three fundamental criteria:

- E-Learning is networked; which makes it capable of instant updating, storage / retrieval, distribution and sharing of instruction or information.
- It is delivered to the end user via a computer using a standard internet technology.
- It focuses on the broadest view of learning – learning solutions that go beyond the traditional paradigms of training.

In this context, we will consider E-learning as the use of new multimedia technologies and the internet to improve the quality of learning by facilitating access to resources and services as well as remote exchange and collaboration. E-learning is an umbrella that covers learning almost anytime, anywhere on a computer, connected to a network. E-learning isn't expected to replace the known conventional methods of training which is the classroom teaching; it is expected to create an augmented learning environment where technology is used to deliver a combination of teaching techniques and also aiming to maximize the participation and learning process of the individual.

Education is an important component of life because it equips us with all that is needed to make our dreams come true. One of the most promising paradigms for education is e-learning. It is commonly referred to the intentional use of networked information and communications technology (ICT) in teaching and learning. Some other terms are also used to describe this mode of teaching and learning including online learning, virtual learning, distributed learning, network and web-based learning. Since the last decade, there is a growing interest in e-learning from several directions. The growth of E-learning is directly related to the increasing access to ICT, as well as its decreasing cost. The capacity of ICT to support multimedia resource-based learning and teaching is also relevant to the growing interest in e-learning. Growing numbers of teachers are increasingly using ICT to support their teaching. Educational organizations see advantages in making their programs accessible via a range of distributed locations, including on campus, home and other community learning or resource centres. With ICT, the dream of learning anywhere and at anytime has become true. Gray Harriman (2010) states that there are different types of E-Learning resources:

- **Online Learning:** This is learning that takes place via the Web and may include text, graphics, animation, audio, video, discussion boards, e-mail, and testing. Online learning is typically "on demand" and self-directed but may include synchronous chat, web based teleconferencing (audio graphics), or similar technology.
- **Distance Learning:** This is learning that takes place when the instructor and the learner are not in the same physical location. It can also take place if the instructor and the learner are in the same location but not at the same time. Today distance learning is carried out via a number of media ranging from postal mail to teleconferencing or the Internet. "Distance Learning" (learner focus) and "distance education"

(instructor focus) are often used as interchangeable terms.

- **Blended Learning:** This combines online with face-to-face learning. The goal of blended learning is to provide the most efficient and effective instruction experience by combining delivery modalities. The term "blended learning" is used to describe a solution that combines several different delivery methods, such as collaboration software, Web-based courses, Electronic performance support systems (EPSS), and knowledge management practices. Blended learning also is used to describe learning that mixes various event based activities, including face-to-face classrooms, live E-Learning, and self-paced instruction.
- **M-Learning:** The term M-Learning or Mobile Learning refers to the use of handheld devices such as PDAs, mobile phones, laptops and any other handheld information technology device that can be used in teaching and learning.

We are all familiar with classroom-based learning which is face-to-face group learning led by an Instructor/Teacher. In E-learning environments, learners interact with learning materials, their instructors and other learners from various locations and often at various times using networked communication technology gadgets. So by its nature, E -learning offers significant flexibility as to when and how learning occurs. E-learning can include independent, facilitated, or collaborative approaches to learning. Independent learning refers to each individual learner completing learning activities or modules on their own, in their own environment, on their own schedule. The learner is independent of an instructor/teacher and the other learners. This does not mean that the learner does not have access to other resources such as an instructor/teacher, but the learner is in control of whether they contact them, when they contact them, and for what. E-learning intersects numerous fields of thought and practice such as training and education, learning and knowledge and technology. It is essentially the computer and network-enabled transfer of skills and knowledge, which include applications and processes such as Web-based learning, computer-based learning, virtual education opportunities and digital collaboration. E-learning can therefore be categorized into two main groups: synchronous and asynchronous. With synchronous e-learning, students can be involved in a course that meets online with the faculty member through streaming audio and video at a predetermined time. With asynchronous learning, a student can participate in the learning activities at the most suitable time for him or her but this also means that the faculty member will not be available for immediate replies.

SYNCHRONOUS E-LEARNING

Synchronous training is a real-time method of e-Learning with live interaction between the instructors and the students. It is called such because students have to log in at a specified time and the classes will be held for a specified period of time. Lessons can take the form of single sessions to several sessions over a few years. Synchronous training is the e-Learning method that is nearest to classroom-style learning as students can raise their 'electronic hands', view a common blackboard and interact with each other. Synchronized training sessions are usually held in AV conferencing media, websites or internet telephony media Synchronous learning comes to the rescue of students facing geographical barriers, by aiding face to face interactions with the instructor. It has been observed that most learners find it difficult to learn without real time conversation with either the instructor or peers. This interaction, combined with access to web based courseware, augments comprehension. But, an in-depth look at the process reveals that synchronous learning has only been able to remove the physical barriers without actually adding much value to the traditional classroom based training. It supports all the learning methods that conventional learning hails, only with an added advantage of a wider student base.

ASYNCHRONOUS E-LEARNING

Asynchronous learning is learning that takes place independent of time and space. Learners are able to interact with course materials and with each other at a time of their choice. A discussion thread is an example of an asynchronous learning. One learner can post a thought, and hours (or days) later, another learner can comment on the posting. Asynchronous learning gives E-learning much of its appeal. Traditionally, students needed to be physically present to engage in learning with other students. Now, learners can engage each other when it is most convenient and a knowledge trail of discussions is left. In synchronous learning, the discussion vanishes (unless it is recorded and indexed) but asynchronously, students that are trailing behind in course work still receive the benefit of being able to read discussion posts. Asynchronous learning frees E-learning from the requirements of time and space. This is perhaps the most revolutionary aspect of e-learning. Learners across different time zones and different continents can now participate in the same courses. Content can be explored and discussed in great depth -allowing learners the time to reflect and formulate thoughtful responses. Asynchronous tools like email and discussion forums have transformed how people communicate and share knowledge.

Asynchronous training may include computer-based training, using CD-ROMs and more frequently web-based training (in which a trainee logs into an online training system with a user name and password to begin an interactive course). The course can be easily updated, is accessible from anywhere and can be used with all kinds of computer systems. This type of training is most suitable to structured content-questions that have right and wrong answers. The content may vary according to circumstances. An example of structured content would be a series of steps to be followed in formatting a document in a particular computer program. The asynchronous environment is most appropriate for those who learn best by thinking about content on their own, and who can structure their time to accommodate instruction.

E-LEARNING TOOLS

Virtual Learning Environments/Learning Management Systems: These are web applications that run on a server and are accessed via a web browser (Internet Explorer, Firefox, Safari, etc.) They are designed to assist with the delivery and organization of courses. They often contain discussion forums, chat areas, areas for delivering content, tests, quizzes and grade books. Courses can be delivered entirely online but by and large, courses are ‘blended’; traditional lectures and seminars supported and enhanced by use of a Virtual Learning Environments.

Virtual Learning Environments generally have two ways of being viewed; as a student or as a teacher/instructor. The student view shows the courses the student is enrolled in and all the relevant material for those courses. The teacher/instructor view allows materials to be created, added and edited. Teachers/Instructors don’t need to know about web design in order to use a Virtual Learning Environments as they include all the features required in one relatively easy to use package.

Blackboard Learning Technology: This helps you make learning more effective in and beyond the traditional walls. Breathing life into educational content, bringing efficiency to day-to-day tasks, empowering instructors with tools to engage every learner, motivating them on the devices they rely on, promoting collaboration and streamlining processes.

Moodle is a course management system (CMS): A software package designed to help educators create quality online courses and manage learner outcomes. Moodle is Open Source software, which means you are free to download it, use it, modify it and even distribute it. Moodle has features that allow it to scale to very large deployments and hundreds of thousands of students. Many institutions use it as their platform to conduct fully online courses, while some use it simply to augment face-to-face courses (known as blended learning). It has been discovered that many of Moodle users love to use the activity modules (such as forums, databases and wikis) to build richly collaborative communities of learning around their subject matter (in the social constructionist tradition), while others prefer to use Moodle as a way to deliver content to students and assess learning using assignments or quizzes.

ADVANTAGES OF E-LEARNING

E-learning is beneficial to education, organizations and to all types of learners. It is affordable, saves time, and produces measurable results. E-learning is more cost effective than traditional learning because less time and money is spent travelling. Since e-learning can be done in any geographic location and there are no travel expenses, this type of learning is much less costly than doing learning at a traditional class room. Flexibility is a major benefit of e-learning. E-learning has the advantage of taking class anytime anywhere.

Education is available when and where it is needed. E-learning can be done at the office, at home, on the road, 24 hours a day, and seven days a week. . E-learning also has measurable assessments which can be created so that both the teachers and students will know what the students have learned, when they've completed courses, and how they have performed. E-learning accommodates different types of learning styles. Students have the advantage of learning at their own pace. Students can also learn through a variety of activities that apply to the many different learning styles available. Learners can fit E-learning into their busy schedule. If they hold a job, they can still be working with e-learning. If the learner needs to do the learning at night, the option is available. Learners can sit in their home and do the learning if they so desire. E-learning encourages students to peruse through information by using hyperlinks and sites on the worldwide Web. Students are able to find information relevant to their personal situations and interest.

E-learning allows students to select learning materials that meet their level of knowledge, interest and what they need to know to perform more effectively in an activity. E-learning is more focused on the learner and it is more interesting for the learner because it is information that they want to learn. E-learning is flexible and can be customized to meet the individual needs of the learners'; learning helps students develop knowledge of the Internet. This knowledge will help learners throughout their careers.

E-learning encourages students to take personal responsibility for their own learning. When learners succeed, it builds self-knowledge and self-confidence in them. Educators and Universities really benefit from E-learning. Students enjoy having the opportunity to learn at their own pace, on their own time, and have it less costly.

PROBLEMS OF E-LEARNING

For the student, several disadvantages exist in the virtual classroom. According to Burbles (2004) there are "hidden barriers to access" of a virtual classroom to students; there are limitations to making an online course accessible to all. Some communication tools may not suit some students; for example, the streaming of audio cannot be heard by a hearing impaired student and thus this tool is not accessible to all. Another disadvantage of the virtual classroom is that it can only be successful if the communication tools used in the classroom are "in the student's possession, accessible to the student (and) operable by the student" (Lehmann, 2004). Although synchronous communication tools are usually perceived as an advantage because of their similarity to communication in the traditional classroom, they can also be a disadvantage. This is because they consist of real-time, text-based communication in which responses are often "out of sequence" as a consequence of varying typing abilities among students (Fetterman, D., 1998). Students must have adequate typing skills and communication skills as the majority of learning is text-based and self-paced, and if they are used to being in a structured, scheduled environment, they will be disadvantaged and most likely get confused and fall behind.

Teachers are not as readily available in the virtual classroom as they are in the traditional classroom, therefore students who usually need continual support of the teacher may feel isolated. The fact that there are technological requirements to enable full participation in the virtual classroom is also another disadvantage to students. For example, if the student does not have a high bandwidth and adequate computer memory needed to access the internet and hence the virtual classroom as well as download course material, they will be disadvantaged. Also, the technological dependence of the virtual classroom can be a disadvantage if there is an internet connection failure or a similar technological problem that prevents students to complete a task. If there is no "back up plan" in the case of a technological hindrance, students will miss out on the learning activity that was scheduled.

Difficulties with software: The disadvantage of E-learning is the managing of computer files, software compatibility and learning new software, including e-Learning. For learners with beginner-level computer skills, it can sometimes seem complex to keep their computer files organized. The lesson points you to download a file which the learner does and later he or she may not find the file. The file is downloaded to the folder the computer automatically opens to, rather than a folder chosen by the learner. This file may be lost or misplaced to the learner without good computer organizational skills. In our institution, the students have the requisite level of working with the computers and the software platform, which they acquire in a first course in the discipline of Informatics.

High motivation: E-Learning also requires time to complete especially those with assignments and interactive collaborations. This means that students have to be highly motivated and responsible because all the work they do is on their own. Learners with low motivation may not complete modules.

