Science and Engineering Dissertation 2: Discussion, Conclusions & Recommendations, Abstract

STUDENT LEARNING SUPPORT
Graduate Student Support
Acknowledgement of the Land

Ryerson University sits on the Traditional Territory of the Mississauga’s of New Credit First Nation. We are honoured to be a part of this community of our Indigenous colleagues and students.

- Chi Miigwetch
Based on *Writing for Science and Engineering*

by Silyn Roberts
Discussion, Conclusion & Recommendations
Purpose

Answer the research question
Show how the results support the answer
Show relationships among results
Show relationship of results to other studies
Draw conclusions
Difficulties

Having trouble deciding where to start
Being unsure of what to include
Starting writing too soon. This is one of the most difficult parts of the dissertation. Don’t begin it until you have finished the Methods and Results sections
How to Write it

Present the main trends, the relationships among trends, and generalizations of trends
Any conclusions that you draw must be clearly stated
Avoid merely restating the material
Discuss any contrary results and attempt to explain them
Explain agreements or disagreements between your work and other published studies
How to Write it

Do not try to hide data that are contrary to your conclusions. Give explanations.

Give evidence for each conclusion

If you speculate, keep it plausible

Defend your conclusion, but be respectful to contrary studies.

State the limitations of your study design

State the important implications of your study
Overall Structure

Beginning: State the aim. Give a brief summary of the results
Give the main point and the strongest arguments before the others
Present the main conclusion again in the final paragraph
Word Choice

Avoid the word “prove”
Use “show, demonstrate, indicate, support, suggest, imply, appear”
Hedging terms like “may be, might be, could be, probably, possibly” may be used as needed, but avoid using too many hedges in one sentence
Verb Tense

Past tense for results

Present tense for outcomes: the answer to the research question, facts, and current situations
Common Errors

The main point is not clear
Too wordy, unorganized
Too short: not all implications have been discussed; not enough familiarity with the literature to contextualize your work
Not beginning with the most important outcomes
Common Errors

Not enough discussion of the significance of the outcomes. The outcomes are not put into context

Unjustifiable conclusions, not supported

Some results are ignored

The interpretation obscures the true meaning of the data
Checklist

It is well structured
The main point is at the beginning
The other points appear in descending order of importance
It interprets the results
It places your work in the context of research in the field
Checklist

Each conclusion is based on evidence
All hypotheses are reasonable
There are no vague statements. Hedging is not overdone
The writer gives a fair, accurate, and objective treatment of other related studies
All anomalous outcomes are presented and explained
More About Conclusions

After the Discussion section the main conclusions of the study are summarized
They are usually numbered consecutively
How to Write it

Nothing new is presented here. Each conclusion is based on previously discussed information.

Each conclusion is brief.

The focus is on importance, validity of results, limitations of the study.

Format: Often a numbered list in descending order of importance.
Common Errors

Too vague and general
Not previously stated in the dissertation
Checklist

Everything in the Conclusions has been mentioned previously
Each conclusion is well supported by information in the dissertation
The main conclusion is first
The conclusions are in descending order of importance
Recommendations

This section gives a list of recommendations that reflect the conclusions. It proposes actions that should be taken.

It is usually combined with the Conclusions in a section called Conclusions and Recommendations.
How to Write it

Base each recommendation on your expert view of what can and should be done

Recommendations may refer to a need, a new concept, a new project, a solution to a problem

Use a numbered list, if possible, and try to match the numbers with those of the Conclusions. Each conclusion may lead to one or more recommendations
Verb Tense

It is recommended that the experiment should be replicated at 250 degrees Celsius.

It is recommended that the experiment be replicated at 250 degrees Celsius.

It is recommended that the experiment is replicated at 250 degrees Celsius.

The recommendations are:
Replicate the experiment at 250 degrees Celsius.
Checklist

The main recommendation is first
The recommendations are in descending order of importance
Each recommendation is clearly stated
Each recommendation is feasible
Each recommendation is related to information in the dissertation
Suggestions for Future Research

This section may be added to the end of the Conclusions and Recommendations section.

Limit the information to the most important ideas for future work.

You may mention a possible continuation of your experiment, especially areas that you feel have not been adequately explored.

