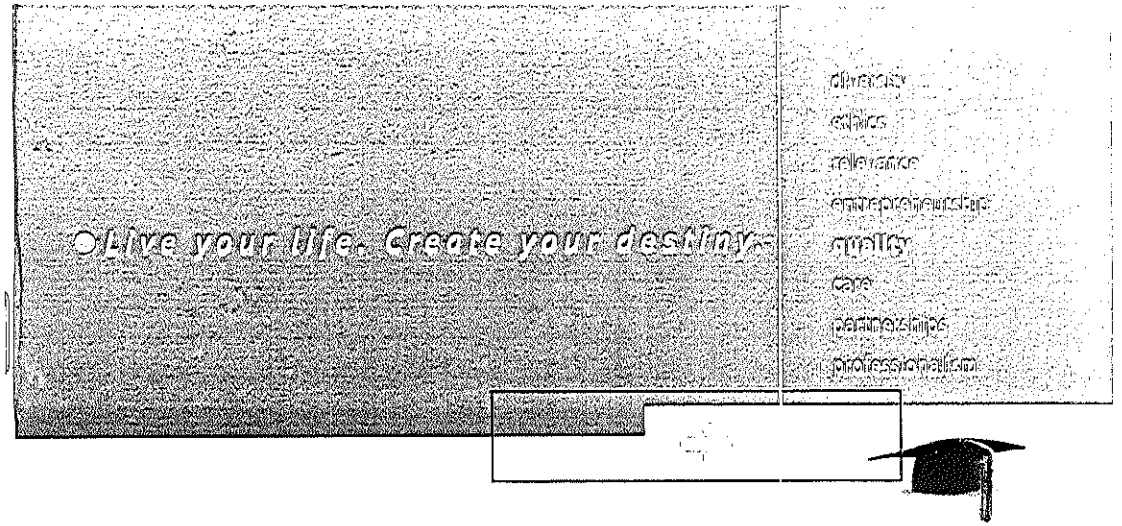

Guidelines for the Preparation of Dissertations and Theses

Tshwane University of Technology

POSTGRADUATE STUDIES

Revised Edition Part 3

GUIDELINES FOR THE PREPARATION OF DISSERTATIONS AND THESES

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CONTENTS

1. INTRODUCTION

Scientific research cannot be meaningful in isolation. It should always form part of the knowledge base of a specific science in order to make any sort of contribution to the science in question. This means that reporting on the research is possibly just as important as the research itself. The research report, i.e., the report on both the literature and the empirical research, should obviously be in a scientific format and, as such, meet scientific standards. In a certain sense, the report can be regarded as academic or scientific communication that highlights an important aspect of scientific practice, namely an action in which the scientist argues a specific point of view, hypothesis or finding for the benefit of fellow scientists. It is up to the scientist to indicate that the research being reported on meets the requirements of his or her science in terms of reliability, validity, objectivity and accuracy. The researcher must also indicate in the report what the central argument of the research is, and provide reasons for the scientific acceptability of the study.

Reporting, or scientific communication, is a validation action: to propose arguments or reasons (theoretical or empirical) to support or disprove a specific hypothesis or finding (also see Mouton & Marais, 1988:194-200).

1.1 TERMINOLOGY

"Dissertation" refers to a written scientific report on research, which is the requirement for obtaining a research master's degree (NQF level 8, PG3).

"Mini dissertation" refers to a written scientific report (or paper) associated with a structured master's degree (research report supplemented by course work, NQF level 8, PG2 and PG3).

"Thesis" refers to a written scientific report on creative and original research, which is the requirement for a doctorate (NQF level 8, PG4).

"Supervisor" refers to a full-time or part-time staff member of Tshwane University of Technology, or an employee of any other company, who is directly involved in providing postgraduate students with guidance.

2. WRITING A DISSERTATION OR THESIS

2.1 A DISSERTATION OR THESIS AS SCIENTIFIC COMMUNICATION

A dissertation or thesis is a document that clearly and thoroughly indicates what the researcher has done to solve the problem he or she has identified. It must be factual, logical and readable. The writer or researcher must, therefore, be able to communicate clearly.

There are a number of requirements for scientific reporting. When writing any dissertation or thesis, the following must be borne in mind:

- The scientific document must inform the reader about the problem, and the implications must be explained in such a way that everyone reading the document has the same orientation towards the problem.
- The necessity of the study must be motivated and the goal must be explained clearly.
- Sufficient theoretical background to understand the study must be provided.
- The method(s) followed and the aids used must be described clearly .
- The data must be presented in such a way that all the researcher's interpretations and inferences are supported.
- It must contain a list of the sources consulted.

In addition to the above requirements, the nature of the research (literature study versus empirical research) will also determine the format of the dissertation or thesis.