Isolation: Another disadvantage of E-learning is that students may feel isolated and unsupported while learning. Instructions are not always available to help the learner so learners need to have discipline to work independently without assistance. E-Learners may also become bored with no interaction. It needs to be stressed that blended learning is not just a mixture of strategies and technologies, but a holistic didactical method that combines "the effectiveness and socialization opportunities of the classroom with the technologically enhanced active learning possibilities of the online environment, rather than ratio of delivery modalities" (Dziuban, Hartman, Moskal, 2004). By applying blended learning, we overcome some proven disadvantages for both form of education - distance e-learning and traditional class room learning. All collaborative learning theory contends that human interaction is a vital ingredient to learning. Consideration of this is particularly crucial when designing e-learning, realizing the potential for the medium to isolate learners. With well-delivered synchronous distance education, and technology like message boards, chats, e-mail, and tele-conferencing, this potential drawback is reduced.

However, E-learning detractors still argue that the magical classroom bond between teacher and student, and among the students themselves, cannot be replicated through communications technology. Kruse (2004) outlined the following ways in which e-learning may not excel over other methods of training:

- Technology issues of the learners are most commonly technophobia and unavailability of required technologies.
- Portability of training has become strength of e-learning with the proliferation of network linking points, notebook computers, PDAs, and mobile phones, but still does not rival that of printed workbooks or reference material.
- Reduced social and cultural interaction can be a drawback. The impersonality, suppression of communication mechanisms such as body language, and elimination of peer-to-peer learning that are part of this potential disadvantage are lessening with advances in communications technologies.

CONTEMPORARY TRENDS IN E-LEARNING AND WHAT IT AFFORDS

The growing interest in e-learning seems to be coming from several directions. These include Educational institutions that have traditionally offered distance education programs either in a single, dual setting. They see the incorporation of online learning in their repertoire as a logical extension of their distance education activities.

The growth of e-learning is directly related to the increasing access to information and communications technology, as well as its decreasing cost. The capacity of information and communications technology to support multimedia resource-based learning and teaching is also relevant to the growing interest in e-learning. Growing numbers of teachers are increasingly using information and communications technology to support their teaching. The contemporary student population (often called the "Net Generation", or "Millennials") who have grown up using information and communications technology also expect to see it being used in their educational experiences (Brown, J. S., Collins, A., & Duguid, P. (2005).).

A key attribute of information and communications technology is its ability to enable flexible access to information and resources. Flexible access refers to access and use of information and resources at a time, place and pace that are suitable and convenient to individual learners rather than the teacher and/or the educational institution. Access to information and communication technologies offers a range of possibilities for capturing and delivering all types of subject matter content to learners and teachers in distributed educational settings. This means access to subject matter content and learning resources via networked information and communications technologies across a range of settings such as conventional classrooms, workplaces, homes, and various forms of community centers (Dede, 2000).

Contemporary educational institutions, including conventional distance education providers, often pride themselves in being able to meet the learning needs of their students and staff at a time, place and pace that are most convenient to them. They have been able to do this with the help of information and communications technologies which afford learners access to up-to- date information as and when they need them, and also the opportunity to discuss this information with their peers and teachers at their convenience. This is becoming increasingly affordable and palatable with a wide range of software applications and computer conferencing technologies for collaborative inquiry among students and asynchronous discussion. These applications enable learners and teachers to engage in synchronous as well as asynchronous interaction across space, time, and pace.

CONCEPT OF LIBRARIAN WITHOUT BUILDING

The concept of Librarian without building is not new in the 21st century libraries. The dawn of this century witnessed a dramatic change in the information profession. The beginning of this century witnessed revolution in the library environment. The concept of digital, virtual, electronic, library, library without wall/building and so on, had made it important for librarians to be in charge of these libraries. Hence we now have the concept digital librarian, virtual librarian, electronic librarian, librarian without wall or building and so on.

Libraries are changing from traditional librarianship with books, journals, catalogue cabinet with cards, shelves loaded with books to E-libraries with e-books and e-journals, OPAC database and so on. So also librarians are changing and adding more value from traditional librarianship to E-librarianship/librarian without building. With the advent of new fields of study and the emergence of virtual learning (E- Learning), there are additional demands for libraries and librarians. Faculty scholarship and student's learning will suffer in an e-learning environment without e-learning librarian (Digital Librarian/ virtual librarian/ Librarian without building).

All over the world, E-learning has become integral feature of higher education, and no educational system can succeed without library; it is always said that library is the heart of any institution. Therefore for an E-learning system to survive, there must be functional E- library and for any E- library to function, there must be an E- librarian (Librarian without building) manning it. Rowley (1998) cited Oppenheim (1997) who described library without building as an organized and managed collection of information in a variety of media in digital format. The materials are organized and managed for the benefit of actual and potential user population. Trolley (1995) posits that library without building or electronic library is the vision of librarians, publishers, technology experts and researchers on how users can have access to information anytime anywhere.

Pujar and Kamat (2009) explained that E-Librarians support access to crucial resources in an E- learning environment. The E- Librarian organizes online tools to provide metadata for online materials for the E- learners, and E-teachers in the following areas: E- resources, content management, Digital library/ Institutional Repository, Courseware, Digital/ Virtual Reference Services, Electronic Discussion Forums, and so on. Librarian can provide access to various services to the E-Learners and E- teachers in an E-learning environment. E-Librarians make access and use of e-resources easier and faster because of the traditional skills which the librarian had acquired. Such skills include ability to select, acquire, organize, disseminate and preserve the right information materials for the right user. Livonen (2005) opined that the E-librarian makes easy and fast access to electronic resources for E-Learning environment.

Gunn (2002) explained that E-libraries are designed to support the information needs of their communities (E-learners and teachers). They offer resources from many sources and in many formats to the E-learners and E-teachers. They make information resources available to the users anytime and anywhere there is an internet Connection. Nfila,(2013) opines that Digital Librarian/ E-librarian is also linked to e-learning; they provide technology based information and services to enable the E- teachers and E-learners to access relevant information and services anywhere, anytime as well as provide empowerment for innovative and lifelong teaching and learning . This enables the e- learners and e- teachers to undertake learning and research at their convenient.

CHARACTERISTICS AND SKILLS OF LIBRARIAN WITHOUT BUILDING IN AN E- LEARNING ENVIRONMENT

E- Learning as earlier defined is a process of using technology to deliver learning and training programme. Such technology includes computers, internet, intranet, wireless, CD-ROM and so on. It implies web-based learning, computer based learning, virtual learning, virtual classroom. It is the delivery of content via internet, intranet/extranet (LAN/WAN). It implies any learning that utilizes a network (LAN/WAN) for delivery, interaction and facilitation. In order for the virtual Librarian (V L) or Librarian without building (LWB) to assist patrons in making the most of innovations in an e-learning environment, he or she keep one step or more ahead in the knowledge and uses of online materials.

The librarian without building in an e-learning environment must have some understanding of the operation of personal computer (PC), this will help him to cope in a situation where there are technical problems while in the middle of reference or research project, librarian without building must have understanding on how to troubleshoot and also how to solve the most common and occurring problems. He must have knowledge of the working of a PC, such as PC repair, hardware and software installation and maintenance. He must also have understanding of computer networking. The bottom line is that the virtual librarian or librarian without building must be multi-skilled. Traditional librarianship skills are needed, technical skills are needed, managerial skills are also needed if he she must succeed in an e-learning environment and in this information age. The librarian without building must have all the knowledge and skills required to practice as a professional librarian; in addition, he must have knowledge of HTML/XML, library software and applications, license and contract negotiation, knowledge of electronic academic publishing, knowledge of copyright, knowledge of TCP/IP, Z39.50, Library 2.0, catalogue 2.0.

He must have the drive to learn and continue learning. Clearly he will be facing a career that is full of challenges and surprises. The combination of all these skills which are very necessary in the running of a virtual Library is what will determine the success or failure of the Virtual Librarian. These skills will help the Virtual Librarian or librarian without building in an e-learning environment to enjoy a long and rewarding career. Librarians that will manage the library without building must be very educated, experienced, intelligent and resourceful. Somvir, (2010) is of the view that librarians in the 21st century must train and retrain themselves and should stop having in mind that their employer has the full responsibility of training and retraining them. They must keep on updating their knowledge and skills in order to meet up with the challenges of the E learning environment. These librarians are technology application leaders who work with other members of the information management team to make information accessible to users. Hashim and Mokhtar (2012) explained that librarian without building in the 21st century libraries in an E- learning environment are knowledge based practitioners who use research as a foundation for their own professional practice.

CARL(2010) listed the following as the competences that is required of the librarian that will manage the 21st century libraries .

- Expert knowledge of the content of information resources.
- Excellent instruction and support for library and information service users.
- Appropriate information technology to acquire, organize and disseminate information.
- Skills to evaluate the outcome of information use and conduct research related to the solution of information management problems.
- Effective communication skills.

These librarians are also expected to be engaged in the exploration and implementation of new technologies needed to match with the present patrons, most of whom have become technologically savvy in the use of ICT. They must possess high level of information literacy skills, as well as knowledge of the principles and techniques of effective reference services. Librarians without building in an E- learning environment must be knowledgeable in integrated library system (ILS) web technologies such as web 2.0, twitter, face book, my space, OPAC 2.0 etc. They must also have knowledge of data management.

A librarian without building that will function in an E- Learning environment must function as a dynamic filter, who filters and take up the role of balancing the information need and use of the E- learners. Therefore, librarian without building must embrace continuous learning, not only of technology but also new ways of providing effective and efficient services to the E- Learners and E- Teachers. Such librarians must contextualized the library where he/she work and the type of work that needs to be done. (Chu, Felix T. 2003)

STATEMENT OF THE PROBLEM

The advent of ICTs in Education that led to the Introduction of E-learning, E-teaching and E-Education has brought on board the concept of E-Library, E-Librarians or Library without building. This is because education and libraries are always together; no education system can achieve its aims and objectives without libraries as partners. This is because libraries are the heart of the education systems; they provide information resources that support the teaching and learning process and they provide the resources that support the instruction curriculum. The problem now is that, with the introduction of ICTs in education, teaching and Libraries, there are additional tasks that are required from the librarians without building in order for them to function in an e-learning environment. Then, what are the skills and knowledge that will be required from them and how can they acquire the needed skills and knowledge to support the E-learning system, these are some of the problems this chapter attempts to address.

Research Questions.

Is there need for E-librarian without building in an E-Learning Environment?

1. What are the needed skills by Librarian without building in an E-Learning environment?
2. What are the challenges of librarian without building in an E-Learning environment?
3. What are the solutions to the challenges of Librarian without building in an E-Learning environment?

METHODOLOGY

Survey research design was used for this study. Questionnaire was the instrument for data collection; the questionnaire was designed and administered to 138 librarians in Nigerian academic libraries. Random sampling method was used and 23 questionnaires were administered in each of the six geo-political zones in Nigeria (University libraries, Polytechnic Libraries and Colleges of education libraries). Out of the 138 questionnaires administered, 127 was returned and found useable and were used for data analysis and this represents 92.0% response rate. The data were analyzed using frequency, percentages and tables methods.

Table 1 shows the different institutions which the respondents are affiliated to. From the above table, it can be deduced that 69 respondents representing 54.3% are from universities, 35 respondents representing 27.6% are from polytechnics, while 23 respondents representing 18.1% are from colleges of education.

Table 2 above shows the respondents responses as to whether their institutions offer E-Learning.

From the table, the data reveals that 127 (100%) that is all the respondents agreed that their institution offer E-Learning.

The Table 3 above provides information as to whether or not the institutions under study have E- Libraries for their E- Learners. From the data in the table above, it can be summarized that all the institutions investigated for this research work had E- Library for their learners as all the respondents 127 (100%) responded in the affirmative.

Table 4 above shows the respondents opinion as to whether there is need for E- Librarian in an E- Learning environment. The results shows that 118 (92.9%) of the respondents strongly agree that there is need for E- Librarian in an E- Learning environment, in the same way, 9 (07.1%) of the respondents also agree with the assertion that there is need for E- Librarian in an E- Learning environment. It is interesting to know that no respondent disagree with the statement.

