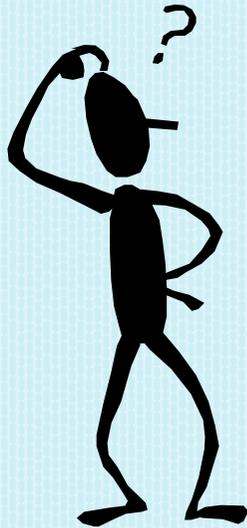


HOW TO WRITE A TECHNICAL RESEARCH PAPER



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Outline

- **Purpose of The Lecture**
- **What is a research paper?**
- **Why we write the research paper?**
- **Where do we begin?**
 - ✓ **Topic/Subject Selection?**
- **Technical Paper Writing Structure**
- **Proof Read**
- **Process of Research**

Purpose of The Lecture

The purpose of this Lecture is to identify and examine the components essential to planning and executing research writing assignments.

At the end of this Lecture, students will be able to:

1. Identify and conceptualize the essential steps in the research paper writing process;
2. Access valuable campus resources to help at various stages of the writing process.
3. Use time management strategies to plan for the successful and timely completion of a research paper.

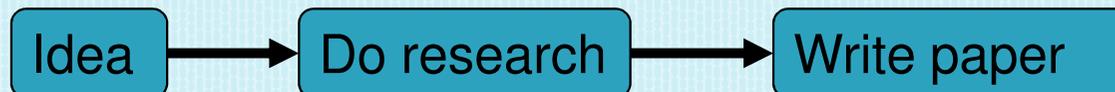
What is a research paper?

“A Research is complete only when the results are shared with the scientific community”

A “**research paper**” is taking and combining “information you find by doing research” and “**your own ideas**” to prove a “thesis statement”.

Information + **Ideas** = **Research**

Writing Research Paper Model :



Why we write the research paper?

- ❖ Science includes the dissemination of knowledge
- ❖ Purpose of a scientific paper:
 - To communicate to the community
 - To contribute to the advancement of knowledge
- ❖ You should have something important enough to share with others
 - New ideas
 - New facts or data
 - Intelligent reviews of old facts and ideas

WHERE DO WE BEGIN?



Research Paper Writing Process

✓ **Choose a topic**

.....Select/Search particular topic

✓ **Read Papers**

.....Read good quality of journal paper (IEEE, Springer, Elsever)

✓ **Technical Writing**

..... Technical writing is about the scientific subject matter

.....Defining/solving a technical problem

✓ **Presentation**

* **Oral Presentation**

.....By Power point

* **Poster Presentation**

.....By Poster



Technical Paper Writing Structure

- × Title
- × Abstract
- × Introduction
- × Literature Review
- × Main Body
- × Results
- × Discussion
- × Summary/Conclusion
- × Acknowledgements
- × References
- × Figures and Tables

Topic/Subject Selection

- Previous knowledge
- Course content
- Personal or professional experience/interests
- Library
- International/National/Journal/Conference papers
- Research papers demand abundant reference to professional sources
- Your subject Teacher/Professor/Project Guide.

Example:

Area : Electronics & Communication

Subject: Optical Fiber Communication

Topic: Photonic Crystal Fiber

Abstract

WHAT SHOULD BE IN AN?

- × An abstract should briefly: (It is around 200-300 words)
 - + Establish the topic of the research
 - + State the research problem or main objective of paper
 - + Indicate the methods used
 - + Present the main research findings
 - + Present the paper's conclusions

COMMON PROBLEMS WITH ABSTRACTS

- × Too long
- × Too much detail
- × Too short
- × Failure to include important information
 - + Objective of research
 - + Methodology

Introduction

PURPOSE OF THE INTRODUCTION

- × To situate the research in its research field
- × To document why the research being presented is important
- × To state the research problem the paper will solve
- × To present the steps that will be taken to solve the problem
- × It helps to the reader for understand the research being presented

WHAT AN INTRODUCTION CONTAINS

- × Context / background for the research
- × Rationale for conducting the research
- × A description of the problem being solved
- × The steps the researcher will take to solve the problem.
- × The scope of the problem – what the research will not address.
- × The limitations of the research.
- × The methods, models, approaches that will be taken in the research (assumptions)

DIFFERENCE BETWEEN ABSTRACT AND INTRODUCTION

ABSTRACT

- + Main purpose of abstract is to summarize paper
- + Abstracts should be short – should only contain summary information

INTRODUCTION

- + Main purpose of introduction is to present context or background for paper
- + Introductions are longer – often contain guides to reading paper

Literature Review

WHY WRITE A LITERATURE REVIEW?

- × To evaluate prior work that has been done in your paper's research area
 - + To show relationships between different existing work
 - + To show relationship between existing work and your work
- × To set the context for your research

Relate new work to published results

- × Knowledge on which new work builds
- × Knowledge that new work extends or corrects

If early in the paper:

- × Sets scene, contrast with new results that come later

If late in the paper:

- × Can show other results in your notation, making comparisons easier

Main Body

Sections should contain a single clear thread of ideas

Include:

- × Definitions
- × Algorithms
- × Description of test data
- × Experimental method
- × Summaries of experimental results
- × Theorems & proofs
- × Analysis of results
- × Equation and methods
- × Expression obtained

Results

- * This section typically contains tables and graphs of all the data and analysis comparison
- * Compare your results with other similar experiments, if appropriate. In this case, be sure to use complete references.
- * Objective presentation of experiment results
 - # Summary of data
- * NOT a Discussion!
- * Common mistakes
 - # Raw data
 - # Redundancy
 - # Discussion and interpretation of data
 - # No figures or tables
 - # Methods/materials reported

Discussion

* Interpret results

- ^ Did the study confirm/deny the hypothesis?
- ^ If not, did the results provide an alternative hypothesis? What interpretation can be made?
- ^ Do results agree with other research? Sources of error/anomalous data?
- ^ Implications of study for field
- ^ Suggestions for improvement and future research?