You may mention a long-term development that could be based on your work.
References

Follow a style guide (e.g. APA, IEEE, CSE, etc.)
Place this list after the Recommendations
It is called “References” or “List of References” or “Reference List” or “Sources”, depending on the style you use.
Acknowledgements

Thank your supervisor and others for:
material
technical help
discussions
contacts
emotional support
How to write it

“I would like to thank the following people:”
“I am particularly grateful to...for...
“I would also like to thank...”

Include title, full name and initials, and department, institution, etc.
Common problems

Sounding patronizing or silly
Not including title, full name, and affiliation
Table of Contents

Purpose:
Give a list of headings and sub-headings with their page numbers
How to write it

Determine the lowest level of heading you want to show.
On the left side of the page list all the headings and subheadings that you want to show. Number them appropriately.
Place the corresponding page numbers to the right. Numbering begins with the introduction.
Listing the abstract is optional.
Checklist

What layout should be used
Correct formatting, consistent indentations
Page numbers correspond with those in the text
(Most word processors have a feature for automating the Table of Contents.)
Common Errors

Mismatches in wording and page numbering
Indenting and formatting are inconsistent
Checklist

Front matter pages are numbered in small Roman numerals
The following are listed and correctly numbered: chapter headings, section and subsection headings, the Reference section, all appendices
Each appendix has a title
Page numbers match with the text
Formatting and indentations are consistent
Sequence and numbering of all headings and subheadings match the text
List of Illustrations

Purpose:
To give a separate listing of illustrations
To include numbers, titles, and page numbers of all figures and tables
How to write it

If you are using both figures and tables, call it “List of Illustrations”. List the figures first, followed by the tables.

If you are using only figures, call it “List of Figures”. If you are using only tables, call it “List of Tables”.

Give the number, title, and page of each.

This list follows the Table of Contents on a separate page unless both are short.
Checklist

Figures are listed before tables
Number, title, and page for each illustration are given
The page numbers match with the text
The illustration numbers in the text match the list
Glossary

Purpose
To give definitions of all specialist terms used in the dissertation
To explain symbols and abbreviations used in the dissertation
How to write it

Preface the list with a statement such as the following:

S.I. (Système International d’Unités) abbreviations for units and standard notations for chemical elements, formulae and chemical abbreviations are used in this work. Other abbreviations are listed below.*

*(Silyn-Roberts, 2000, p. 27)
How to write it

Decide on the terms that need to be defined. Avoid defining well-known terms.

These include technical terms, symbols (including Greek letters), abbreviations and acronyms.
Placement

Immediately after the Table of Contents

If there are no abbreviations, it may be placed at the end, before the appendices

If there are many abbreviations and terms, the list may be split into two lists: “Glossary” and “List of Abbreviations” and placed in that order after the Table of Contents
Abstract
Purpose

Allow reader to see the main points at a glance
Provide a ‘road map’ for the dissertation
Enable the reader to decide whether or not to read the entire document
Common Errors

Being descriptive and not informative
Deciding what to include
Giving adequate coverage
Giving balanced coverage
Giving a coherent narrative
Achieving the desired length
General Format

A not-too-general statement placing the work in context
Method
Results and/or observations
Main conclusions
Main recommendations (if appropriate)
Advice

Make it informative
Add no new information
Do not include figures, tables, references
Complete the dissertation before writing the Abstract
In addition to the Abstract, give short chapter summaries at the beginning of each chapter
Length

Master’s dissertation: approximately 300-500 words
Ph.D. dissertation: approximately 500-800 words
Varies according to length and complexity of the content
Checklist

Contains context statement, method, results, conclusions, (recommendations)
It is informative, rather than descriptive
Contains no new information
Was written after the dissertation was completed
Graduate Student Support

• One-on-one tutorial sessions to help students with writing and referencing during any stage of the process.
• Two 50-minute appointments per week.
• Online workshops on a variety of graduate writing-related topics.
• Useful guides and resources on the website.
• Be sure to make an appointment on our website a week or two before your desired date as spots fill up quickly.

4th floor, Student Learning Centre
Visit Student Learning Support website
(416) 598 – 5978