Table 5 above summarized the respondents view regarding the skills needed by librarian without building in an E- Learning environment. 127 (100%), that is, all the respondents agreed that high computer knowledge and skills are needed for a librarian to function in an E- Learning environment, in the same way, 123 (96.7%) of the respondents posit that knowledge of various data bases is required for the librarian to function in an E- Learning environment. Also, all the respondents 127 (100%) are of the view that for any librarian to function in an E- Learning environment, the librarian must be multi- skilled, that is, he or she must have various skills. More also, 127 (100%), all the respondents believed that for a librarian to function in an E-Learning environment, such a librarian must be highly intelligent. 96 (75.6%) of the respondents are of the opinion that ability to learn very fast is another skill that is required by a librarian to function in an E- Learning environment. In the same way, 83 (65.4%) of the respondents stated that good communication skill is essential for librarian in an E-Learning environment. In relation to evaluation skill, all the respondents 127 (100%) agreed that evaluation skill is need for any librarian to function in an E- Learning environment. While 122 (96.1%) of the respondents are of the opinion that ability to teach others is a requirement for a librarian in an E- Learning environment.

Table 6 above reveals the challenges that librarian without building in an E- learning environment faces. 118 (92.9%) of the respondents stated that technical and administrative issues are parts of the challenges that librarian without building faces. 122 (96.1%) of the respondents are of the view that finance is a major challenge that librarian without building faces, 114 (89.8%) agreed that adapting to change is a serious challenge faced by librarian without building in an E- Learning environment. All the respondents 127 (100%) are of the opinion

Table 1. Affiliation of respondents

Affiliation of Respondents	Frequency	Percentage
University	69	54.3%
Polytechnic	35	27.6%
College of Education	23	18.1%
Total	127	100%

Table 2. Does your institution offer e-learning

Does Your Institution Offer E-Learning	Frequency	Percentage
Yes	127	100%
No	Nil	Nil
Total	127	100%

Table 3. Does your institution have e- library for e- learners

Does your Institution have E- Library for E- Learners	Frequency	Percentage
Yes	127	100%
No	Nil	Nil
Total	127	100%

Table 4. There is need for e- librarian in an e- learning environment?

There is Need for E-Librarian in an E- Learning Environment?	Frequency	Percentage
Strongly Agree	118	92.9%
Agree	9	07.1%
Un- Decided	Nil	Nil
Disagree	Nil	Nil
Strongly Disagree	Nil	Nil
Total	127	100%

Table 5. Skills needed by librarian without building to functions in an e- learning environment

Skills Needed by E-Librarian to Functions in an E-Learning Environment	Frequency	Percentage
High Computer Knowledge and Skills	127	100%
Knowledge of various Databases	123	96.7%
Multi Skilled	127	100%
Highly Intelligent	127	100%
Ability to learn very fast	96	75.6%
Good communication skills	83	65.4%
Evaluation skills	127	100%
Ability to teach others	122	96.1%

that capacity building is a major challenge facing librarian without building; also, 124 (97.6%) of the respondents believe that bottlenecks from vendors are parts of the challenges that librarian without building faces. While all the respondents again 127 (100%) agreed that the issue of copyright is a serious challenge to librarian without building in an E- Learning environment.

Table 7 above presented the possible solution to the challenges to librarian without building in an E- learning environment. 124 (97.6%) of the respondents suggested that the parent institutions should support the library in all aspects. Also, 127 (100%), that is all the respondents suggested that adequate financial support should be given to the librarian without building in an E- Learning environment. In the same way, all the respondents 127 (100%) are of the view that capacity building in terms of training and retraining of the librarian without building is another way of achieving the goal of librarian without building in an E- Learning environment. 121 (95.3%) of the respondents suggested that the various institutions should have their policies on copyright. Also, 127 (100%), that is all the respondents suggested that librarian without building in an E- Learning environment should be ready to learn, continue learning and willing to teach others.

DISCUSSION OF FINDINGS

This study revealed that all the institutions that participated in this survey provide E- Learning platforms and the different institutions have different names for the programme, such as dis-

Table 6. Challenges of librarian without building in an e- learning environment

Challenges of Librarian without building in an E- Learning Environment	Frequency	Percentage
Technical and administrative issues	118	92.9%
Financial Challenges	122	96.1%
Adapting to Change	114	89.8%
Capacity Building	127	100%
Vendors issues	124	97.6%
Copyright issues	127	100%

Table 7. Solutions to the challenges

: Solutions to the challenges	Frequency	Percentage
Institution management should support the library	124	97.6%
Adequate finance should be release for E-Library development	127	100%
Adequate capacity building for Librarian without building	127	100%
There should be institutional policies on copyright	121	95.3%
Librarian Without Building should be ready to learn and teach others	127	100%

tance learning, open learning, Open University, distance education, continue education and so on. The research work also found out that all the institutions that were involved in this research work have E- Libraries for their E- Learners. It is interesting to know that 118 (92.9%) of the respondents strongly agreed that there is need for E- Librarian in an E- Learning environment. The study also discovered that for E- Librarian to function in an E- Learning environment there is need for such librarian to build up skills and knowledge. The required skill and knowledge include high computer literacy. The E- librarian must not be computer phobic; he/she must have high knowledge of various data bases and their functionalities.

The E- librarian must be multi- skilled. He must possess the ability to do different tasks. He/she must be highly intelligent and must be above average intelligence. He/she must be able to learn very fast and teach others as well. Such a librarian must have good communication skills and must be knowledgeable in evaluation of information resources and services. The study also discovered that there are some challenges that the E- Librarian faces such as administrative and technical challenges, financial challenge, change challenge, capacity building, copyright and vendors' challenges. The study also proffered solutions to the challenges - there should be institutional support for the development of E- Library, capacity building should be intensified for E- Librarian, there should be institutional policies on copyright, E- Librarian (Librarian without building) should be ready to go the extra mile to learn and also teach others.

RECOMMENDATIONS

Information and communication Technologies have changed the educational system for better, and these changes had also imparted the library because libraries are always associated with education and development. It is therefore recommended that librarians should strive to acquire more knowledge and skills so as to stand the changing nature of their job. It is also recommended that government agencies that accredit programmes at tertiary institutions should make sure that any institution that offers E- learning must also have well organized E- library and a well trained E- librarian must be employed to manage the E- library.

This chapter also recommends that librarians should try as much as possible to attend conferences and workshops both locally and internationally, where they can acquire these new skills and knowledge that are required of them to function effectively in an E- learning environment. Training should also be organized for librarians by the various professional bodies. In most countries there are professional associations and bodies that train and equip members with necessary skills. In Nigeria for example, the Nigeria Library Association and the Librarian Registration Council of Nigeria should take it as a point of duty to organized training for librarians at a subsidized cost. At the international scene, the West Africa Library Associations (WALA), the International Federation of Library Associations (IFLA) and many others should also do same to equipped librarians for the task ahead. The study also recommends that there should be institutional support for the development of E- Library; capacity building should be intensified for E- Librarians and the parent institutions should try as much as possible to bear the cost of training, so that they can catch up with the advancements in technology. There should be institutional policies on copyright.

The E- Librarian (Librarian without building) should be ready to go extra mile to learn and also teach others. They should not rely solely on the institution to train them because E- Librarians in this age must be competent enough to handle challenges of the E-Learning Environment.

FUTURE RESEARCH DIRECTIONS

The authors recommends that further research should be carried out to investigate the relationship between E- Librarian, (librarian without building), E- Teacher and the E- Learners in an E- Learning environment. This has become important because the three actors (E- Librarian, E- Teacher, and the E- Learners) are the major components of E- Learning. The success or failure of the E-Learning system depends to a very great extent on the cordial relationship between them. Also, it is recommended that another study should be carried out to investigate the choice of librarian as regards working as a professional librarian in a traditional library system or working as an E-librarian in an E- Learning environment and the study should find out the reasons librarians prefer working as professionals in a traditional library system or as an E – Librarian in an E- Learning environment.

CONCLUSION

The introduction of Information and Communication Technologies (ICTs) in education has brought on board new methods of teaching and learning. These new method of teaching and learning has also brought on board new library, new librarian, and new roles for the librarian. Therefore, the librarian without building in this new learning environment must acquire new skills required to fit into the changing world of modern day educational system. E- learning as a learning platform has empowered so many individuals, organizations, as well as nations at one point or the other. E- Library and E- librarian or library without building must be recognized and empowered as part of the learning process because the success of any E- learner greatly depends on the E- teachers, E- libraries and the E- librarians or the librarians without building in an E- Learning environment must strive at all cost to acquire new knowledge and skills they must not rely soly on their parent organizations such training and retraining, and must continue to upgrade that knowledge and skills through capacity building, through seminars and work shop, through short and long term training in order to remain relevant in this present digital age.

There is hope for librarian without building in an E-learning environment; if they can develop themselves and know how to fly their onions, this is true because E-learning cannot function effective without E-library and E-Librarians (Librarian without building) in charge of the library just as the traditional educational system cannot survive without library attached to the institution to support the teaching, learning and Research process of their parent organization.

REFERENCES

Allen, M. W. (2013). Learning circuits. Retrieved from http://www.astd.org/LC/2004/0704_allen.htm

Brown, J. S., Collins, A., & Duguid, P. (2005, January-February). Situated cognition and the culture of learning. *Educational Researcher*, 32–42.

Burbles, N. C. (2004). Navigating the advantages and disadvantages of online pedagogy. In *Learning, Culture and Community in Online Education: Research and Practice*. New York: Peter Lang Publishing.

Canadian Association of Research Libraries. (2010). Core competencies for 21st century CARL librarians. Retrieved from www.carl-abrc.ca

Chu, F. T. (2003). The future of librarianship. In *Expectations of librarians in the 21st century*. Westport, CT: Greenwood Press.

Clark, R. C., & Mayer, R. E. (2003). *E-learning and the science of instruction*. San Francisco: Jossey-Bass.

Dede, C. (2000). Emerging technologies and distributed learning in higher education. In D. Hanna (Ed.), *Higher education in an era of digital competition: Choices and challenges*. New York: Atwood.

Dringus, L. P., & Cohen, M. S. (2005). An adaptable usability heuristic checklist for online courses. Paper presented at the 35th Annual FIE ‘05. New York, NY.

Dziuban, C. D., Hartman, J. L., & Moskal, P. D. (2004), Blended learning. ECAR Research Bulletin, 7.

Fetterman, D. (1998). Virtual classroom at Stanford University. Retrieved on April 3, 2013 from http://www.stanford.edu/~davidf/virtual.html

Gray Harriman Ltd. (2010). E-learning resources. Retrieved from http://www.grayharriman.com/index.htm

Gunn, H. (2002). Virtual libraries supporting student learning. *School Libraries Worldwide*, *18*(2), 27–37.

Hashim, L., & Mokhtar, W. H. (2012). Preparing new era librarians and information professionals: Trends and issues. *International Journal of Humanities and Social Science*, *2*(7), 151–156.

Kruse, K. (2004). Learning guru. Retrieved from http://www.e-learningguru.com/articles/art1_3.htm

Lehmann, K. J. (2004). Successful online communication. In K. J. Lehmann (Ed.), *How to be a Great Online Teacher*. New York: Scarecrow Education.

Livonen, M. (2005). University Libraries as a gateway to e-learning. Paper presented at International Conference of Information and communication Society. Tallinn, Estonia.

Nichols, M. (2003). A theory of e-learning. *Journal of Educational Technology & Society*, *6*(2), 1–10.

Peljar, S. M., & Kamat, R. K. (2009). Libraries a key to harness e-learning: Issues and perspective. *DESIDOC Journal of Library & Information Technology*, *29*(1), 23–30.

Rosenberg, M. J. (2001). *E-learning*. New York: McGraw-Hill.

