

Research Methodology and Scientific Writing, 2011, II2202



**KTH Information and
Communication Technology**

Scientific Writing II

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School of Information and Communication Technology**

Presentation – Graphs

Illustrate and reveal data:

- Make the viewer focuses on substance
- Avoid distorting the data
- Present many numbers in a small area
- Make large data sets connective

- Use explanatory text under Figure / Table

- Explain the Figure / Table in the text

Presentation – Graphs

A graph should:

- Encourage to compare different pieces of data
- Reveal the data at several detail levels
- Have a clear purpose
- If possible: Integrate statistical and written descriptions

Presentation – Graphs

- *Line graphs* for showing changes over time
- *Bar graphs* for illustrating populations
- *Pie charts* for illustrating parts of a whole data set
- *Scatter plots* reveal outliers and patterns
- *Tables* can present smaller number sets and text

-> Use the right graph for the right data

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Writing Report / Thesis

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Report /Thesis

Why write reports and theses?

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-> Get readers to read it!

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How get readers to find your reports and theses?

Report /Thesis

Why write reports and theses?

-> Get readers to read it!

How get readers to find your reports and theses?

-> Interest and attract the readers

Report /Thesis

Guide the reader through the text – the “red thread”

- Readers interpret the text where it is located
- Highlight and emphasizes various pieces of information:
 - Depend on degree of importance

Titles

- Aim to attract the readers
- State the main topic of the study
- Separate your thesis from other theses in the field
- A clear and complete but succinct (powerful)

Abstract

- Capture the readers - Attract a wide range
- Write for non-specialists
- Summarise the contents of the report / thesis.
 - One – two sentences about the background
 - Purpose
 - The study
 - Results
 - Conclusions
- “Stand by its own” – concise, informative and complete

Abstract

- Important findings in few words - about 1/2 A4-page
- Avoid:
 - Abbreviations
 - Unfamiliar terms
 - Citations
- Do not include:
 - References

Keywords

Why use keywords? - To find the thesis

Choose keywords that:

- Reflect the contents
- Select important and specific terms – do not promise too much
- Avoid using the same words as in the title
- Avoid general single words that apply to a large number of papers

Introduction

- Interest your audience
- Provides sufficient context:
 - understand the study independently of previous publications on the topic.
 - lead to the work
- Gives an overview of *what to expect* in the paper
- A clear “funnel”:
 - start broadly -> narrow to a question

Background

- From general background to specific background of the subject
- Previous research and work in the area
- Discuss current beliefs
 - But exhaustive literature review in a chapter
- References to others
- Use past tense and present tense

Problem / Problem statement

- ❖ Direct focus on the problem / phenomenon
- ❖ Describe problems of previous work and/or unknown factors in the area
- ❖ *Current problem situation*
 - The causes
 - The effects
- ❖ State the central point
- ❖ Usually ends with a question

Hypothesis

- ✓ A proposed explanations for observable phenomena
 - ✓ Is a belief - Must be clear and concise
 - ✓ Must be measurable
 - ✓ Must follow from the problem statement
- > Not always needed

Purpose

- For the thesis
- Difference between:
“purpose with the thesis” – “purpose with the work”
- Most important element – central point
- Logically follow from previous statements

Purpose for the thesis

- Readers know what to expect in the thesis (read in direct way)
- Every paragraph and sentence relate to the purpose
- May allow the purpose of the work

Method for the thesis

- In Introduction: -> For writing the thesis
- Working process
- Commonly - literature studies
- Introduction of the study

Delimitations

- ✓ Everything that could be included in the thesis
- ✓ Choice for exclusion
- ✓ Arguments for selection
 - Not time!

Disposition

- ✓ “Reading schedule” for the reader
- ✓ Write as text – not bulleted lists
- ✓ For every chapter
 - what is the contribution?

Good Cohesion and Coherence

- ✓ Sentence locations
- ✓ Topic sentences
- ✓ Word locations
- ✓ Key terms
- ✓ Transitions – between paragraphs, sections, chapters

Common problems

- ✓ Missing elements (problems, question, introduction to experimental approach/study)
- ✓ Obscure elements /Unclear descriptions
 - confuse the readers
- ✓ Excessive length – often several topics
- ✓ Context/Background is too narrow

Chapter/Section 2

□ Commonly the theory part

- Detailed description about the subject
- Present and describe relevant theories regarding the topic
- Use references!

