Writing Engineering Reports

Purdue Writing Lab



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Overview

This presentation will cover:

- Report purpose and planning
- Report format and organization
- Headings and language
- Visual design
- Source documentation
- Finishing touches

Report Purpose

Describe research

- Explain problem or issue studied
- Discuss research method
- Describe data collected
- Describe research findings
- Explain implications

Report Purpose

- Inform readers of research results precisely, concisely, and specifically
 - They shouldn't have to read whole report to get essential points

Report Planning

- Before writing, consider:
 - Why you are writing
 - What you hope to achieve
 - Who you are writing for

These considerations will determine your report's content, organization, textual and visual design

- Reports generally include these sections in this order:
 - Abstract
 - Introduction
 - Literature Review
 - Methodology
 - Results
 - Discussion
 - Conclusion

- But be aware that order is flexible in that sections can be combined
 - Some journals combine introduction and literature review
 - Others have the results and discussion combined

Abstract

- Always comes first
- Microcosm of entire paper contains key info from each section
 - Contains essential information only it is brief!
 - Covers research highlights
 - Gives the research problem and/or main objective of the research
 - Indicates the methodology used
 - Presents the main findings and conclusions

Abstract Example:

A nonlinear finite element procedure for the pre- and postbuckling analysis of thin-walled box-section beam-columns is presented. The influence of local plate buckling upon the overall ultimate buckling behavior of the member is incorporated in the analysis by adopting a set of modified-stress – versus – strain curves for axially loaded plates. Factors such as residual stresses, associated with hot-rolled and cold-formed sections, and initial geometrical imperfections are Accounted for in the analysis. A number of examples are presented to demonstrate the accuracy and efficiency of the method.

From "Elasto-Plastic Analysis of Box-Beam-Columns Including Local Buckling Effects" in *Journal of Structural Engineering*.

Background/Introduction

- Explains the research problem and its context
 - Explains importance of the problem (Why does it matter? Why is more information needed?)
 - Explains reason and goals for study
 - Explains the limitations of the research performed

You want your reader to fully understand the significance of your research

Literature Review

- Summarizes and evaluates the literature that you have used in your study by considering:
 - How that literature has contributed to your area of research
 - The strengths and weaknesses of previous studies How that literature informs your own research and understanding of the research problem

Methodology

- Explains how data was gathered/generated
- Explains how data was analyzed
- Assumes reader understands material
 - Does not include explanatory material
- Is in past tense and passive voice
 - "A 1" piece of coil was cut"
 - The research has been carried out
 - It is the research, and not your activities, that are of interest

Results

- Visually and textually represents research findings
 - Visual representation of results:
 - Graphs, tables, diagrams, charts
 - Explanatory text:
 - Text points out the most significant portions of research findings
 - Indicates key trends or relationships
 - Highlights expected and/or unexpected findings

Discussion

- Assesses and comments on research results
- Includes:
 - Explanation for Results
 - Comments on unexpected results, offering hypothesis for them
 - Comparison to literature
 - Does your research confirm previous studies? Deviate from them?
 - Explanation for how info can be applied in broader context

Summary

- Discusses:
 - What was learned through research
 - What remains to be learned
 - Weaknesses and shortcomings of study
 - Strengths of study
 - Possible applications of study (how it can be used)
 - Recommendations

Organizational Considerations

- Your audience, purpose, and contents should influence your report organization and format
 - Example: your professor may have very specific guidelines
- Carefully consider your decisions

Headings and Subheadings

- Headings and subheadings guide readers' attention
- Can be used to keep track of various parts of project:
 - For example: "Making Components," "Assembling Components," and "Testing Assembly"
- They should be:
 - Specific and helpful
 - Used to break up text and "chunk" information
 - Used to guide readers' attention

Headings and Subheadings

Example of vague heading:

 - "The use of some computing technologies in certain engineering classrooms"

Example of specific heading:

– "Using Matlab in the Freshman engineering classroom"

Language and Vocabulary

Reports should be easily accessible

- Be straightforward and concise
- Use simple terms, not jargon and technical terms
- Keep sentences short and simple (20 words max)
- Be specific and not general
 - Use concrete numbers and metaphors or similes

- A report's visual design can make or break its communication success
- Visual Design includes:
 - Use of graphs and other graphics
 - Use of white space

Graphics:

- Should be used to illustrate specific points
- Should be incorporated in a way that is natural to report's content/context
- Should be explained fully in text using references such as "Fig. 1 shows..."
- Should be cited if taken from a source

- Graphics a caveat
 - Graphics do not speak for themselves!
 - For this reason, textual information should come *before* graphics.

- General layout should focus readers on key information
 - Use white space to guide readers' attention
 - Created through use of headings, subheadings, and visuals

Source Documentation

- Cite sources whenever you are quoting, paraphrasing, or summarizing work that is not your own
 - Quoting directly is discouraged
- Sources include:
 - Books
 - Journal, magazine, or newspaper articles
 - Interviews
 - Conference Proceedings
 - Lectures

Source Documentation

Citing:

- Shows your credibility as a researcher
- Gives proper credit to authors and researchers
- Protects you from accusations of plagiarism

Source Documentation

- Use APA or other specified format for documentation
- Check online for style guides
 - http://owl.english.purdue.edu
 - http://www.apastyle.org/
- Check journals for format info

Finishing Touches

- Usability Testing
 - Have a colleague read your report for clarity, organization, and visual design
- Check your sources for proper citations
- Proofread carefully or better yet, ask someone to do it for you

References

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- Halligan, N. (2004). A short course on writing technical reports. Technical Writing. Retrieved June 9, 2005 from http://www.technical-writing-course.com/type-of-technical-report.html
- Kvam, E. (Personal communication, June 11 2005).