Somvir, A. (2010). Role of librarian in the 21st century. Retrieved from http://www.scribd.com/doc/34056683/Role-of-librarians-in-the-21st-century

Tavangarian, D., Leypold, M. E., Nölting, K., Röser, M., & Voigt, D. (2004). Is e-learning the solution for individual learning?. Electronic Journal of e-Learning, 2(2), 273-280.

Triacca, L., Bolchini, D., Botturi, L., & Inversini, A. (2004). Mile: Systematic usability evaluation for e-learning web applications. *AACE Journal*, *12*(4).

ADDITIONAL READING

Abdul, H. A. (2002). e-learning Is it the e or the Learning that matters? *The Internet and Higher Education*, *4*, 2002.

Abdulwahab, O. (Ed.). library and information science in developing countries Contemporary issues. United states, Information Science Reference (an imprint of IGI Global)

Alexander, S. (2001). E-learning developments and experiences. *Education + Training*, *43*(4/5), 240–248. doi:10.1108/00400910110399247

Alexander, S., & Golja, T. (2007). Using students' experiences to derive quality in an e-Learning system: An institution's perspective. *Journal of Educational Technology & Society*, *10*(2), 17–33.

Armitage, s., O'Leary, R. (2003) A good guide for learning technologists (eLearning series No.4: Learning and Teaching support Network Generic centre. Bates, A. (2005) Technology, e-Learning and Distance Education London: Routledge

Boff, C., & Singer, C. (2003). Academic reference librarians in the 21st Century. In BridgeKarl (Ed.). Expectations of librarians in the 21st century, Westport, Greenwood press.

Botha, M. (2004). The information deprived continent: can we do something? In Brophy, Peter, Fisher, Shelagh & Craven, Jenny (Ed.). libraries without walls: the distributed delivery of library and information services. Proceeding of an international conference held on 19 – 23 September 2003, organized by the centre for research in library and information management (CERLIM), Manchester Metropolitan University. London, Facet Publishing.

Brophy, P., Fisher, S., & Craven, J. (Eds.). (2004). Libraries without walls 5: the distributed delivery of library and information services. Proceeding of an international conference held on 19 – 23 September 2003, organized by the centre for research in library and information management (CERLIM), Manchester Metropolitan University. London, Facet Publishing.

Carliner, S. (2004). *An overview of online learning* (2nd ed.). Armherst, MA: Human.

Carpenter, J., & Wallis, M. (2004). Research resources and the academic researchers. In Brophy, Peter, Fisher, Shelagh & Craven, Jenny (Ed.). Libraries without walls: the distributed delivery of library and information services. Proceeding of an international conference held on 19 – 23 September 2003, organized by the centre for research in library and information management (CERLIM), Manchester Metropolitan University. London, Facet Publishing.

Clark, R. C., & Mayer, R. E. (2003). e-learning and the science of instruction. San

Collis, B., & Moonen, J. (2001). Flexible learning in a digital world. London. Kogan Page. JISC e-Learning Models Desk Study Terry Mayes & Sara de Freitas 39 of 43 Issue 1

Collis, B., Peters, O., & Pals, N. (2000). 'A Model for Predicting the Educational Use of Information and Communication Technologies'. *Instructional Science*, *29*, 95–125. doi:10.1023/A:1003937401428

Cynthia, A. (2003). The more things change: what is a librarian today? In B. Karl (Ed.), *Expectations of librarians in the 21st century*. Westport: Greenwood press.

David Stanley, H. (2003). The 21st century librarian in Bridges Karl (Ed.). Expectations of librarians in the 21st century, Westport, Greenwood press. education. New York: Peter Lang.

Ehlers, U. (2004). Quality in e-learning. The learner as a key quality assurance category. *European Journal of Vocational Training*, *29*, 3–15.

English, L. O. (2003). New librarians in the 21st century: The normalization of change in Bridges Karl (Ed.). Expectations of librarians in the 21st century, Westport, Greenwood press.

Francisco: Jossey-Bass.

Goodyear, P. (2002). Psychological Foundations for Networked Learning. In C. Steeples & C. Jones (Eds.), *Networked Learning: Perspectives and Issues*. London: Springer-Verlag. doi:10.1007/978-1-4471-0181-9_4

Hanson, T., & Day, J. (Eds.). (1996). *Managing the Electronic library: A practical guide for information professionals*. London: Bowker Saur.

Hopkinson, A. (2012). Establishing the digital library: Don't ignore the library standards and don't forget the training needed. In *Tella*. Adeyinka and Issa.

Johnson, R. D., Hornik, S., & Salas, E. (2008). An empirical examination of factors contributing to the creation of successful e-learning environments. *International Journal of Human-Computer Studies*, *66*, 356–369. doi:10.1016/j.ijhcs.2007.11.003

Kasperek, S. (2003). Technology skills in libraries if the 21st century in Bridges Karl (Ed.). Expectations of librarians in the 21st century, Westport, Greenwood press.

Kearsley, G. (Ed.). (2005). *Online learning: Personal reflections on the transformation of education*. NJ: Educational Technology Publications.

Kolawole, O. O. (2004). Overcoming barriers to library use by Nigerian professionals. In Brophy, Peter, Fisher, Shelagh & Craven, Jenny (Ed.). libraries without walls: the distributed delivery of library and information services. Proceeding of an international conference held on 19 – 23 September 2003, organized by the centre for research in library and information management (CERLIM), Manchester Metropolitan University. London, Facet Publishing.

Lesk, M. (2005). *Understanding Digital Libraries* (2nd ed.). Amsterdam: Elsevier.

Lomex, E. L. (2003). Electronic resources librarians in the 21st century. In B. Karl (Ed.), *Expectations of librarians in the 21st century*. Westport: Greenwood press.

Martin, A., & Madigan, D. (Eds.). (2006). *Digital Literacy for learning*. London: Facet Publishing.

McCown, R., Driscoll, M., & Roop, P. (1996). *Educational psychology. A learning-centered approach to class-room practice* (2nd ed.). Boston: Allyn and Bacon.

Moreno, R., & Mayer, R. E. (2002). Learning science in virtual reality multimedia environments: Role of methods and media. *Journal of Educational Psychology*, *94*, 598–610.

Morris, A., & Cox, A. (2004). Librarians in digital communities of practice. In P. Brophy, S. Fisher, & J. Craven (Eds.), *Libraries without walls: The distributed delivery of library and information services*. London: Facet Publishing.

Mutual, S. M. (2012). Demystifying digital scholarship. In A. Tella & A. O. Issa (Eds.), *library and information science in developing countries: Contemporary issues*. United states: Information Science Reference (an imprint of IGI Global).

Naidu, S. (2002). Designing and evaluating instruction for e-learning. In P. L. Rodgers (Ed.), *Designing Instruction for Technology-Enhanced Learning* (pp. 134–159). Hershey, PA: Idea Group Publishing.

Narciss, S., Proske, A., & Körndle, H. (2007). Promoting self-regulated learning in web-based learning environments. *Computers in Human Behavior*, *23*, 1126–1144. doi:10.1016/j.chb.2006.10.006

Obe, S. P., & Griffiths, P. (2002). *Creating a successful e- information services*. London: Facet Publishing.

Paechter, M., & Schweizer, K. (2006). Learning and motivation with virtual tutors. Does it matter if the tutor is visible on the net? In M. Pivec (Ed.), *Affective and emotional aspects of human–computer-interaction: Emphasis on game-based and innovative learning approaches* (pp. 155–164). Amsterdam: IOS Press.

Parker- Gibson. Necia (2003). Qualities of a 21st century librarian. In Bridges Karl (ed.). Expectations of librarians in the 21st century, Westport, Greenwood press.

Resource Development Press.

Richardson, J. C., & Swan, K. (2003). Examining social presence in online courses in relation to students' perceived learning and satisfaction. *Journal of Asynchronous Learning Networks*, *7*(1), 68–88.

Role of method and media. Journal of Educational Psychology, 94

Rosenberg, M. J. (2001). e-Learning. New York: McGraw-Hill.

Ross, S. (2003). The future of librarianship. In B. Karl (Ed.), *Expectations of librarians in the 21st century*. Westport: Greenwood press.

Rowley, J. (2004). The Electronic Libraries: fourth Ed. of computers for libraries.London, Facet Publishing.

Seale, J. (2006). *Disability and e-leaning in higher education: Accessiblity theory and practice*. Oxford, United kingdom: Routledge.

Selim, H. M. (2007). Critical success factors for e-learning acceptance. Confirmatory factor models. *Computers & Education*, *49*, 396–413. doi:10.1016/j.compedu.2005.09.004

Shank, R. (1997). *Virtual Learning*. New York: McGraw-Hill.

Shee, D. Y., & Wang, Y. S. (2008). Multi-criteria evaluation of the web-based e learning system: A methodology based on learner satisfaction and its applications. *Computers & Education*, *50*, 894–905. doi:10.1016/j.compedu.2006.09.005

Shotsberger, P. G. (2000). The human touch: Synchronous communication in web-based learning. *Educational Technology*, *40*(1).

Swan, K. (2001). Virtual interaction: Design factors affecting student satisfaction and perceived learning in asynchronous online courses. *Distance Education*, *22*(2). doi:10.1080/0158791010220208

Theng, Yin-Leng, Foo, Schubert, Goh, Dion & Na, Jin- Cheon (2009). Hand book of research on digital libraries: Design, development And impact. Hershey, Information science reference.

Training (pp. 33-50). Englewood Cliffs, NJ: Educational Technology Publications.

Uwaje, Chris (2010). E- Knowledge- Time is running out. Abuja, connect technology limited.

Wagner, E. D. (2001). *Emerging learning trends and the world wide web*. Web-based.

Wang, Y. S. (2003). Assessment of learner satisfaction with asynchronous electronic learning systems. *Information & Management*, *41*, 75–86. doi:10.1016/S0378-7206(03)00028-4

Wilen-Daugenti, T. (2009)..edu — Technology and learning environments in higher

KEY TERMS AND DEFINITIONS

21st Century Librarian: 21st century librarians refer to those librarians that provide services to both face and faceless patrons. Their services enable the users to access the present day virtual libraries without necessarily coming in contact with the librarians. The 21st century Librarians makes use of technologies in performing their day to day duties.

21st Century Libraries: the 21st century library is a collection of units of document in both prints and digital the resources are spread everywhere, accessible always, anytime and anywhere with the aid of Information and Communication Technologies. It is a type of library where individuals and groups such as authors, publishers, vendors and readers are linked through hyperlink technology across the global electronic network to relate in different ways.

Academic Libraries: These are libraries that are established in institutions of higher learning, such as Universities, Polytechnics and colleges of Education. They are to such the curriculum of their parent organization, in terms of teaching learning and research activities of their parent organization.

E-Learners: A student that uses e-learning to gain education.

E-Learning: Web-based training (WBT), also known as elearning and on-line learning, is training that resides on a server or host computer that is connected to the World Wide Web.

E-Library/Library without Building: It can be refers to as an electronic or online library where users can have access to information resources electronically over the net. This type of library provides 24 hours online access to digital resources to users.

Virtual Learning Environment: A virtual learning environment (VLE) is a set of teaching and learning tools designed to enhance a student's learning experience by including computers and the Internet in the learning process.

This work was previously published in E-Learning 2.0 Technologies and Web Applications in Higher Education edited by Jean-Eric Pelet, pages 45-64, copyright year 2014 by Information Science Reference (an imprint of IGI Global).