Chapter/Section 3

□ Can be – Method & Methodology

- Detailed description about the research method, and methodology
 - Sufficient to evaluate and repeat the work
 - Use references
- Presents and explains the method in order to fulfill the purpose of this thesis
- If poor, wrong or incomplete:
 - > the study is not trusted

Chapter/Section 3

- ❑ The chapter should (could) include:
 - ✓ Philosophical assumption(s)
 - ✓ Research Method(s)
 - ✓ Research Approach(es)
 - ✓ Research Design(s)

Chapter/Section 4

- **Follows the method part – The study**
 - Includes detailed description about the study but not results
 - Material used for the study (media, apparatus)
 - Subjects (patients, experimental materials)
 - Number asked, Number participated, Selected, Relevant details (gender, age, knowledge)
 - Dependent / Independent variables

The Study

- Procedures (what, how, why you did something)
- If a lot of details (and long chapter):
 - Place the significant parts in the chapter
 - Place less and detailed parts in Appendix
 - Detailed descriptions of procedures
 - Other “lengthly” descriptions
 - Data sets, Tables, Algorithms, Proofs
 - Transcriptions
 - Arrange in chronologic order
 - Link the different topics
 - Not forward referencing except to Appendix

The Study

- Literature study as data collection:
 - > Only if the collected pages are for data analysis (not background data) – making analysis on the text

Common problems

- Insufficient details
- Lack of arguments or Invalid arguments
- Unjustifiable switching between passive and active voice
- Unjustifiable switching between past tense and active voice

Chapter/Section 5

□ Follows the study part – Analysis

- Present analysis of the data
- Data from the experiments
- Coding / Interpretation
- Correlations between data
- Examples:
“the heart rate increased with”, “The terminals were used 90% of a day”, “It is 67% women and 20% men”

Chapter/Section 6

□ Follows the analysis part

– Results and Discussions of the study

- Report main findings and other important findings
- Present only the relevant results
 - Reflect the information presented in the method section
- Point the reader to the data shown in figures and tables

Chapter/Section 6

- Additional supportive evidence
- Important findings
- Present and discuss alternative measurements
- Interpret the data for the reader
 - The meaning of the data

Chapter/Section 6

- Quality assurance of the study:
 - Validation
 - Replication
 - Reliability
 - Dependability
 - Transferability
 - Confirmability

Chapter/Section 7 - Conclusions

□ Conclusions:

- Present only the relevant thesis results
 - Reflect information presented in the introduction
 - Hypothesis – falsify or verify
 - Explain contradictions
- Additional results meaningful to the thesis

Chapter/Section 7 - Conclusions

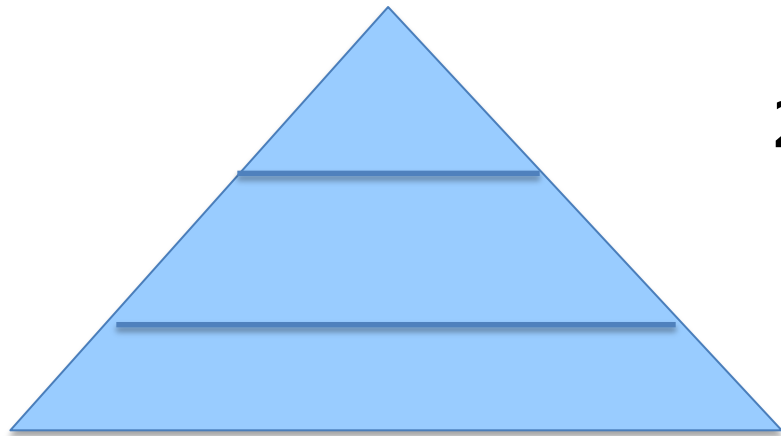
- Present results that confirm or falsify:
 - Purpose of the thesis
 - Goal
 - Problem statement of the thesis
 - Experimental approach
 - Result of the whole study
- Emphasize and signal your results
- Tell *what you think about your results* and *how strongly you believe in them*.

Chapter/Section 7 - Conclusions

- ❑ **Discussion** (report/thesis – not result of the study)
 - Interpret your key findings.
 - Reflect on – ***and argue***:
 - Purpose of the thesis
 - Limitations
 - Hypothesis
 - Problem statement of the thesis
 - Interpret the results of the study, summarize and generalize
 - Other authors' work (Background)
 - Keep in mind who your potential readers will be

Chapter/Section 7 - Conclusions

□ From key findings to closure



1. Interpret key findings / Answer problem statement
2. Compare/ Contrast to previous studies, Limitations of the study, Unexpected findings, Hypothesis
3. Summary, Significance/Implications for your field and society

Chapter/Section 7 - Conclusions

- **Further work** - Look to the future
 - What will be the next step for the study
 - For anyone to work with
 - What will be the next step for the thesis

Chapter/Section 7 - Conclusions

Common problems:

- Missing components (Results that reflect purpose, goal, hypothesis, background, experiment)
- Excessive experimental details
- Inclusion of irrelevant or peripheral information
- Inclusion of speculations and conclusions **beyond interpretation of results**

References

- ❑ **Provide original references**
- ❑ **Correctly place the reference**
 - Which is correct?

The inductive reasoning [3] will be used as the main scientific methodology for this thesis.

The inductive reasoning will be used as the main scientific methodology for this thesis [3].

References

- Which is correct?

According to [3],

According to Hofmann [3],

References

□ Justin Zobel, *Writing for Computer Science*, Springer; 2nd edition (April 27, 2004), paperback: 280 pages, ISBN-10: 1852338024, ISBN-13: 978-1852338022

□ Angelika H. Hofmann, *Scientific Writing and Communication: Papers, Proposals, and Presentations*, Oxford University Press, USA (December 16, 2009), Paperback: 704 pages, ISBN-10: 0195390059, ISBN-13: 978-0195390056

Questions?