Leedy and Ormrod (2001:288) state that a report is a document that clearly and specifically indicates what the researcher did to solve the research problem. In this regard, the report must achieve four objectives:

- It should give the reader a clear understanding of the research problem and why it merited an in-depth investigation.
- It should describe exactly how data were collected.

- It should present sufficient and accurate data that should substantiate all interpretations and conclusions contained in the report.
- It should interpret the data for the reader and indicate exactly how the data was used to solve the research problem.

2.2 THE LAYOUT OF THE DISSERTATION OR THESIS

The previous paragraph dealt with the objectives that should be pursued and achieved in a research report (dissertation or thesis). The discussion indicated in broad terms the layout, arrangement or format of the research report –

- the introductory section,
- the presentation and discussion of the data, and
- the conclusion or final part of the report.

Although this general format must be followed throughout a research report, it goes without saying that a more detailed arrangement is necessary in order to present the contents systematically and accurately. In Leedy and Ormrod (2001:297-299), the format of a research project (dissertation/thesis) is discussed in detail.

The format of a research project, dissertation or thesis can vary. However, the design and the nature of the research (literature study versus empirical research) will to a large extent determine the format of the research report. Leedy's example of a format or layout is based on a research proposal suitable for an American university.

The possible decision-making steps in the research process were discussed in the preceding sections. However, all the steps need not necessarily be executed. Some of the steps can be combined, provided that the study lends itself to such an action. It is also not necessary to follow all the steps in strict sequence. You will, however, agree that some steps cannot be executed before others. You are therefore strongly advised to follow a specific sequence of steps that will enable you to conduct your master's or doctoral study in a purposeful manner.

3. AN EXAMPLE OF THE CHAPTER CLASSIFICATION OF A TYPICAL DISSERTATION OR THESIS

The following should be seen as an example only – in practice, the chapter classification of a dissertation or thesis will be determined by the research project. A more modern tendency for doctoral theses is to write each chapter with its own introduction, literature survey, results and discussion and conclusion (almost like an article for a journal). In such cases, the thesis must still have a general introduction to the entire thesis and one conclusion at the end that will summarise the overall conclusion.

The example that follows rests on the following two suppositions:

i The research method will be either a literature study or an empirical investigation.

ii The research objective will be to conduct exploratory or descriptive research.

Chapter 1: Introduction

The function of an introductory chapter in a scientific document is to introduce the reader to the topic, to indicate what previous work was done in this regard, what the problems are and why and how these problems were investigated. It prepares the reader for the scientific argumentation and evaluation of the information and findings. A thorough discussion of the background that gave rise to the problem is essential. The chapter is concluded with the objective(s) of the study. This chapter is a more detailed version of the first section of the research proposal, and introduces the reader to the study undertaken and the fundamental principles on which it is based. Although it is the first chapter, it is common practice to write it last.

Chapter 2: Literature survey

This chapter forms the literature section of the dissertation or thesis and contains the theoretical content that is necessary to understand the project and its necessity (with reference to existing research). The record-keeping system used by the student forms an important part of this section. The number of chapters and their contents will be determined by the nature and extent of the study. The student, guided by the supervisor, makes a decision in this regard.

It is important for students to note that it is essential to complete most of the literature study before proceeding to the final planning and execution of the research. The reason for this is that students often neglect the literature study. They start by collecting data only to discover during the literature study that their methodology and questions have critical weaknesses. This results in a theoretical egg-dance, which inevitably has a negative effect on the quality of the final product.

Each section should be concluded with a summary of the principles found in the literature that are applicable to the study.

Chapter 3: Theoretical considerations

If applicable, particulars of the literature, mathematical processing and model development are dealt with in this chapter.

Chapter 4: Methods and materials

Details regarding the methods and materials are often scrutinized very critically by other scientists, and weigh heavily in examining. This section, containing one or sometimes more than one chapter, can be regarded as the core of the dissertation or thesis, since an error or weakness in this explanation can invalidate the findings, dooming the study as a whole to failure. The content of this section will be determined by the nature of the research. The following guidelines may be used:

1. Start the chapter with a clear explanation of the methodology that will be followed to solve the problem.
2. Provide a detailed description of the components of the methodology, i.e., the nature, applicability, strengths and weaknesses, validity, tests, test samples, statistical methods, question curves, field workers, etc.
3. In experimental research it will contain a careful, but detailed, description of equipment, reagents and/or chemicals used (where applicable) and detailed information regarding procedures and methods used. This part should provide sufficient information for other researchers to duplicate the work done.