Chapter 86
Trends of Blended Learning in K-12 Schools:
Challenges and Possibilities

Alex Kumi-Yeboah
Dalton State College, USA

Patriann Smith
University of Illinois – Urbana-Champaign, USA

ABSTRACT

Blended learning is a well-known and successful instructional model used in higher education and K-12 schools (International Association for K-12 Online Learning, 2012; Watson, 2012). It is estimated that about 37 percent of school districts in the United States had students enrolled in technology-supported distance education courses during the 2004/2005 school year (Zandberg & Lewis, 2008). An increased student population, coupled with the need to reduce educational costs, has led to a high demand for virtual instruction (Watson, 2010). Blended learning is a hybrid of traditional face-to-face and online learning in which instruction occurs through both classroom and online formats, with the online component being a natural extension of traditional classroom learning (Colis & Moonen, 2001). As such, the process may involve a combination of instructional technology formats (e.g., videotape, CD-ROM, Web-based training, film) and face-to-face instructor-led instruction (Driscoll, 2002). Despite its hybrid nature and the potential it holds for transforming classroom instruction, to date, little research exists that examines trends in blended learning and the challenges and possibilities of utilizing this method of instructional delivery at the K-12 level. Further, even less is known about best practices in K-12 blended learning and instruction (Ferdig et al., 2009). Given these considerations, in this chapter, the authors first explore trends in blended learning in K-12 schools. Subsequently, they examine the benefits and challenges of K-12 blended learning. In the final phases of the chapter, the authors highlight possible solutions to the challenges, discuss recommendation, and identify directions for future research.

DOI: 10.4018/978-1-4666-8246-7.ch086

INTRODUCTION

Recent yearly costs and budget deficits have made it difficult for many school districts to purchase and supply textbooks to students. In 26 states, K-12 schools in the United States received less state funding in the 2012-13 school year than they did last year, and in 35 states, school funding now stands below the levels of that observed in 2008. In support of these statistics, reports indicate that 35 states currently receive less funding per student than they did five years ago. And, as an example of the increase in costs for school funding, Florida's school funding demonstrated an increase of approximately $273 per pupil in 2013 despite reduction in funding to the state at a rate of $569 per-pupil over the past four years, 2008-2012 (U.S. Census Bureau, 2010).

As a result of these shifts in school and state funding, resources such as "Open Educational Resources" (OER) have emerged as a pathway for the delivery of engaging, customized, and up-to-date content at a faster and more cost effective rate. However, with the increasing population of students in K-12 schools, as well as the shortage of teachers, certain courses remain unavailable in schools. As an instructional model that allows students to enroll in courses or recover course credits from missed or failed classes (Watson et al., 2012), blended learning provides a feasible alternative.

Blended-learning involves integration of various event-based activities, such as face-to-face classrooms, live e-learning, and self-paced learning (2003). Given the flexibility involved, the International Association for K-12 Online Learning (iNACOL, 2012) estimates that more than 1.5 million students in K-12 schools took one or more online courses in 2010 (Wicks, 2010). Moreover, in the year 2012, 31 states including Washington, DC had instituted statewide full-time online schools at the K-12 level (Watson et al., 2012). Further, states such as Alabama, Florida, and Michigan offered full or part-time online delivery options to students in grades K-12 (see Tables 1 & 2).

Table 1. State Virtual Schools and Course Enrollments in the United States

States	Number of Course Enrollments in 2011-12
Florida	303329
North Carolina	97170
Alabama	44332
Georgia	20876
Michigan	19822
Indiana	17627
South Carolina	15833
New Hampshire	15558
Texas	12419
Utah	12190
Louisiana	9179
Montana	6797
Virginia	6460
Wisconsin	5151
South Dakota	3822
Mississippi	3382
West Virginia	3376
Arkansas	3000
North Dakota	3000
New Mexico	2802
Illinois	2795
Connecticut	2049
Hawaii	1844
Kentucky	1700
Colorado	1575
Iowa	1437
Vermont	769

Source: HS population: http://nces.edu.gov/program/stateprofiles

With the rapid increase in student and teacher access to the Internet over the past ten years, blended-learning as an instructional model has become a more reasonable option for K-12 schools. For instance, in 2009, 97% of teachers had one or

Table 2. Number of States with Statewide Online Learning Options in the United States

Years	State Virtual Schools	Full-Time Schools
2007	30	14
2008	34	21
2009	35	24
2010	39	27
2011	40	30

Source: Keeping Pace 2007-2011

more computers located in the classroom every day and 54% were allowed to bring computers into the classroom. In fact, daily Internet access was available for 93% of the computers located in the classroom and the ratio of students to computers in the classroom was 5.3 to 1 (National Center for Education Statistics, 2009). Such availability has not only increased teachers' ability to cater to the needs of a larger number of students while maintaining the quality of learning outcomes (Riel & Polin, 2004), but has also held potential for greater accessibility to course content and instruction.

Given the potential of blended learning as an instructional tool, in this chapter, we first provide background information concerning blended learning, and then explore the current trend of this instructional model in K-12 schools. Through examination of the benefits and challenges of K-12 blended learning, we subsequently highlight possible solutions to challenges, and make recommendations for future research.

BACKGROUND

Blended learning involves the use of instructional tools such as multimedia and virtual Internet resources, classroom websites, Course Management Systems, and synchronous and asynchronous discussions. These tools are necessary to help implement and develop a successful blended learning program in K-12 schools (Rovai & Jordan, 2004). In blended learning, instruction may occur in online and offline settings (Singh, 2001). In the online setting, instruction occurs using the Internet. In the offline setting, instruction occurs in a traditional, face-to-face classroom between the teacher and students. No matter the setting, the percentage of time and types of activities utilized by students in either online or offline environments depends largely on the nature of the course and the instructor's preference (Wingard, 2004). Invariably, instructor preference may also determine to varying degrees, whether learning is structured or unstructured.

In structured blended-learning environments, the instructor has the ability to track the frequency of student participation and progress towards course completion. Structured environments also provide the instructor with access to online assessments of student learning, as well as communication with students through email. Structured environments may therefore appear favorable for students who learn better on their own rather than in traditional face-to-face classroom settings (Singh, 2001). Unstructured online environments are informal and involve synchronous and asynchronous discussions and email correspondence. Such environments provide students with the opportunity to control some of their learning experiences, as well as the freedom to interact and collaborate with peers without the instructor's constant face-to-face monitoring (Hoyle, 2003).

As is generally the case with instructional delivery methods, both structured and unstructured environments prove advantageous for some but challenging for others.

Troha (2003) notes:

the intent of blended learning is to enhance learning by combining the best of both worlds such as face-to-face and online courses that appear to lend themselves to self-study online. Such elements tend to include easy-to-interpret, straightforward *information that is relatively easy for the (student) to accurately grasp on his/her own. (p. 49)*

To maximize the advantages of this method, four main principles of blended learning have been proposed:

1. A thoughtful integration of face-to-face and fully online instructional components.
2. Innovative use of technology.
3. Reconceptualization of the learning paradigm.
4. Sustained assessment and evaluation of blended learning (Carman, 2005; Martyn, 2003).

The first principle maximizes the benefits of the learning environment and addresses diverse students' needs and preferences. The second principle, based on the innovative use of technology, requires the application of technology in pedagogically appropriate ways and the use of technological tools for the creation and maintenance of socially-situated and highly interactive learning environments (Vaughan, 2007). The third principle offers a reconceptualization of the learning paradigm through its incorporation of novel pedagogical and learning theories (e.g., student-centered, social constructivism), thereby allowing for development of new understandings and knowledge generated through students' social interactions with groups of peers (e.g., active author of content, self-paced learner) and teachers (e.g., mentors, coaches) (Dziuban, Moskal, & Hartman, 2004). The fourth principle of blended learning focuses on ensuring educational quality (Graham, 2006).

Through the provision of such guidelines, which highlight the affordances of online and face-to-face teaching integration for students in K-12 schools, teachers are empowered to undertake the design of innovative ways of teaching and managing students in K-12 blended classroom settings. Yet, design constitutes only one element of successful blended-learning instructional implementation.

Adherence to "best practices" identified in relation to this instructional method is another significant consideration. Oakes and Casewit (2003) highlighted five best practices to be considered when planning blended learning, namely:

1. Create a structured core curriculum of learning activities that are taught using a variety of instructional methods.
2. Support an environment in which students can learn smaller parts and work their way up to more complex ideas.
3. Create a classroom in which students can learn informally.
4. Provide technological support and for students.
5. Provide an easy to use environment.

Similarly, Schmidt (2002) recognized the following as indispensable components of blended learning:

1. **Administration:** Which involves the organization of the syllabus, increases teacher productivity/efficiency, distributing/collecting material, and scheduling duties.
2. **Assessment:** Which involves the ability to providing feedback, tracking student progress, and testing opportunities.
3. **Content Delivery:** That comprises communicating content through different learning styles, using multimedia, incorporating learning activities, using the Internet for the acquisition of knowledge.
4. **Community Component:** That involves building the classroom community through synchronous/threaded chats, providing office/help hours to communicate online.

Alternatively, Rovai and Jordan (2004) approached blended-learning from the perspective of course design, observing its operation along a continuum from "fully face-to-face" to "fully online learning environments" (p.14). From this perspective, blended learning is categorized as follows:

1. The use of Multimedia and Virtual Internet Resources in the classroom. Examples include the use of videos, virtual field trips, and interactive websites.
2. The use of Classroom Websites in the classroom.
3. The use of Course Management Systems. Examples include the use of Moodle, WebCT and Blackboard.
4. The use of Synchronous and Asynchronous Discussions in the classroom. Examples of resources available include Yahoo Groups, TappedIn, Blogs, and Elluminate (Rovai & Jordan, 2004).

Each approach provides a reasonable entry point from which to consider blended-learning. As reflected by these conceptions, of considerable importance are the learning environment, curriculum of learning activities, assessment, organization, technology support, and the use of Course Management Systems such as Moodle, Blackboard and WebCT. Though certain conceptions favor an emphasis on implementation, and others a focus on design, successful implementation will require K-12 teachers to consider the needs of students within the classroom in determining how the elements will be modified to meet the needs of students with whom they interact.

PEDAGOGY OF BLENDED LEARNING IN K-12 SCHOOLS

The preponderance of blended learning beyond K-12 levels is not surprising, as successful e-learning instruction with young children requires a significant degree of adaptation. Yet, this adaptation is crucial, and as Scott (2003) observes, elementary students "should not be excluded from the virtual learning world simply because of their age and developmental levels" (Scott, 2003, p. 2). In a quasi-experimental study conducted by Rockman et al. (2007) to evaluate the effectiveness of Spanish courses offered to 463 middle school students (seventh and eighth graders) in the West Virginia Virtual School System, researchers employed a blended model of instruction that combined face-to-face and virtual instruction with Web-based activities. A three-member teacher team consisting of a certified Spanish lead teacher designed and delivered lesson plans as well as conducted weekly conversations with students. Another certified Spanish teacher, an adjunct, provided content-related feedback through e-mail and voice-mail, and graded students tests and quizzes. The third teacher, a non-Spanish certified classroom facilitator, guided students both Online and Offline to complete assignments and projects on time. In this study, the blended learning component was offered in 21 schools with inadequate resources to provide face-to-face Spanish classes for students, and face-to-face group (instruction) included seven schools with adequate resources for virtual schools, specifically in regards to language arts achievement and school size. The results indicated that students in the face-to-face instruction performed significantly higher than those receiving instruction in the online blended section of the course.

In contrast, a study conducted by O'Dwyer, Carey and Kleiman (2007) using quasi-experimental design methods to compare students' mathematics ability in a fully online Algebra class (seventh and eighth grades) with students in a traditional face-to-face instruction yielded different results. The findings from a comparison of 463 students (231 seventh and eighth graders from the treatment group, 232 seventh and eighth graders from the comparison group) indicated that students in the online program performed better than those in the traditional face-to-face classrooms.

Similar findings were observed in a study designed to examine the effectiveness of a virtual Web-based learning as compared to traditional face-to-face instruction in a science laboratory class with 113 fifth-grade students in Taiwan (Sun, Lin, & Yu, 2008). The study utilized a quasi-experimental method that included a treatment (56 students) and a controlled group (57 students) in four classrooms from two randomly sampled schools. Students in the treatment group used the virtual Web-based science lab time and conducted virtual experiments and projects with teacher supervision while students in the control group performed similar science experiments using traditional face-to-face lab equipment. Results from the study reflected a higher performance for students engaged with the virtual Web-based lab as opposed to those in the control whose experiments involved traditional lab equipment.