* Relate to previous research

* Common Mistakes

- ^ Combined with Results ^ New results discussed
- ^ Broad statements
- ^ Incorrectly discussing inconclusive results
- ^ Ambiguous data sources ^ Missing information

Summary/Conclusion

- Tell them what you've told them
 - some people only read abstract, intro and conclusions
- Relate back to general area
- Introduce future work
- Keep this section short!
- State the most important findings and how your work has advanced the field.
- Possibly comment on what additional work would be beneficial or is planned.

Acknowledgements

* **Acknowledgment:** indicate thanks to those who have helped with the work, but are not co-authors. List funding source:

- Thanks to Scott Maier for technical assistance; SVS acknowledges helpful suggestions from Dr. S. Fuzier
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- This research has been supported by NASA through the Research Initiative for Florida Universities under the grant NAG3-2751

References

References is a list of books, articles, and other publications which serve as the sources of information for your paper.

* Check specific referencing style of journal

* Should reference:

<> Peer-reviewed journal articles, abstracts, books

* Should not reference:

<> Non-peer-reviewed works, textbooks, personal communications

* Common Mistakes

<> Format, Format, Format

(Figures & Tables, Equations, and References)

<> Redundant Information

Text, Figures, Tables, and Captions

<> Type of Reference

Figures and Tables

* Tables

...Presents lists of numbers/ text in columns

* Figures

....Visual representation of results or illustration of concepts/methods
(graphs, images, diagrams, etc.)

* Captions

....Must be stand-alone

* Guidelines for Figures and Tables

....High resolution

....Neat, legible labels

....Simple

....Clearly formatted

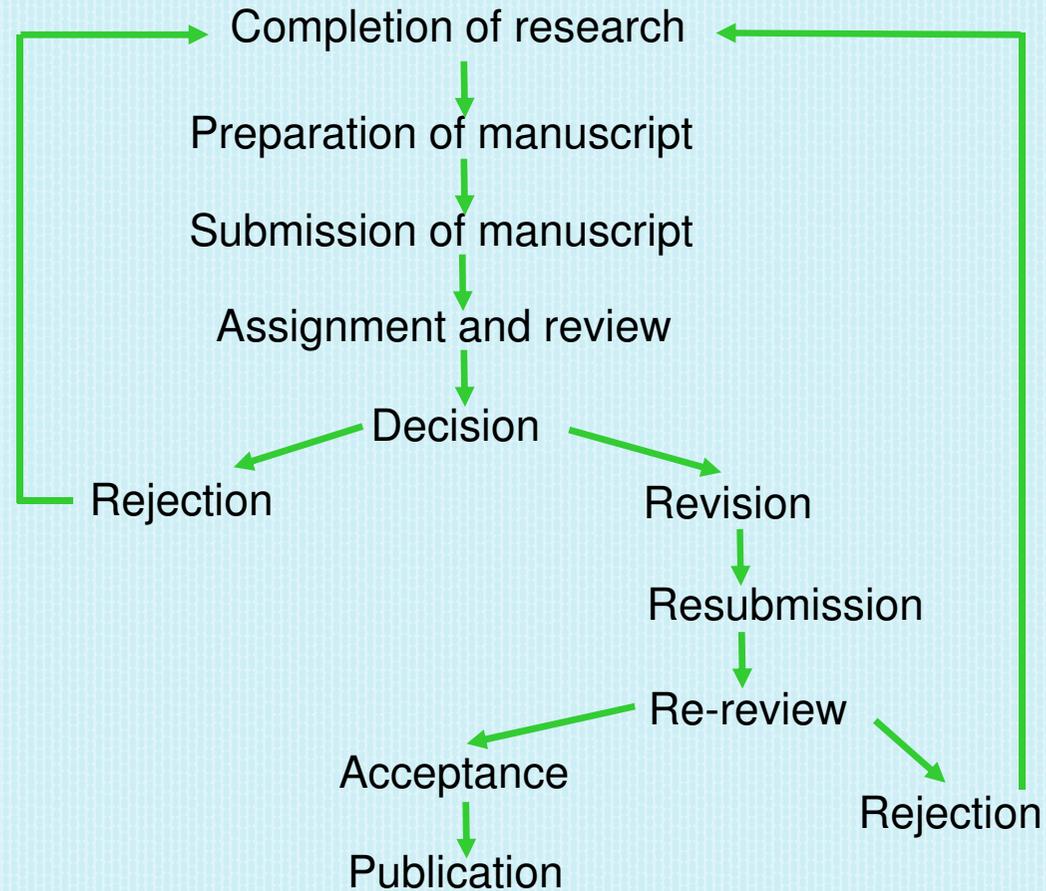
....Indicate error

....Detailed captions

PROOFREAD, PROOFREAD, & PROOFREAD!!!

1. ~~Are all words spelled correctly? (Use a paper or online dictionary is unsure!)~~
2. Did I capitalize the beginning of each sentence and all proper nouns?
3. Did I punctuate correctly?
4. Do I use grammar correctly?
5. Did I answer all of the topic questions, and fulfill all of the requirements on my rubric.
6. Did I include an introduction and conclusion?
7. Did I type the paper using the correct font type, size, line spacing and margin requirements?
8. Did I paraphrase all content?
9. Did I use parenthetical notations for quotes?
10. Do my sentences make sense when read aloud?
11. Have I had my paper peer edited?
12. Does my paper flow well?
13. Did I include a bibliography page?

Process of Research



Finished!!! You did it!!!