Chapter 5: Results and discussion

Like the section dealing with methods and materials, this section is highly exposed to criticism. This is justified, as it is usually the section neglected by students. The research task is not completed when the processed data has been presented in tables, figures, models and so forth. The research task focuses on

the interpretation and consideration of the results and the drawing of inferences – all of which form part of the pursuit of a solution to the problem. In the evaluation and examination of the research both the researcher's reasoning abilities and his or her skill in the techniques of data processing and interpretation are put to the test. The following guidelines apply in this regard:

1. To present the massive volume of data collected in an ordered manner, the researcher must put the data in writing, arrange it in tables and figures and group it in such a way that specific segments or groups of data correspond to specific segments (or subproblems) of the problem investigated.

2. The researcher must continuously deal with the data in such a way that the relationship with the problem or hypothesis is always indicated.

3. The interpretation of the data and the inference drawn on the basis of the data is especially important to determine the success or failure of the research. Statements or conclusions must be motivated and, where applicable, based on a sound statistical analysis of the data. Different views of a concept must be clearly stated, and the researcher must, by means of logical reasoning, indicate why one view is preferred to another. If the researcher does not accept any of the views, he or she must either provide his or her own view, or make an acceptable synthesis of other views. Once again the principle of logical reasoning applies.

4. Conclusions and findings must always be stated explicitly, and it must be clear on which facts and/or published literature the conclusions and findings are based. It must not be necessary for the supervisor or the general reader to reach conclusions by themselves or to struggle to find out how the conclusions were reached.

5. The discussion of the results must be objective, systematic and fluent.

Chapter 6: Summarising conclusions and recommendations

Just as the introductory chapter is an introduction to the research problem and the investigation, the final chapter is a retrospective summary and a conclusion. In this chapter, all the loose ends must be tied up, and the researcher must indicate in a few paragraphs what has been achieved in each phase of the research process.

On the basis of this summary, the researcher must clearly formulate his or her findings and conclusions regarding the research problem, subproblems or hypothesis.

In closing: An investigation of this nature often gives rise to recommendations, whether it be problems requiring further research or implications arising from the inferences. These recommendations can now be formulated to serve as guidelines for further research or other follow-up actions.

4. TECHNICAL AND EDITORIAL CARE OF DISSERTATIONS AND THESES

The dissertation or thesis must meet certain technical requirements with regard to layout, numbering system and typing.

4.1 TYPING AND OTHER GENERAL PRESCRIPTIONS

A4-size Bond paper of good quality must be used. Type on the recto or right-hand side only and follow general typing rules. Consistence is yet again the most important rule to follow. Use double-spacing, with doubled spacing between paragraphs and a size 12 font. The margins at the top, bottom and right-hand sides must be 25 mm, while the left-hand margin should be at least 30 mm.

The supervisor may have specific preferences regarding the layout of the text and the numbering system used in headings. All headings and accompanying numbering start against the left-hand margin, and the information under each heading is justified against the margin. As indentation causes numerous problems and wastes paper, it should be avoided. However, should you so prefer, you may centre chapter headings. Subsections within the text may be indented. Each chapter starts on a new page.

Chapter headings and the headings of main sections are typed in upper-case letters. Different letter sizes and/or bold print may be used to indicate progressive subordination. Headings of further subsections are typed in lower-case letters. Within the text itself, words or phrases may be underlined, printed in italics or printed in bold if emphasis is required.

Example: (Centre or left margin)

CHAPTER 2

SURVEY OF THE FIELD, PROBLEM STATEMENT AND METHODOLOGICAL JUSTIFICATION

4.1 SURVEY OF THE FIELD

1.1.1 Analytical view of the topic

An analytical view of the title of this study focuses on the following aspects: ...

1.1.2 Communication

In terms of communication one must look at the nature ...

1.1.2.1 Definition

Chapter 2 clearly shows that ...

4.2 TECHNICAL STRUCTURE OF A DISSERTATION OR THESIS

The dissertation or thesis consists of:

(i) Preliminaries (all information preceding the text) which consist of at least the title page, an abstract in Afrikaans and English and an index. These pages can also include a dedication, acknowledgements, a list of figures, a list of tables and a glossary. The following order is strictly adhered to in the preliminaries:

Title page
Declaration of own work and copyright [© Tshwane University of Technology]
Dedication
Acknowledgements
Abstract (summary in English) and the "Ekserp" (summary in Afrikaans) on separate pages
Index (or Contents)
List of figures
List of tables
Glossary

(ii) The text of the dissertation or thesis and bibliography/references

(iii) Annexures/Appendices containing, for example, questionnaires, list of abbreviations, symbols, additional tables or figures, etc.

(iv) The hard cover in which it is bound.

4.3 THE PRELIMINARIES

In the preliminary pages only the right-hand pages (rectos) are used. Pages containing preliminaries are numbered in lower-case Roman numerals. Although page i (the title page) of the preliminaries is included in the numbering, the number is not typed on this page. It is recommended that the pages be numbered at the top right hand or centre of the page.

