Introduction to Scientific Writing

Research

- Research is an essential and powerful tool in leading towards progress.
- Without systematic research there would have been very little progress.
- **Research process is the examination and analysis of systematically gathered facts about a particular problem.**

Why publishing your work is important?

- May be to….
- Graduate
- Get a job
- Advance your career.

- But the most important aims of scientists are:

1. To add to the body of human knowledge
2. To help yourself and others understand the nature of the universe

- When you organize your manuscript, the first thing to consider is that the order of sections will be very different than the order of items on you checklist.
- An article begins with the Title, Abstract and Keywords.

The article text follows the IMRAD format, which responds to the questions below

- **I**ntroduction: What did you/others do? Why did you do it?
- **M**ethods: How did you do it?
- **R**esults: What did you find?
- **A**nd
- **D**iscussion: What does it all mean?

Steps to organizing your manuscript

1. Prepare the figure and tables
2. Write the Methods
3. Write up the Results.
4. Write the Discussion

5. Write a clear conclusion.
6. Write a compelling introduction.
7. Write abstract.
8. Compose a concise and descriptive Title.
9. Select Keywords for indexing.
10. Write Acknowledgement.
11. Write up the References.

- There are two important things:-
- The topic to be studied should be the first issue to be solved.
- Review the literature related to the topic and select some papers (about 30) that can be cited in your paper.

Step 1: Prepare the figures and tables

- "A figure is worth a thousand words."
- Illustrations, including figures and tables, are the most efficient way to present your results.
- Your data are the driving force of the paper.
- Tables give the actual experimental results.
- Figures are used for comparisons of experimental results with those of previous works, or with calculated/theoretical values.

- Avoid crowded plots, using only three or four data sets per figure.
- Never include long boring tables.

Step 2: Write the Methods

- This section responds to the question of how the problem was studied.
- If your paper is proposing a new method, you need to include detailed information.
- Do not repeat the details of established methods.
- Use References and Supporting Materials to indicate the previously published procedures.

- List the methods in the same order they will appear in the Results section, in which you did the research;

1. Description of the site
2. Description of the surveys or experiments done.
3. Description of the investigations methods.
4. Description of the statistical methods used.
5. In this section, avoid adding comments, results, and discussion, which is a common error.

Step 3: Write up the Results

- This section responds to the question "What have you found?"
- Only representative results from your research should be presented.
- The results should be essential for discussion.

Statistical rules

1. For numbers, use two significant digits unless more precision is necessary.
2. Never use percentages for very small samples. An important issue is that you must not include references in this section.

Step 4: Write the Discussion

- Here you must respond to what the results mean.
- It is the easiest section to write, but the hardest section to get right.
- Chance to sell your data.
- You need to make the Discussion corresponding to the Results, but do not reiterate the results.
- Never ignore work in disagreement with yours.

Step 4: Write the Discussion cont...

- To achieve good interpretations think about:

1. How do these results relate to the original question or objectives outlined in the Introduction section?
2. Do the data support your hypothesis?
3. Are your results consistent with what other investigators have reported?
4. Discuss weaknesses and discrepancies.
5. Is there another way to interpret your results?
6. What further research would be necessary to answer the questions raised by your results?
7. Explain what is new without exaggerating

Step 5: Write a clear Conclusion

- This section shows how the work advances the field from the present state of knowledge.
- Without a clear conclusion section, reviewers and readers will find it difficult to judge your work and whether it merits publication in the journal.
- A common error in this section is repeating the abstract, or just listing experimental results.
- You should provide a clear scientific justification for your work in this section.
- To distinguish between results and the conclusions you are drawing from them
  - Results – past tense
  - General statements and conclusions – present tense

Step 6: Write a compelling Introduction

- This is your opportunity to convince readers that you clearly know why your work is useful.
- **A good introduction should answer the following questions:**

1. What is the problem to be solved?
2. Are there any existing solutions?
3. Which is the best?
4. What is its main limitation?
5. What do you hope to achieve?

- You need to introduce the main scientific publications on which your work is based, citing a couple of original and important works, including recent review articles.

Step 6: Write a compelling Introduction cont.....

1. Never use more words than necessary.
2. Don't make this section into a history lesson.
3. We all know that you are keen to present your new data.
4. The introduction must be organized from the global to the particular point of view, guiding the readers to your objectives when writing this paper.
5. State the purpose of the paper and research strategy adopted to answer the question.
6. Hypothesis and objectives must be clearly remarked at the end of the introduction.

Step 7: Write the Abstract

- The abstract tells prospective readers what you did and what the important findings in your research were.
- Together with the title, it's the advertisement of your article.
- Make it interesting and easily understood without reading the whole article.
- Avoid using jargon, uncommon abbreviations and references.
- You must be accurate, using the words that convey the precise meaning of your research.