The contradictory results from this small subset of studies may be attributed to numerous factors. Sitzmann, Kraiger, Stewart, and Wisher (2006) supported the findings above which reflect increased performance within blended-learning environments. More specifically, the authors observed that results from many blended, online learning and traditional face-to-face learning reflect superiority of classroom-based instruction with regards to knowledge outcomes (Sitzmann et al., 2006). Yet, another significant factor to be considered in the effectiveness of this form of instruction is the construction of effective blended program designs.

In keeping with this consideration, Singh and Reed (2001) suggested the following as a framework for blended learning:

1. **Audience:** Addresses questions such as "What do the learners know and how varied is their level of knowledge? Are the learners geographically centralized or geographically dispersed? Are the learners here because they wish to be or because they have to be?"
2. **Content:** Some content lends itself well to online situations. Other content, a complex and detailed procedure for assembling a valve train, for example, may work best in face-to-face setting.
3. **Infrastructure:** Considering issues such as physical space and the limitations posed and placing instruction on-line. For instance, if students do not have access to high bandwidth connections, on-line video streaming would be a poor choice.

While Singh and Reed (2001) focused on broader concerns affecting the learning environment, Carman (2002) noted that five elements constitute the main components embedded in the design of effective blending learning procedures:

1. **Live Events:** Consist of synchronous, instructor-led events. Examples are traditional lectures, video-conferences, and synchronous chat sessions like Elluminate.
2. **Self-Paced Learning:** Includes experiences the learner completes individually on her own time such as an internet or CD-ROM based tutorial.
3. **Collaboration:** Learners communicate and create with others, e-mail, threaded discussions, and, come to think of it, this wiki are all examples.
4. **Assessment:** This includes measurements of learners' mastery of the objectives. Examples are conventional tests, quizzes, and grades, narrative feedback, portfolio evaluations.
5. **Support Materials:** These include reference material, both physical and virtual, FAQ forums, and summaries (p. 2).

As seen above, attention to both the program design and product of learning are critical if K-12 students are to demonstrate gains. For researchers to capitalize on the affordances of blended learning and capture these gains, not only is careful planning needed in collaboration with teachers, but assessment of content via varied measures would also be necessary.

BENEFITS OF BLENDED LEARNING TO K-12 STUDENTS

The affordances of blended learning for K-12 students are many. Among those highlighted here are motivation, communication, attendance and pacing, time and other benefits for at-risk students, as well as differentiation of instruction.

Blended learning allows students to become motivated in directing their own learning. Research has shown that when students participate in a "cyber-study group," they tend to out-perform students who study alone (Newlin, et al., 2002). Further, it has been the case that peer-to-peer interactions made possible through blended learning "promote collaboration among students in K-12 schools," "a collective sense of responsibility" and enables students with low levels of self-efficacy or who demonstrate an external locus of control to "receive feedback and encouragement from their study partners" (Newlin et al., 2002, p. 14).

Not only does blended-learning motivate K-12 learners, but the method also enhances both oral and written communication. As an affordance for oral and communication, Eastman and Swift (2002) noted, "communication tools like discussion boards and chat rooms can be effective in inter-team collaboration as well as in faculty-student communication" (p. 21). Moreover, communication tools such as blogging and chats have been shown to empower students, enhance the development of communications skills, and increase students' capacity to work cooperatively with one another. In online discussions, students who lack confidence to speak during class discussion or in face-to-face classroom environments frequently demonstrate confidence. In fact, teachers often become easily accessible to students through such forms of synchronous activity (Eastman & Swift, 2002).

In written communication, students are also allowed the advantage of communication via a myriad of tools. One such tool is blogging. Blogging has the potential to provide instant, online writing opportunities for an audience of thousands as well as the ability to free and revised publishing (Bull, 2003). With blogging, teachers have noticed that the "presence of an audience can increase engagement and a depth of writing" (Bull, 2003, p. 6). Blogging "forces students to become more savvy about the world around them" (Bull, 2003, p. 17) and the need to feed the interest of the audience inspires students to be clever and interesting (Toto, 2004). When used appropriately in blended-learning, blogging further empowers "students to become more analytical and critical; through actively responding to Internet materials, students can define their positions in the context of others' writings as well as outline their own perspectives on particular issues" (Oravec, 2002, p. 32).

A third advantage of blended-learning relates to attendance and pacing. In blended-learning classrooms, students have the ability to study at their own pace within a time framework. Whenever a student is absent, s/he may have ample time to access materials and/or class meetings, regardless of virtual absence from the immediate and synchronous learning environment. This opportunity serves as a tremendous help in enabling students to remain on track academically. Access to content unhindered by the challenges of physical presence proves to also be advantageous for students with prolonged sicknesses or injuries that prevent them from attending school. Through "self-study modules," as typically available through blended-learning, students can review "certain content at any time for help in understanding a concept or to work ahead for those students who learn at a faster pace" (Alvarez, 2005, p. 12). And in fact, despite observations that "the online environment is not the ideal setting for all types of learning," neither are classrooms, and therefore, it is not surprising that "many teachers and corporate trainers are concentrating their efforts on integrating internet-based technologies and classrooms to create blended learning environments" (Alvarez, 2005, p. 26).

The time afforded to learners and the possibilities allowed when these learners are at-risk are also significant considerations for blended learning in K-12 schools. Blended-learning provides authentic and structured time to allow students the opportunity to proceed at their own pace. With this instructional method, teachers can monitor students' progress and provide encouragement and support, especially to students who lag behind academically (Oblender, 2002). Research also points to an improvement in K-12 student performance with blended-learning, especially for low achieving and at-risk students. For example, the use of online activities in blended-learning provides opportunities for at-risk students at various levels of K-12 education to participate in class projects and therefore, other common issues, such as attendance, become less problematic. With the accessibility to classwork from home, and with constant assistance from peers and teachers online, blended learning may provide an added advantage over traditional face-to-face methods as follows:

1. Students in rural or small school districts where the proximity of the classroom is the main challenge to content/material can gain accessibility.
2. Home-schooled students with instruction in subjects their parents feel unable to teach can learn those subjects.
3. Handicapped or hospitalized students who cannot travel to the traditional classroom can work through the class content while receiving treatment.
4. Expelled students who are required not to attend the traditional classroom as a consequence but still can have access to material to prevent falling behind academically (Keeler, Richter, Anderson-Inman, & Ditson, 2007).

Differentiated instruction functions particularly well within blended-learning environments. According to de Gula (2004), differentiated instruction involves "custom-designing instruction based on student needs" (p. 11). Teachers in blended-learning environments are well-positioned to successfully differentiate based on students' needed because teachers have the chance to respond to all students through e-mails, voice-mails, chats, blogs, and other online tools for academic help at any particular time and within various spaces. Not only can instruction be differentiated, but teachers can also meet students' individualized needs (Archambault et al., 2010; Christensen & Horn, 2008; Waldeck, 2008; Watson & Gemin, 2008) through multiple mechanisms that provide immediate formative feedback about a student's performance (Dennen, 2005; Rice et al., 2008). Wingard (2005) further highlighted the probability for increased student-instructor interaction and student preparation in the class or course.

In considering the content-oriented skills afforded to learners via this method, Prichard and O'Hara (2011) observed:

Environments that support linking graphics, sound and video elements in addition to text elements ... provide students with multiple opportunities for language production, task engagement and academic vocabulary development. Not only can various language development needs be addressed simultaneously by promoting the use of visually engaging and language rich technologies, the ability to use these environments encompasses many of the technology skills students need as they graduate from high schools and work toward future careers." (p.19)

Singh (2003) agreed that a combination of different delivery modes in blended learning helps to balance out and optimize the development and deployment of costs and time. Though online content can be expensive to produce, integration of online and mentoring sessions with self-paced materials such as text assignments and PowerPoint presentations can be effective.

Through this portrayal of the affordances of blended learning, teachers in K-12 schools can recognize the opportunities for teachers and students to design, plan, organize, and implement possible learning goals and objectives for a particular subject or discipline in order to achieve academic success. More specifically, for at-risk K-12 learners, teachers are provided with the tool of blended learning as an alternative that minimizes the obstacles faced in relation to access and academic support via traditional methods of instruction.

CHALLENGES OF BLENDED LEARNING IN K-12 SCHOOLS

The design and implementation of blended-learning are not without their challenges. Among the factors that may hinder the implementation or delivery of blended instruction are platform availability, administrative challenges, lack of finance, cost of delivery, tuition costs, lack of training, issues related to policy, and student access (Watson, 2010). Though many platforms are available for implementation of blended-learning in higher education, certain open source sites like Moodle or other Course Management Systems are inappropriate for elementary students. As Russo (2001) noted, "younger students may not have the study skills, reading abilities and self-discipline without the guidance of the teacher in the classroom" (p. 4). This issue is therefore one which continues to be addressed.

Administrative challenges further compound the problem, in that, lack of awareness, policy-making decisions, re-designing courses and/or programs, faculty preparedness, and quality assurance contribute to a lack of school capacity for successful implementation of blended-learning (Cook, Owston, & Garrison, 2004). Invariably, the majority of K-12 school administrators lack the requisite skills in managing Web-based instruction as well as implementing effective online programs for students, and, understandably, lack of awareness about blended and/or online learning on the part of some state legislatures tend to have prolonged policies that affect the design and implementation of successful programs on blended learning in K-12 schools (Cook, Owston, & Garrison, 2004). Despite training received on the use of technology by K-12 teachers and the pedagogy of teaching in blended learning programs, only an alarming 12% of new teachers in the K-12 schools reportedly received university training related to online education (Dawley, Rice, & Hinck, 2010).

Reports from Project Tomorrow (2010) indicated that only a small percentage of pre-service teachers at the K-12 level reported that they did not receive any form of training about teaching in online environments. Yet, iNACOL statistics suggest that many states still struggle in developing and implementing policies in online/blended learning in K-12 schools. This may be the case because in many states, online/blended learning programs are guided and overseen by rules and regulations created for traditional schools (Watson, 2010). And despite the tendency to identify the need for technological expertise as a necessity in these systems, a lack of adequately qualified instructional technology staff to manage, develop, design and train teachers in K-12 schools continues to be a major challenge challenges for implementation in the 21st century (Project Tomorrow, 2010).

From the student perspective, the challenge of equal access to the online component of blended instruction for all students remains a significant concern (Watson, 2012). For students with greater access to the Internet, there is a reasonable advantage. And for those who do not have access to the computer and/or Internet or have limited access as a result of parents' inability to afford this amenity on a consistent basis, challenges arise either from their inability to enroll and become active participants in courses, or from the lack of constant access, which decreases the likelihood of their familiarity and effectiveness in the use of online tools. It is not surprising, therefore, that for students in inner-city and rural areas, access to computers and Internet have been described as a major obstacle to online/blended learning in K-12 schools (Watson, 2012). Notwithstanding, research shows that online learning models do not significantly meet the needs of all students (Barbour & Reeves, 2009; Keeler et al., 2007; Rice, 2006), and this is understandable, given the fact that, for students in K-12 schools, adeptness with Internet navigation, technical aptitude, independent learning skills, and or adult supervision tend to be necessary if these learners are to fully engage in learning via online methods (Davis, 2011; Sturgis et al. 2010; Watson & Gemin, 2008).

SOLUTIONS AND RECOMMENDATIONS

Evidently, the possibilities and affordances of blended-learning could inform its substantive growth in K-12 schools over the next few years. With budget deficits and increasing student populations in the K-12 school systems, blended/online learning appears to be a promising alternative. Not only does blended-learning in K-12 schools possess the capacity to transform the delivery of instruction by providing equal access to quality education, but it also appears to be an avenue through which 21st century technological skills can be developed and maintained. The possibilities offered to access content, extend learning, receive support, and to engage in authentic activities with engaging audiences are also characteristics that may prove beneficial to young learners.

To this end, the need for collaboration of colleges of education in various universities with school districts in the expansion of blended learning in K-12 schools is a laudable goal. Among the more pressing issues would be the training of pre-service and in-service teachers concerning the design, development, and delivery of effective instruction using blended learning course management modules (Project Tomorrow, 2010). Through collaboration, K-12 schools may also reduce the discrepancies of standards among states, establishing common national competency standards for digital-age teachers as a means of easing state-to-state reciprocity (Resta & Carroll, 2010).