4.3.1 Title page

The title page contains the following information:

- the full title
- the author's full names and surnames
- a statement by the author regarding the degree, institution, supervisor(s) and date

The following guidelines must be followed when designing a title page:

- **Bold print** is used for the **title,** the **candidate's name,** the **name of the degree** and **Tshwane University of Technology.**
- The name of the Department (in lower-case letters) as well as the name of the faculty (in capitals) must appear on the page.
- The correct official name of the instructional programme (e.g.. Magister Technologiae: Engineering: Metallurgical) must appear on the M Tech title page, but <u>not</u> on the D Tech page (Doctorates are generic degrees).
- Note that the **Latin names** for the degrees **(Magister Technologiae and Doctor Technologiae)** are used instead of a translation (Master's Degree or Doctorate).
- The wording **"submitted in <u>partial</u> fulfilment"** must appear on the page.
- No specific font type and size are prescribed, but font size 14 is recommended.

ANTI-TUMOR ACTIVITY OF RIMINO PHENAZINE COMPOUNDS

by

ESME VAN NIEKERK

Submitted in partial fulfilment of the requirements for the degree

MAGISTER TECHNOLOGIAE: BIOMEDICAL TECHNOLOGY

in the

Department of Biological Sciences

FACULTY OF NATURAL SCIENCES

TSHWANE UNIVERSITY OF TECHNOLOGY

Supervisor: Prof CE Median

Co-Supervisor: Prof D du Toit

September 1998

THE FILTER FURNACE ATOMIZER FOR

ATOMIC ABSORPTION SPECTROMETRY

by

Rita Mofolo

Submitted in partial fulfilment of the requirements for the degree

DOCTOR TECHNOLOGIAE

in the

Department of Chemistry and Physics

FACULTY OF NATURAL SCIENCES

TSHWANE UNIVERSITY OF TECHNOLOGY

Supervisor: Prof D A Katskov
Co-Supervisor: Prof P Tittarelli

January 2002

4.3.2 Declaration and copyright

The following declaration must be included on the next page:

DECLARATION BY CANDIDATE

"I hereby declare that the dissertation/thesis submitted for the degree ....(e.g.. M Tech: Marketing) ... , at Tshwane University of Technology a, is my own original work and has not previously been submitted to any other institution of higher education. I further declare that all sources cited or quoted are indicated and acknowledged by means of a comprehensive list of references".

M. Y. Name

Followed by the following at the bottom of the page:

Copyright© Tshwane University of Technology 2002

The student does not have to sign the page in the dissertation/thesis, but a signed copy will be kept on file.

4.3.3 Dedication

If the author wants to dedicate his/her work to a specific person, this is done on the next recto page. There is no heading and no prescribed format for this page.

Example: (Centre or left margin)

This study is dedicated to
my wife Tertia
and
daughter Marisca
for their support.

4.3.4 Acknowledgement

It is customary for an author to thank or acknowledge specific persons (family, supervisors) or institutions. This is done on the next

recto page under the centred heading ACKNOWLEDGEMENTS. Mention must be made of financial support received from Tshwane University of Technology and/or funding agents such as the NRF or the MRC and may also include staff or other persons who provided support and/or specific facilities that were used.

Example:

ACKNOWLEDGEMENTS

I would like to express my sincere gratitude and appreciation to:
My supervisor, Dr Conradie, for his positive attitude and guidance.
Tshwane University of Technology and the NRF, for financial assistance.

4.3.5 Abstract

An English and Afrikaans abstract of the dissertation or thesis follows after the title page and the dedication on two separate recto pages, under the centred headings ABSTRACT and EKSERP, respectively. An abstract is a short, informative summary of a maximum of 200 words for a master's degree, and 400 words for a doctorate. It describes the **problem,** the research **methods and procedures** followed and the **main findings** and **conclusions.**

4.3.6 Index (or Contents)

The index (or contents) appears on the next page. The index must contain the headings of all the sections (chapters and numbered subsections of chapters) and also correspond to these in terms of wording, the use of capital letters and the accompanying numbering. None of the entries in the index are underlined. Only the main headings and chapter headings may be typed in bold – everything followed by leaders and page numbers is typed in normal typescript.

The heading INDEX or CONTENTS (in capital letters) is centred. In the next line the word PAGE is typed against the right-hand margin. In the next line the heading CHAPTER and the chapter number are typed against the left-hand margin. Further information is justified against the left-hand margin. Each heading is followed by a leader (a

row of spaced full-stops) leading to the page number at the right-hand side of the page.

Example: (Centre or left margin)

CONTENTS

The rest of the chapters to follow, followed by:

4.3.7 List of figures and/or illustrations

If a list of figures is included, it follows on the recto page after the index. Because the list of figures and list of tables are also indicators of the content of the document, they are numbered as part of the preliminaries in lower-case Roman numerals.

