

Thesis

Technical Report Writing

Introduction

- Thesis is a long research report
- Following discussion provides a guideline on writing thesis
 - Problem of getting started
 - Getting organized
 - Dividing the huge task into less formidable pieces

Outline

- Make a thesis outline
- Make list of chapters
- Organize chapter (order)

Organization

- Make different files for different portions of thesis
 - Chapters
 - References
 - Appendices
- Keep backup of all files

Timetable

- Make a time table for writing thesis after consulting your supervisor
- Manage your time

Presentation

- Your time can be more productively spent improving the content rather than the appearance
- It should still be presentable and professional looking
- Use graphics packages for making neat figures
- Use math tools for writing equations
- Provide appropriate table headings and figure captions
- Text within figures should be readable

Structure of Thesis

- Title page
- Declaration/Certificate
- Acknowledgements
- Dedication (Optional)
- Table of Contents
- Abstract
- Introduction
- Literature review
- Middle chapters (if needed)

Structure of Thesis

- Materials and Methods
- Theory (if required)
- Results and Discussions
- Conclusion and Suggestions for Future Work
- References / Bibliography
- Appendices

Title Page

- Title (including subtitle if any)
- Author (full name as appears on the degrees/passport)
- Institution
- Department
- Date of delivery
- Research mentor(s) and advisor, their institutions

Declaration/Certificate

- A declaration form or certificate is simply a **signed** declaration in the preface stating:
- This dissertation is submitted for the degree of Doctor of Philosophy/Master of Science(as appropriate).
- This dissertation is the result of my own work and includes nothing which is the outcome of work done in collaboration except as declared in the Preface and specified in the text.
- It is not substantially the same as any that I have submitted, or, is being concurrently submitted for a degree or diploma or other qualification at any University or similar institution except as declared in the Preface and specified in the text. I further state that no substantial part of my dissertation has already been submitted, or, is being concurrently submitted for any such degree, diploma or other qualification at any University or similar institution except as declared in the Preface and specified in the text

Acknowledgements

- Students may include a brief statement acknowledging the contribution to their research and studies from various sources, including (but not limited to)
- Their research supervisor and committee
- Funding agencies
- Teachers
- Fellow students
- Family

Dedication (Optional)

- Students may include a brief statement dedicating their research to any person (family, friends, etc.), cause or institution.

Table of Contents

- Table of contents (required)
 - list all headings and subheadings with page numbers
 - indent subheadings
- List of tables (required if document has tables)
- List of figures (required if document has figures)
- List of illustrations (required if document has illustrations)
- Lists of symbols, abbreviations or other (advisable if applicable)

Abstract

- Write this last
- It is an overview of your whole thesis, and is between 200-400 words
- The abstract is a concise and accurate summary of the research described in the document
- It states the problem, the methods of investigation, and the general conclusions, and should not contain tables, graphs, complex equations, or illustrations
- There is a single abstract for the entire work

Abstract

- A good abstract explains in one line why the paper is important. It then goes on to give a summary of your major results, preferably couched in numbers with error limits. The final sentences explain the major implications of your work.
- A good abstract is concise, readable, and quantitative.
- Length should be ~ 1-2 paragraphs, Max. 400 words.
- Abstracts generally do not have citations.
- Information in title should not be repeated.
- Be explicit.
- Use numbers where appropriate.
- Answers to these questions should be found in the abstract:
 - What did you do?
 - Why did you do it? What question were you trying to answer?
 - How did you do it? State methods.
 - What did you learn? State major results.
 - Why does it matter? Point out at least one significant implication.

Introduction

- It is the first chapter and is extremely important because it sets the scene and the tone for the thesis
- It is your first real opportunity to highlight the importance and value of your work
- This first chapter must introduce the thesis with an emphasis on its key components, providing a clear statement of the topic or problem under investigation
- It generally includes:
 - Context information (background to the topic)
 - Theoretical framework
 - Statement of the problem (indicates 'gap' in the research)
 - Aims of the project (states aim of your research and how it fits into the gap)
 - Brief description of your methodology/ research
 - Outline of chapters - Thesis plan

Introduction

- You can't write a good introduction until you know what the body of the paper says
- Consider writing the introductory section(s) after you have completed the rest of the paper, rather than before
- Be sure to include a hook at the beginning of the introduction (a statement of something sufficiently interesting to motivate your reader to read the rest of the paper)
- Review your introduction periodically, but don't worry too much about it until you have completed the whole thesis
- Be particularly careful with proofreading this chapter; a first chapter with errors suggests sloppy work and the possibility that the research has been conducted in a sloppy manner too
- Use the final paragraph of your introduction to make sure that the sequencing of your chapters is logical. Remember, you are telling a story: the story of your research.