Another significant barrier to be addressed is funding. Availability should be prioritized at the state or national levels for K-12 schools. Already, recent legislative measures reflect initiatives and therefore to provide high-speed digital infrastructure to 99% of American students within the next five years to provide Internet access to approximately all schools in the United States. If these measures are implemented, administrators could expect to focus on funding avenues, which ensure the preparation of teachers to effectively utilize online tools to achieve the goals of blended-learning. Funding sources may take the form of grants or financial resources. Through investment in such measures, not only will schools be better positioned to increasingly meet the needs of learners in the 21st century, but they are also expected to significantly reduce costs per student in traditional school systems. In Georgia, the State Budget Task Force in Georgia has confirmed that the state could save about $4.5 million if one percent of students in the state enrolled in at least two or more blended learning courses (Alliance for Excellent Education, 2010). Such trends reflect the financial possibilities for K-12 schools should blended learning be adopted.

Despite attention to such critical issues, the goal for blended-learning in schools may continue to experience considerable inhibition, given that many policy makers and state legislators remain uninformed about the benefits, challenges, trends and future growth of this instructional model in K-12 schools. The burden is therefore upon administrators and educators in the school systems, as well as advocates of blended-learning, both within and beyond higher education, to inform policy makers and other organizations involved in promoting state and federal policies that affect technology in K-12 schools.

FUTURE RESEARCH DIRECTIONS

The predicted growth of blended learning in K-12 schools across U.S is unprecedented. In 2000, it was estimated that approximately 45,000 K-12 students took an online/blended learning course. This trend has continued such that in 2009, about three million K-12 students were enrolled in the various blended learning courses in the United States (iNACOL, 2010). As a result of this, it could be deduced that blended learning has the potential to transform America's education system by serving as the backbone of a system that offers more personalized learning approaches for all students (Watson, 2010).

Future investigation could be conducted to compare the costs of blended, online and face-to-face instruction in K-12 schools (Staker, 2011; Watson, 2010). This may assist in satisfying the concerns of individuals who express fears about the use of online and blended education at the K-12 level. Furthermore, an investigation into the perception of K-12 teachers, administrators and educators about blended learning as compared to fully online instruction is warranted. It is important that research be continually conducted to demonstrate the extent to which students' performance in fully online learning and blended learning compares to that of traditional face-to-face classes.

In order for blended learning to be successful, K-12 teachers will need the requisite skills to deliver and manage blended/online pedagogy. It is important for teachers to understand how to use the technological tools, manage the use of instructional resources or course materials, professionally interact with students and parents, and guide students in the safe and ethical use of technology.

As school systems begin to develop and implement blended/online instructions, there are questions that need to be addressed, such as the availability of technology, access to Internet, quality teachers to teach online, and student safety to name a few. It is possible that districts with adequate funds would have a significant advantage in acquiring the needed resources, a distinct contrast to increasingly cash-strapped districts, which would encounter severe challenges in dealing with issues such as student to computer ratios. In situations like these, small school districts with financial obstacles could seek help from business corporations through grants, which may provide some additional funding for computers and other technological tools for students. At the macro-level, state legislatures could also enact new policies on the use of technology in K-12 schools as a way to promote K-12 blended/online education for districts with financial problems.

Christensen, Horn, and Johnson (2008) projected that by 2019, almost 50% of high school courses will be offered using online/blended learning modalities. This argument was based on increasing teacher shortages in critical subject areas such as Mathematics, Special education, Science, and English Language, the bleak budgets at the state and local levels, as well as the growing pressure to increase graduate rates would all continue to contribute to the major challenges facing schools. Irrespective of the challenges identified, blended learning remains a viable option that continues to "open the learning door" for many students to succeed regardless of their diverse learning needs. And, with the growth and increased accessibility of technological tools such as computers, iPads, netbooks, podcasts, educator apps, Apex learning, Black board, and free Web 2.0 tools, the online component of blended learning courses will become more feasible option for K-12 students.

CONCLUSION

Blended-learning has been demonstrated as a holistic didactical method, integrating "the effectiveness and socialization opportunities of the classroom with the technologically enhanced active learning possibilities of the online environment rather than ratio of delivery modalities" (Dziuban, Hartman, & Moskal, 2004, p. 36). With the increased demand of student population at the K-12 level and with the advancement of the common core curriculum, school systems which find alternative methods to provide instruction that is engaging and motivating to the students who are already "technologically connected" will face challenges. However, through collaboration around design and implementation, administrators, policy makers, and educators may identify a starting point for implementing and extending blended learning models, which provide access to both online and traditional face-to-face instruction in K-12 schools.

REFERENCES

Alliance for Excellent Education. (2010). State government redesign efforts: New brief examines governors' actions to reduce spending, close budget shortfalls. *Straight A's*. *Public Education Policy and Progress*, *10*(20), 54–68.

Alvarez, S. (2005). Blended learning solutions. In B. Hoffman (Ed.), *Encyclopedia of Educational Technology*. Retrieved from http://coe.sdsu.edu/eet/articles/blendedlearning/start.htm

Archambault, L., Diamond, D., Coffey, M., Foures-Aalbu, D., Richardson, J., & Zygouris-Coe, V. … Cavanaugh, C. (2010). Research committee issues brief: An exploration of at-risk learners and online education. Vienna, Austria: International Association for K–12 Online Learning (iNACOL).

Barbour, M. K., & Reeves, T. C. (2009). The reality of virtual schools: A review of the literature. *Computers & Education*, *52*(2), 402–416. doi:10.1016/j.compedu.2008.09.009

Belanger, Y. (2005). *Laptop computers in the K-12 classroom.* Retrieved from http://www.ericdigests.org/2001-1/laptop.html

Bull, G., & Kajder, S. (2003). Scaffolding for struggling students: Reading and writing with logs. *Learning and Leading with Technology*, *31*(2), 32–34.

Carman, J. M. (2002). *Blended learning design: five key elements.* Retrieved from http://www.knowledgenet.com/pdf/Blended%20Learning%20Design_1028.PDF

Carman, J. M. (2005). *Blended learning design: Five key ingredients*. Retrieved from http://www.agilantlearning.com/pdf/Blended%20Learning%20Design.pdf

Christensen, C., & Horn, M. (2008). How do we transform our schools? *Education Next*, *8*(3), 13–19.

Collis, B., & Moonen, J. (2001). *Flexible learning in a digital world*. London: Kogan Page.

Cook, K., Owston, R. D., & Garrison, D. R. (2004). *Blended learning practices at COHERE universities*. Toronto, Canada: York University.

Davis, M. R. (2011). Online credit recovery emphasizes personalized learning. *Education Week*. Retrieved from http://www.edweek.org/ew/articles/2011/01/12/15edtech_ credit.h30.html?r=1832446736

Dawley, L., Rice, K., & Hinck, G. (2010). *Going virtual 2010: The status of professional development and unique needs of K-12 online teachers.* Retrieved from http://edtech.boisestate.edu/goingvirtual/goingvirtual3.pdf

Dennen, V. (2005). *Designing peer feedback opportunities into online learning experiences*. Retrieved from www.uwex.edu/disted/conference/Resource_library/Proceedings

Driscoll, M. (2002). Blended learning: Let's get beyond the hype. *Learning and Training Innovations Newsline*. Retrieved from http://www.ltimagazine.com/ltimagazine/article/articleDetail.jsp?id=11755

Dziuban, C. D., Hartman, J. L., & Moskal, P. D. (2004). Blended learning. *ECAR Research Bulletin, 7*.

Eastman, J., & Swift, C. (2002). Enhancing collaborative learning: Discussion boards and chat rooms as project communication tools. *Business Communication Quarterly*, *65*(3), 29–41. doi:10.1177/108056990206500304

Ferdig, R. E. (2009). Virtual schooling standards and best practices for teacher education. *Journal of Technology and Teacher Education*, *17*(4), 479–503.

Foundation for Excellence in Education. (2010). *Digital learning now.* Retrieved from www.excelined.org/Docs/Digital%20Learning%20Now%20Report%20FINAL.pdf

Graham, C. R. (2006). Blended learning systems: Definition, current trends, and future directions. In C. J. Bonk & C. R. Graham (Eds.), *Handbook of blended learning: Global perspectives, local designs* (pp. 3–21). San Francisco, CA: Pfeiffer Publishing.

Hilz, R., & Goldman, R. (2004). *Learning together online: Research on asynchronous networks*. Mahwah, NJ: Lawrence Erlbaum Associates.

Hoyle, R. (2003). How to evaluate blended learning. *People Management*. Retrieved from http://www.peoplemgmt.com/

International Association for K-12 Online Learning. (iNACOL). (2010). *National standards for quality online teaching.* Vienna, Austria: iNACOL. Retrieved from www.Inacol.org/research/nationalstandards/NACOL%20Standards%20Quality%20OnlineTeaching.pdf

International Association for K-12 Online Learning. (iNACOL). (2011). *Annual report on K-12 online education.* Retrieved from www.inaco.org

International Association for K-12 Online Learning. (iNACOL). (2012). *Annual report on K-12 online education.* Retrieved from www.inaco.org

Keeler, C. G., Richter, J. L., Anderson-Inman, M. A., & Ditson, M. (2007). Exceptional learners: Differentiated instruction online. In C. Cavanaugh & R. Blomeyer (Eds.), *What works in K–12 online learning* (pp. 125–178). Eugene, OR: International Society for Technology in Education.

Martyn, M. (2003). The hybrid online model: Good practice. *Educause Quartely*, *1*, 18–23.

Newlin, M. H., & Alvin, Y. W. (2002). Predictors of performance in the virtual classroom: Identifying and helping at-risk cyber-students. *T.H.E. Journal*, *29*(10), 21–26.

O' Dwyer, L., Carey, R., & Kleiman, G. (2007). A study of the effectiveness of the Louisiana algebra I online course. *Journal of Research on Technology in Education*, *39*(3), 289–306.

Oakes, K., & Casewit, C. (2003). *E-learning: The answer is blended learning, now what was the question again.* Retrieved from http://www.astd.org/astd/Publications/TD_Magazine/2003_pdf/76031017.htm

Oblender, T. (2002). A hybrid course model: one solution to the high online drop-out rate. *Learning and Leading with Technology*, *29*(6), 42–44.

Oravec, J. A. (2002). Bookmarking the world: Weblog applications in education, weblogs can be used in classrooms to enhance literacy and critical thinking skills. *Journal of Adolescent & Adult Literacy*, *45*(7), 616–618.

Pritchard, R., & O'Hara, S. (2011). Using technology to improve academic vocabulary development in STEM classrooms. *AccELLerate! The Quarterly Review of the National Clearinghouse for English Language Acquisition*, *3*(4), 19.

Project Tomorrow. (2010). *Learning in the 21st century: 2010 trends update.* Washington, DC: Project Tomorrow. Retrieved from www.blackboard.com/CMSPages/GetFile.aspx?guid=8106

Resta, P., & Carrol, T. (2010). *Redefining teacher education for digital-age learners: A call to action, the summary report of the invitational summit on redefining teacher education for digital-age leaners.* Austin, TX: The University of Texas at Austin Learning Technology Center. Retrieved from www.kdsi.org/WhitePaper2.pdf

Rice, K., Dawley, L., Gazel, C., & Florez, C. (2008). *Going virtual: Unique needs and challenges of K–12 online teachers*. International Association for K–12 Online Learning. Retrieved from http://www.inacol.org/research/docs/goingvirtual.pdf

Rice, K. L. (2006). A comprehensive look at distance education in the K–12 context. *Journal of Research on Technology in Education*, *38*(4), 425–448.