The heading LIST OF FIGURES is centred and typed in capital letters, followed in the next line by the word PAGE in capital letters against the right-hand margin. Prescriptions for the use of capital letters and numbering are the same as for the index. Note that the figures in each chapter are numbered separately. In the following example, Figure 2.1 is therefore in Chapter 2; Figure 3.1 and 3.2 in Chapter 3; and Figure 4.1 in Chapter 4.

Example: (Centre or left margin)

LIST OF FIGURES

4.3.8 List of tables

A list of tables follows the list of figures on the next recto page under the centred heading LIST OF TABLES. The prescriptions are the same as those for the list of figures and the index. Note that the tables for each chapter are numbered separately. In the following example, Table 4.1 is therefore in Chapter 4 and Table 5.1 in Chapter 5.

Example: (Centre or left margin)

LIST OF TABLES

4.3.9 Glossary

In some subject fields it is sometimes necessary to provide an explanatory glossary. This consists of an alphabetical list of technical or subject-specific words and their meanings used by the author to define specialist terms that appear in the study.

The glossary follows on a recto page after the list of tables under the heading GLOSSARY. However, the glossary is not a table of contents, and is therefore not numbered in the same way as the index, list of figures and list of tables.

Example: (Centre or left margin)

GLOSSARY

AD VALOREM	In proportion to the estimated value of the goods concerned
AMORTIZATION	Paying off a debt gradually by money put aside
AVERAGE (AT SEA)	Damage or loss in sea insurance
EXCISE	Duty or tax levied on certain goods and licenses.

4.4 THE TEXT

See Section 5 for bibliographical reference techniques and Section 6 for the language editing of the text.

4.4.1 Numbering and typing format of headings

Numbers are used for numbering. Each chapter is numbered separately. When a chapter is divided into sections and subsections, decimal Arabic numbers are used interspersed with full-stops to indicate progressive subordination of headings within the text. If, for example, CHAPTER 1 is subdivided, the following subsections would result:

First section:	1.1
Second section:	1.2
Third section:	1.3, et cetera

Should 1.1 be further subdivided, the following subsections would result:

First subsection:	1.1.1
Second subsection:	1.1.2
Third subsection:	1.1.3, et cetera

Should 1.1.1 be subdivided, the following subsections would result:

First subsection:	1.1.1.1
Second subsection:	1.1.1.2
Third subsection:	1.1.1.3, et cetera

Numbers to the left of the first full-stop therefore indicate the chapter number, while those to the right of the full-stop indicate sections and subsections.

Limit the Arabic number system to four or, at the most, five subdivisions, after which numbers in brackets should be used, for example (1), (2), (3), etc., against the margin. However, these subdivisions are not indicated in the index. Should even more detailed subdivision be required, lower-case Roman numerals in brackets can be used, for example (i), (ii), (iii).

4.4.2 Numbering and typing format of captions of tables, figures and equations

Numbers are also used for the numbering of tables, graphs and figures. TABLE 1.10 refers to the tenth table of Chapter 1, FIGURE 5.6 to the sixth figure of Chapter 5, Equation 3.3 to the third equation in Chapter 3, etc. Choose your own typing format, but take care to be consistent. Captions must be brief, but fully descriptive.

In the case of a table, the **heading is always typed at the top** (centred or against the left margin).

Example:

TABLE 4.1: Home language of lecturers

(table)

In the case of a figure, the **caption is always placed below the figure** (see example in 7.2.3). **(Centre or left margin)**

Example:

(figure)

FIGURE 1.1: Schematic representation of the diffusion system

Equations must be numbered clearly. Several options are available and supervisors should be consulted about their preferences. Equations could be numbered as follows:

$$y = mx + c \qquad \text{(Eq. 3.3)}$$

4.4.3 Typing format of text

The line spacing is doubled under a heading. Paragraphs are justified against the left-hand margin, with doubled line-spacing between paragraphs. Lower-case letters are used, except in cases where grammatical rules require capital letters. Where accent is required, capital letters, underlining, bold print and/or italic print are used. Take care to be consistent and to follow general typing rules.

4.4.4 Numbering within the text

Headings are numbered with numerals, first Arabic and then Roman. When it is necessary to list items within the text, letters and/or symbols such as *, -, may be used. However, a clear distinction must be drawn between the numbering of headings and numbering within the text.

4.4.5 Bibliography/References

The thoughts, arguments and/or inferences of another author must be acknowledged by referring to the source of information in the text. The list of references comprises an alphabetical list of all the sources cited when writing the research report.

Reference technique and the compilation of a bibliography are discussed in detail in Section 5.