Step 7: Write the Abstract cont….

- It gives key results but minimizes experimental details.
- Abstract offers a short description of the interpretation/ conclusion in the last sentence.
- Must be keep as brief as possible, normally they have less than 250 words.
- In an abstract, the two *whats* are essential.

1. **What has been done?**
2. **What are the main findings?**

Step 8: Compose a concise and descriptive title

- It is your first opportunity to attract the reader's attention, so the first impression is powerful!
- Best time to write the final title is after the draft of main sections
- The title must explain what the paper is broadly about.
- Keep the title informative and concise (clear, descriptive, and not too long).
- You must avoid technical jargon and abbreviations.
- Most journals prefer short titles – 100 characters (10 – 12 words)

Step 9: Select keywords for indexing

- Keywords are used for indexing your paper.
- Avoid words included in the title.
- Some journals require that the keywords are not those from the journal name.
- Only abbreviations firmly established in the field are eligible (e.g., US, BPD).
- Check the Guide for Authors and look at the number of keywords.

Step 10: Write the Acknowledgements

- Thank people who have contributed to the manuscript.
- Probably, the most important thing is to thank your funding agency or the agency giving you a grant or fellowship.

Step 11: Write up the References

- There are more mistakes in the references than in any other part of the manuscript.
- In the text, you must cite all the scientific publications on which your work is based.
- Do not over-inflate the manuscript with too many references – it doesn't make a better manuscript!
- Avoid excessive self-citations and excessive citations of publications from the same region.
- Minimize personal communications.
- You can use any software, such as EndNote or Mendeley, to format and include your references in the paper.

Step 11: Write up the References

- Make the reference list and the in-text citation conform strictly to the style given in the Guide for Authors.
- Check the following:

1. Spelling of author names
2. Year of publications
3. Usages of *"et al."*
4. Punctuation
5. Whether all references are included

Length of the manuscript

- Look Guide for Authors, but an ideal length for a manuscript is 25 to 40 pages, double spaced, including essential data only.

1. **Title:** Short and informative
2. **Abstract:** 1 paragraph (<250 words)
3. **Introduction:** 1.5-2 pages
4. **Methods:** 2-3 pages
5. **Results:** 6-8 pages
6. **Discussion:** 4-6 pages
7. **Conclusion:** 1 paragraph
8. **Figures:** 6-8 (one per page)
9. **Tables:** 1-3 (one per page)
10. **References:** 20-50 papers (2-4 pages)

Some of the possible types of scientific publications are:

1. Original research:

- These are detailed studies reporting original research and are classified as primary literature.
- They include hypothesis, background study, methods, results, interpretation of findings, and a discussion of possible implications.
- Original research articles are long, with the word limit ranging from 3000 to 6000 some journals up to 12000

2. Review article:

- Provide a critical and constructive analysis of existing published literature in a field, through summary, analysis, and comparison, often identifying specific gaps or problems and providing recommendations for future research.
- *These are considered as secondary literature since they generally do not present new data from the author's experimental work.*

3. Clinical case study:

- Clinical case studies present the details of real patient cases from medical or clinical practice.
- The cases presented are usually those that contribute significantly to the existing knowledge on the field.
- The study is expected to discuss the signs, symptoms, diagnosis and treatment of a disease.
- These are considered as primary literature and usually have a word count similar to that of an original article.

4. Clinical trial:

- Once again, specific to the field of medicine, clinical trials describe the methodology, implementation and results of controlled studies, usually undertaken with large patient groups.
- Clinical trial articles are also long, usually of about the same length as an original research article.
- Clinical trials also require practical work experience, as well as, high standards of ethics and reliability..

5. Perspective, opinion, and commentary:

- Perspective pieces are scholarly reviews of fundamental concepts or prevalent ideas in a field.
- These are usually essays that present a personal point of view critiquing widespread notions pertaining to a field.
- These are considered as secondary literature and are usually short articles, around 2000 words.

- Opinion articles present the author's viewpoint on the interpretation, analysis, or methods used in a particular study.
- It allows the author to comment on the strength and weakness of a theory or hypothesis.
- Opinion articles are usually based on constructive criticism and should be backed by evidence.
- These are also relatively short articles.

- Commentaries are short articles usually around 1000-1,500 words long that draw attention to or present a criticism of a previously published article, book, or report, explaining why it interested them and how it might be illuminating for readers.

6. Book review:

- ➢Book reviews are published in most academic journals.
- ➢The aim of a book review is to provide insight and opinion on recently published scholarly books.
- ➢Are also relatively short articles and less time-consuming.
- ➢Book reviews are a good publication option for early-career researchers as it allows the researcher to stay abreast of new literature in the field, while at the same time, adding to his publication list.

References

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