Riel, M., & Polin, L. (2004). Online communities: Common ground and critical differences in designing technical environments. In *Designing for virtual communities in the service of learning* (pp. 16–50). Cambridge, UK: Cambridge University Press. doi:10.1017/CBO9780511805080.006

Rockman., et al. (2007). *ED PACE final report submitted to the West Virginia Department of Education*. Retrieved from http://www.rockman.com/projects/146.ies.edpace/finalreport

Rovai, A. P., & Jordan, M. (2004). Blended learning and sense of community: A comparative analysis with traditional and fully online graduate courses. *International Review of Research in Open and Distance Learning*, *12*(4), 43–56.

Russo, A. (2001). E-learning everywhere. *School Administrator*, *58*(9).

Schmidt, K. (2002). The web-enhanced classroom. *Journal of Information Technology*, *18*(2).

Scott, J. (2003). Don't forget the little people: Vision for an online kindergarten learning community. *T.H.E. Journal*, *30*(7).

Singh, H. (2003). Building effective blended learning programs. *Educational Technology*, *43*(6), 51–54.

Singh, H., & Reed, C. (2001). *A white paper: Achieving success with blended learning*. Centra Software. Retrieved from http://www.centra.com/download/whitepapers/blendedlearning.pdf

Sitzmann, T., Kraiger, D., Stewart, D., & Wisher, R. (2006). The comparative effectiveness of web-based and classroom instruction: A meta-analysis. *Personnel Psychology*, *59*(3), 623–664. doi:10.1111/j.1744-6570.2006.00049.x

Staker, H. (2011). *The rise of K-12 blended learning: Profiles of emerging models*. Mountain View, CA: Innosight Institute. Retrieved from www.innosightinstitute.org/blended_learning_models/

Sturgis, C., Rath, B., Weisstein, E., & Patrick, C. (2010). *Clearing the path: Creating innovation space for serving over-age, under-credited students in competency-based pathways.* Retrieved from http://www.inacol.org/research/docs/ClearingthePathReportJan2011.pdf

Sun, K., Lin, Y., & Yu, C. (2008). A study on learning effect among different learning styles in a web-based lab of science for elementary school students. *Computers & Education*, *50*(4), 1411–1422. doi:10.1016/j.compedu.2007.01.003

Toto, C. (2004, January 12). Online blogging, net result: Writing skills improve. *The Washington Times*. Retrieved from http://www.washtimes.com

Troha, F. (2003). *Bulletproof blended learning design: Process, principles and tips*. Bloomington, IN: International Online Library.

U.S. Census Bureau. (2010). *Public elementary-secondary education finance data*. Retrieved from http://www.census.gov/govs/school/

U.S. Department of Education, National Center for Education Statistics. (2010). *Teachers' use of educational technology in U.S. public schools: 2009*. Retrieved from http://nces.ed.gov/pubsearch/pubsinfo.asp?pubid=2010040

Vaughan, N. (2007). Perspectives on blended learning in higher education. *International Journal on E-Learning*, *6*(1), 81–94.

Watson, J. (2007). *A national primer on K-12 online learning*. International Association for K-12 Online Learning (iNACOL). Retrieved from http://www.inacol.org/research/docs/national_report.pdf

Watson, J., et al. (2010). *Keeping pace with K-12 online learning*. Boulder, CO: Evergreen Education Group. Retrieved from www.kpk12.com/wpcontent/uploads/KeepingPaceK12_2010.pdf

Watson, J., et al. (2011). *Keeping pace with K-12 online learning: An annual review of policy and practice*. Evergreen Education Group. Retrieved from http://kpk12.com/cms/wp-content/uploads/KeepingPace2011.pdf

Watson, J., & Gemin, B. (2008) *Promising practices in online learning: Socialization in online programs*. Vienna, Austria: iNACOL. Retrieved from http://www.inacol.org/resources/promising-practices/iNACOL_PP_Socialization.pdf

Watson, J., & Gemin, B. (2009). *Keeping pace with K-12 online learning: An annual review of policy and practice*. Retrieved from http://kpk12.com/

Watson, J., Murin, A., Vashaw, L., Gemin, B., & Rapp, C. (2010). *Keeping pace with K-12 online learning: A review of state-level policy and practice*. Evergreen, CO: Evergreen Education Group. Retrieved from http://www.kpk12.com/cms/wp-content/uploads/ KeepingPaceK12_2010.pdf

Wicks, M. (2010). *A national primer on K-12 online learning: Version 2*. Retrieved from www.inacol.org

Wingard, R. G. (2005). Classroom teaching changes in web-enhanced courses: A multi-instructional study. *EDUCAUSE Quarterly*, *11*(2).

Zandberg, I., & Lewis, L. (2008). *Technology-based distance education courses for public elementary and secondary school students: 2002-03 and 2004-05 (NCES 2008-08)*. Washington, DC: National Center for Education Statistics, Institute of Education Sciences, U.S. Department of Education.

ADDITIONAL READING

Almond, P., & Winter, P. Cameto, R. Rusell, M. Sato, E. Clarke-Midura, J. Torres, C. Haertel, G. Dolan, R. Beddow, P., & Lazarus, S. (2010). Technology-enabled and universally designed assessment: Considering access in measuring the achievement of students with disabilities-A foundation for research. *Journal of Technology, Learning, and Assessment 10*(5). Retrieved from http://escholarship.bc.edu/ ojs /index.php/ jtla/article/view/1605.

Black, E. W., Ferdig, R. E., & DiPietro, M. (2008). An overview of evaluative instrumentation for virtual high schools. *American Journal of Distance Education*, *22*(1), 24–25. doi:10.1080/08923640701713422

Cavanaugh, C. S. (2004). *Development and management of virtual schools: Issues and trends*. Hershey, PA: Information Science Publishing.

Dede, C. (2009). Technologies that facilitate generating knowledge and possibly wisdom: A response to Web 2.0 and classroom research. *Educational Researcher*, *38*(4), 60–63. doi:10.3102/0013189X09336672

Dillion, E., & Tucker, W. (2011). *Lessons for online learning. Education Sector*. Retrieved from www.educationsector.org/print/publications/lessons-online-learning.

Englert, C. S., Zhao, Y., Dunsmore, K., Collings, N. Y., & Wolbers, K. (2007). Scaffolding the writing of students with disabilities through procedural facilitation: Using an Internet-based technology to improve performance. *Learning Disability Quarterly*, *30*(1), 29–34. doi:10.2307/30035513

Flavin, S. (2001). *E-learning advantages in a tough economy*. Retrieved from http://www.babsoninsight.com/contentmgr/showdetails.php/id/217.

Garrison, D. R., & Cleveland-Innes, M. (2003). *Critical factors in student satisfaction and success: Facilitating student role adjustment in online communities of inquiry.* Invited paper presented to the Sloan Consortium Asynchronous Learning Network Invitational Workshop, Boston, MA.

Kopriva, R. (2009). Assessing the skills and abilities in math and science of ELLs with low English proficiency: A promising new method. *AccELLerate 2*(1), 7-10. Retrieved from http://www.ncela.gwu.edu/accellerate/.

New Jersey Institute of Technology. (2005). *Hybrid learning*. Retrieved from http://media.njit.edu/hybrid/

Oakes, K., & Casewit, C. (2003). *E-learning: The answer is blended learning, now what was the question again.* Retrieved from http://www.astd.org/astd/Publications/TD_Magazine/2003_pdf/76031017.htm

Osguthorpe, R. T., & Graham, C. R. (2003). Blended learning environments: Definitions and directions. *The Quarterly Review of Distance Education*, *4*(3), 227–234.

Patrick, S., & Powell, A. (2009). *A summary of research on the effectiveness of K-12 online learning*. Vienna, VA: International Association for K-12 online learning. Retrieved from www.inacol.org/research/docs/NACOL_ResearchEffectiveness-1r.pdf.

Rice, K. L. (2006). A comprehensive look at distance education in the K–12 context. *Journal of Research on Technology in Education*, *38*(4), 425–448.

Roblyer, M., & Davis, L. (2008). Predicting success for virtual school students: Putting research-based models into practice. *Online Journal of Distance Learning Administration*, *11*(4). Retrieved from http://www.westga.edu/~distance/ojdla/winter114/roblyer114.html

Setzer, J. C., & Lewis, L. (2005). *Distance education courses for public elementary and secondary school students: 2002–2003*. Washington, DC: U.S. Department of Education, National Center for Education Statistics.

Stahl, G. (2006). Supporting group cognition in an online math community: A cognitive tool for small-group referencing in text chat. *Journal of Educational Computing Research*, *35*(2), 103–122. doi:10.2190/Q435-7611-2561-720P

Stockley, D. (2005). *Blended learning or training-definition and explanation*. Retrieved from http://derekstockley.com.au/blended-learning.html

Swan, K. (2002). Building learning communities in online courses: The importance of interaction. *Education Communication and Information*, *2*(1), 23–49. doi:10.1080/1463631022000005016

Twigg, C. A. (2003). *Improving learning and reducing costs: Lessons learned from round I of the PEW grant program in course redesign*. Troy, New York: Centre for Academic Transformation, Rensselaer Polytechnic Institute.

U.S. Department of Education, Office of Planning, Evaluation and Policy Development. (2010). *Evaluation of evidence-based practices in online learning: A meta-analysis and review of online learning studies.* Washington, District of Columbia: U.S. Department of Education. Retrieved from www.ed.gov/rschstat/eval/tech/evidence-based-practices/finalreport.pdf.

Voos, R. (2003, February). Blended learning—what it is and where might it take us? *Sloan-C View (2)*1. Retrieved from http://aln.org/publications/view/v2n1/blended1.htm.

Waldeck, J. (2007). Answering the question: Student perceptions of personalized education and the construct's relationship to learning outcomes. *Communication Education*, *56*(4), 409–432. doi:10.1080/03634520701400090

Wallis, C. (2006). The multitasking generation. *Time Magazine, 167*(13), 48–56.

Wang, K. H., Wang, T. H., Wang, W. L., & Huang, S. C. (2006). Learning styles and formative assessment strategy: Enhancing student achievement in Web-based learning. *Journal of Computer Assisted Learning*, *22*(3), 207–217. doi:10.1111/j.1365-2729.2006.00166.x

Wise, B., & Rothman, R. (2010). *Issue brief: The online learning imperative: A solution to three looming crises in education*. Washington, DC: Alliance for Excellent Education.

KEY TERMS AND DEFINITIONS

Asynchronous: Distance learning instructional tool where students can learn the same content (pre-recorded lecture, notes posted online, web-based simulation) at different times. It could be an existing or occurring at the same time. The online learning resources used to support asynchronous learning include email, threaded conferencing systems, chats, blogs, online discussion boards, and wikis.

Blended Learning: A form of distance learning that combines different forms of instructional technology (e.g., videotape, CD-ROM, Web-based learning, e-mail, telephone, & chats, blogging) with traditional face-to-face instructor-led instruction depending on availability, access, and resources in the context of location, time and space.

Course Management Systems: Consists of tools that enable an academic instructor or teacher to create online or blended learning course content, teaching and management of that course on the Web without having to handle Hypertext Markup Language or other programming languages. Examples include (Blackboard, Angel, Sakai, Oncourse, and Moodle).

Instructional Technology: Instructional technology consists of the design, development, utilization, management, and delivery of instruction either through media, electronic, print and other technology (computers, audiovisuals and equipment) as well as the evaluation of instruction for learners.

Online Learning: Is a type of learning where access to learning experiences occurs through the use of technology. Online learning can be "Fully or wholly" online or can be described as learning in reference to technology medium or context with which it is used.

Synchronous: Is a distance-learning environment where content of delivery happen at the same time for everyone, but can be online using (Web conferencing or IM chats or offline). It could also be face-to-face instruction, where learners and teachers are all in the same place at the same time.

Traditional Face-to-Face Instruction: Is a form of instruction that requires teachers and students to single location (classroom) with a fixed amount of time for interaction between instructor and students at a specified time in a particular place and time (classroom).

This work was previously published in Practical Applications and Experiences in K-20 Blended Learning Environments edited by Lydia Kyei-Blankson and Esther Ntuli, pages 1-17, copyright year 2014 by Information Science Reference (an imprint of IGI Global).

Index

C

D

E

F

G

H

I

J

K

L

M

Q

R

S

T

U

V

W

Z