4.5 ANNEXURES

The author may want to include items such as schedules, lists of symbols and abbreviations used, additional tables or figures, questionnaires or detailed discussions of subordinate themes in the thesis or dissertation. These are attached in the form of annexures which come right at the end, after the bibliography. Each annexure must start on a new recto page. Annexures are numbered in capital letters: A, B, C, etc.

4.6 THE COVER

The completed dissertation or thesis must be bound in a hard cover.

The **title of the dissertation or thesis** is printed on the front cover, followed by the **initials and surname of the author,** and then the **date** (only the year) of submission (date when the final examination copy was submitted for examination).

On the spine, the title is printed **from the top to the bottom,** so that the information can be read from left to right if the book is put down flat on a table. In the case of a short title, the name of the author is printed next to the title. In the case of a long title, the name may be printed below the title.

5. REFERENCE METHODS AND THE LIST OF REFERENCES

5.1 INTRODUCTION

When writing an assignment, dissertation or thesis, it is important to acknowledge the sources of information that were consulted. This is done by listing the sources in a bibliography at the end of the document, and referring to them in the text of the document where applicable.

There are numerous reference methods or citation styles, all of which are acceptable as long as the author applies one method consistently throughout the entire dissertation or thesis. Researchers in a specific discipline often prefer a specific method that is used consistently within that discipline. As in the case of most academic institutions, **Tshwane University of Technology prefers the Harvard reference method** for the sake of uniformity.

For a more detailed description of the Harvard reference method you are referred to the "Citation guide for use in writing assignments, dissertations and theses" (Lotter, 2001), published by Tshwane University of Technology. (A revised edition, with technical corrections and more examples of electronic sources, will be published during 2002). Study this guide very carefully before the dissertation or thesis is written.

5.2 TERMINOLOGY

5.2.1 Citation

A citation is a reference to a source from which information was obtained. Citation means formally recognising such a source within your text.

5.2.2 Bibliography

The word **bibliography** normally refers to a list of all the sources consulted in writing a document, and not only to those cited. However, for the purpose of a dissertation or a thesis, **only those sources which have been cited in the text must be included in the bibliography or list of references.** If needed, an additional list may be added for the ist of sources that were consulted, but not cited.

5.2.3 Entry

An entry in the bibliography or list of references is the full record of the source which was cited in the text. A simple entry for a book will normally consist of the author(s), the year in which the book was published, the title and its publication information (place where the publisher has its offices as well as the name of the publisher).

5.3 PURPOSE OF TEXT REFERENCES (CITATIONS)

If other authors' ideas or arguments are used or if facts taken from their work are presented, reference must be made to the sources in which the ideas, arguments and/or facts were found. This is done by –

- clearly identifying the source (author and work) in which the facts, deas and arguments were found; and
- stating exactly where (the pages in the source) the information was found.

Sources are referred to in dissertations and theses for two main reasons:

- To acknowledge the sources used.
- So that readers can consult sources to determine whether each source is credible and whether facts and knowledge were interpreted and conveyed correctly in the dissertation or thesis.

5.4 THE RELATIONSHIP BETWEEN TEXT REFERENCES AND THE BIBLIOGRAPHY

Text references and the bibliography (list of references) go hand in hand. It is essential for the particulars of an item in the bibliography to be absolutely correct. If this is not the case, the text reference will also be incorrect.

6 LANGUAGE EDITING OF DISSERTATIONS AND THESES

6.1 WRITING STYLE

6.1.1 Text structure

A good dissertation must be extensive and precise, while at the same time being concise. The author must therefore beware of unnecsary repetitions and long-windedness. Use good yet simple and concise language, and keep sentences as short as possible. Consistently use the UK version of English and NOT the US version of the English language (e.g. *colour* and not *color*).

The following techniques serve as aids in this regard:

- Break complex statements down into lists/points.
- Do not use high-sounding words when simple words would be just as effective.

Avoid empty phrases such as "it is interesting to see that ..."

- Avoid unnecessary words, for example, "it was found that the precipitation was in a moist condition" can be stated simply by saying "the precipitation was moist".

Never use pronouns such as I, they, my, etc.

6.1.2 Specialist terminology

Subject-specific language forms an essential part of any scientific publication. However, the author must be sure that the readers will understand the specialist terminology used. If, for example, you need to write down the name of a chemical compound, the official names (nomenclature) as prescribed by IUPAC (The International Union for Pure and Applied Chemists) must be used. For example, *ethanol* instead of *ethyl alcohol* and *propanone* instead of *acetone* (ask your supervisor for more information). Should there be any doubt, terms must be defined in the text and in a glossary (if included).

6.1.3 Sentence structure

Long sentences with a number of subordinate clauses are difficult to follow, especially if the subject itself is complex. Reading tests have shown that sentences with more than 25 words are generally more difficult to understand. Where possible, sentences must therefore be short and concise.