Introduction

- What can belong in the introductory section(s) of your paper?
 - A statement of the goal of the paper: why the study was undertaken, or why the paper was written. Do not repeat the abstract.
 - Sufficient background information to allow the reader to understand the context and significance of the question you are trying to address.
 - Proper acknowledgement of the previous work on which you are building. Sufficient references such that a reader could, by going to the library, achieve a sophisticated understanding of the context and significance of the question.
 - All cited work should be directly relevant to the goals of the thesis. (not a place to summarize everything you have ever read on a subject).
 - The introduction should be focused on the thesis question(s).
 - Explain the scope of your work, what **will** and **will not** be included.
 - A verbal "road map" or verbal "table of contents" guiding the reader to what lies ahead.

Literature review

- Often part of the Introduction, but can be a separate section.
- This section should cite previous research in the area. It should cite those who had the idea or ideas first, and should also cite those who have done the most recent and relevant work.
- It is an evaluation of previous research on your topic, where you show that there is a gap in the knowledge that your research will attempt to fill.
- The key word here is evaluation.

Literature review

- To establish the need for your research, you must indicate in precise terms the problem which has not yet been adequately investigated.
- This is usually done by showing:
 - the limitations of previous research
 - the gaps in the previous research
 - the unresolved conflicts in the field that still require investigation
 - new developments that are required by the current state of knowledge in your field.
- It should be obvious where introductory material ("old stuff") ends and your contribution ("new stuff") begins?

Materials and Methods

- Outlines which method you chose and why (your methodology); what, when, where, how and why you did what you did to get your results.
- What belongs in the "methods" section of a scientific paper?
 - Information to allow the reader to assess the believability of your results.
 - Information needed by another researcher to replicate your experiment.
 - Description of your materials, procedure, theory.
 - Calculations, technique, procedure, equipment, and calibration plots.
 - Limitations, assumptions, and range of validity.
 - Description of your analytical methods, including reference to any specialized statistical software.
- Citations in this section should be limited to data sources and references of where to find more complete descriptions of procedures.
- Do not include descriptions of results.

Results and Discussions

- In the discussion of your findings you have an opportunity to develop the story you found in the data, making connections between the results of your analysis and existing theory and research.
- Outlines what you found out in relation to your research questions or hypotheses, presented in figures and in written text.
- Results contain the facts of your research. Often you will include a brief comment on the significance of key results, with the expectation that more generalized comments about results will be made in the Discussion section.

Results

- The results are actual statements of observations, including statistics, tables and graphs.
- Indicate information on range of variation.
- Mention negative results as well as positive.
- Do not interpret results - save that for the discussion.
- Lay out the case as for a jury.
- Present sufficient details so that others can draw their own inferences and construct their own explanations.
- Use S.I. units (m, s, kg, W, etc.) throughout the thesis.
- Break up your results into logical segments by using subheadings
- Sometimes Results and Discussion are separate sections.

Discussions

- Quarantine your observations from your interpretations.
- The writer must make it crystal clear to the reader which statements are observation and which are interpretation.
 - Comments on your results
 - Explains what your results mean
 - Interprets your results in a wider context; indicates which results were expected or unexpected
 - Provide explanations for unexpected results.
 - The Discussion should also relate your specific results to previous research or theory.
- You should point out what the limitations were of your study, and note any questions that remain unanswered.
- The Discussion CAN also include Conclusions/Future Research.

Conclusion and Future Work

- In this section the author demonstrates his/her mastery of the field and describe the work's overall contribution to the broader discipline in context. A strong conclusion includes the following:
 - Conclusions regarding the goals or hypotheses presented in the Introduction
 - Reflective analysis of the research and its conclusions in light of current knowledge in the field
 - Comments on the significance and contribution of the research reported
 - Comments on strengths and limitations of the research
 - Discussion of any potential applications of the research findings
 - A description of possible future research directions, drawing on the work reported.

Recommendations for Future Work

- Include when appropriate (most of the time)
- Remedial action to solve the problem.
- Further research to fill in gaps in our understanding.
- Directions for future investigations on this or related topics.

References / Bibliography

- There must be only one Bibliography or References section for the whole thesis.
- cite all ideas, concepts, text, data that are not your own.
- if you make a statement, back it up with your own data or a reference.
- all references cited in the text must be listed.

Appendices

- Appendices must be limited to supporting material genuinely subsidiary to the main argument of the work.
- They must only include material that is referred to in the document.
- Material suitable for inclusion in appendices includes the following:
 - Additional details of methodology and/or data
 - Diagrams of specialized equipment developed
 - Copies of questionnaires or surveys used in the research
- Note: Figures, calculations and tables, including captions, should be embedded in the text and not in an appendix, unless they are more than 1-2 pages and are not critical to your argument.

Thesis Structure

Why am I doing it?

What is known?

What is unknown?

What do I hope to discover?

How am I going to discover it?

What have I found?

What does it mean?

So what? What are the possible applications or recommendations?

What contribution does it make to knowledge? What next?

Introduction
Significance

Review of research
Identifying gaps

Aims

Methodology

Results

Discussion

Conclusions

Recommendations



THE END