6.1.4 Paragraphs

Paragraphs help the reader to divide the text into manageable sections. Make use of the following guidelines:

- A paragraph must contain a main statement supported by a group of particulars.
- In technical works, the main statement is usually found at the beginning or close to the beginning of a paragraph. However, for persuasive purposes, the main statement is placed at the end to form a climax towards which the

supporting facts have built up.

- The transition between paragraphs must be smooth and consecutive paragraphs must be related.

- Long, uninterrupted text sections are discouraging to the reader and paragraphs must therefore not be too long.

6.1.5 Abbreviations and acronyms

Avoid the use of abbreviations in the text. Words and phrases such as *for example*, that is, and et cetera must be written in full. Acronyms (abbreviations pronounced as words) may be used if the explanations are provided in a glossary or included in a list of abbreviations and/or symbols as part of an addendum.

6.1.6 Scientific units

Whenever reference is made to any units of measure, it is very important that the correct SI units (Systéme International d'Unités) be consistently used. Ask your supervisor for more details (see Annexure A).

6.2 EDITING

This includes checking and correcting the text and seeing to the finishing touches. The editing of the text is the responsibility of the author, who must

- check the accuracy of the information;
- clear up ambiguities; and
- emphasise important aspects.

The editing process entails critical evaluation of the text regarding the requirements arising from the objectives of the research. The author must check each chapter and determine whether it –

- actually contains meaningful facts;
- is free of inaccuracies, ambiguities and bias;
- emphasises important aspects and is free of verbosity, irrelevancies and unnecessary detail;
- contains arguments that will stand the test of logical analysis;
- is easy to understand; and
- applies to the topic.

Editing comprises three separate actions –

- editing of integrity;
- editing of logical progression; and
- editing of text and language.

6.2.1 Editing of integrity

The index must be examined and the following aspects must be checked:

- Are the headings and subheadings clear descriptions of the sections covered?
- Do they form a recognisable logical pattern, and is this pattern reflected by the numbering system?

The text must then be checked page by page to determine whether –

- the headings and numbers are identical to those used in the index; and
- the tables, figures and references are quoted correctly in the text.

6.2.2 Editing of logical progression

Each chapter must be read to check whether –

- the objective is clearly stated and also whether the conclusion indicates if the objective was achieved or not;
- the logical progression is visible, since any gaps usually indicate that the information was organised incorrectly; and
- any section contains facts that do not belong there, i.e. that have been mentioned elsewhere or that do not apply to the relevant chapter/central theme.

Structural errors must be corrected before the text and language are edited.

6.2.3 Editing of text and language

Only after the author is satisfied with the basic format of the report can he or she attend to the structure of the text and language usage. **Use the UK version of English and not the US version.**

Criteria for functional writing:

- Accuracy – adequate for the needs of the readers
- Conciseness – leave out trifles, but cover the essential matters sufficiently
- Clarity – avoid vagueness and ambiguity
- Emphasis – emphasise important information
- Objectivity – avoid emotional statements

6.2.4 Editing of graphic material

Use the same criteria as in language editing: accuracy, conciseness, clarity, emphasis and objectivity.

6.2.5 Editing of significant figures

Ensure that the correct number of **significant figures** is used whenever results are reported. The correct scientific notation when reporting figures must be used. In SA, the decimal comma is used and not a **decimal point**, which is used in almost all ot countries and is required by all scientific journals. For this reason, it is permissible to use the decimal point to avoid any confusion (especially in the case of overseas examiners), but please be consistent.

7 PRESENTING AND PUBLISHING RESEARCH RESULTS

A researcher's job is not done until his work is published. A dissertation or thesis will, in most cases, only be read by a handful of people and most universities expect of their students to publish their research findings. It is expected of a candidate for a doctorate to uncover new information, new ideas, and new understandings that can make a significant contribution to the world's body of knowledge that should be shared with a broader audience.

7.1 PRESENTATIONS AT CONFERENCES

It is expected of postgraduate students to present their research findings at regional, national, or international conferences. If you would like to present a paper at a professional conference, you will, in most cases, need to submit an abstract of your planned presentation to the organisers of the conference several months in advance. The specific format varies from one conference to another and it is best to consult the "call for papers" that invites proposals for conference presentations. As you prepare for your first conference, ask your supervisor for guidance and advice.

7.2 JOURNAL ARTICLES

The most effective, and certainly the most permanent way of disseminating your research findings is to submit them to a research journal. Please consult your

supervisor for the exact requirements regarding publications in journals since this is one of the requirements for research degrees. Before a manuscript is submitted, it is important to select the most appropriate journal for your research findings. All journals have their own particular format according to which a manuscript should be prepared.

7.3 SHARING AUTHORSHIP

Whether you are presenting a paper or submitting a manuscript to a research journal, you will always have to include your supervisors and other possible coworkers as co-authors. A general rule of thumb is this: Individuals who have made significant intellectual contributions to the work share in authorship (Leedy & Ormrod, 2001:304). Multiple authors are normally listed in order of contributions made. Sharing authorship with others is not only a form of recognition for their contribution, but is also a matter of ethics.

8 CONCLUSION

As indicated by its title, this document is an attempt to provide guidelines on the preparation and writing of a dissertation or a thesis. The aim was to acquaint research students with the most essential knowledge required to start with the writing of the dissertation or thesis as soon as possible.

Once you have worked through this document, you should agree that any researcher should easily adapt to the systematic nature of the research process, which places a high premium on the validity and credibility of research findings. This is what research is essentially about. Research expertise is a combination of theoretical knowledge with regard to the research process, and the practical application of this knowledge. However, a researcher's work is not completed until he or she has published the results.

We trust that you will not only find the contents of this document useful, but that it will also help you to enjoy writing your dissertation/thesis. Good luck with your research task!

BIBLIOGRAPHY

BAILEY, K. D. 1986. *Methods of social research.* 2nd ed. London: Collier Macmillan.

BUCKLEY, J. W., BUCKLEY, M. H. & CHIANG, H. 1976. *Research methodology & business decisions.* [S.l.]: National Association of Accountants and the Society of Industrial Accountants.

COHEN, L. & MANION, L. 1989. *Research methods in education.* 2nd ed. United Kingdom: Routledge.

DUMINY, W. W. 1975. *Wenke vir die skryf van 'n werkstuk.* 2de hersiene uitg. Pretoria: Universiteit van Pretoria.

EMORY, C. W. 1985. *Business research methods.* Homewood: Irwin.

HUYSAMEN, G. K. 1994. *Methodology for the social and behavioural sciences.* Pretoria: Sigma Press.

KERLINGER, F. N. 1986. *Foundations of behavioural research.* New York: Holt, Rinehart and Winston.

LEEDY, P. D. 1985. *Practical research: planning and design.* New York: Macmillan.

LEEDY, P. D. 1993. *Practical research: planning and design.* 5th ed. New York: Macmillan.

LEEDY, P. D. & ORMROD, J. E. 2001. *Practical research: planning and design.* 7th ed. New Jersey: Prentice Hall.

LOTTER, C. 2001. *Citation guide for use in assignments, dissertations and theses.* Pretoria: Technikon Pretoria.

MOUTON, J. & MARAIS, H. C. 1988. *Basic concepts in the methodology of the social sciences.* Pretoria: Human Sciences Research Council.

MURDICK, R. F. 1966. *Business research: concept and practice.* Scranton, Pa: International Textbook Company.

RYAN, B., SCAPENS, R. W. & THEOBALD, M. 1992. *Research method and methodology in finance and accounting.* London: Academic Press.

SWANEPOEL, M. [S.a.]. *Die gebruik van literatuur in navorsing.* Pretoria: Technikon Pretoria.

TECHNIKON PRETORIA. [S.a.]. Students' guidelines for advanced study. Unpublished.

TECHNIKON PRETORIA. [S.a.]. Guidelines for the study panel. Unpublished.

TECHNIKON PRETORIA. 1995. *Guidelines on research and the research process.* Pretoria: Technikon Pretoria.

UNIVERSITY OF THE WITWATERSRAND. Faculty of Engineering. 1985. *Guide for the preparation of theses, dissertations and project reports.* Johannesburg: University of the Witwatersrand.

VAN SCHOOR, M. C. C. & EALES, M. 1977. *Handleiding by die saamstel van werkstukke.* Bloemfontein: Universiteit van die Oranje-Vrystaat.

WELMAN, A. K. 1988. *Guidelines for writing scientific reports.* Pretoria: Human Sciences Research Council.

WENKE vir die persklaarmaak en reproduksie van verhandelings en proefskrifte. 1987. Pretoria: Kitskopie.

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ANNEXURE A: SI UNITS

The Systéme International d' Unités (SI system)is the international system of units now recommended for all scientific purposes.

The SI system is a coherent and rational system derived from the m.k.s. system. It replaces all other units, such as the c.g.s and imperial units.

The system has seven base units and two dimensional units (see Table B1). All other units have been derived from those nine units. Although Kelvin (K) is the official unit for temperature, it is common practice to make use of °C when referring to the temperature of a liquid or an oven (never use °F). Depending on the field of study, commonly used units such as cm^3, dm^3, km, cm, mℓ, ℓ and g are not strictly correct according to the SI system, but they have become such useful units that it would be possible to use them. It is, however, very important never to mix units (e.g. cm^3 and mℓ) in one report. Scientific journals all have their own preferences, which will be described in the instructions to authors. The most important thing to remember is always to be consistent. **Imperial units are not allowed.**

When combining units, it is important to use them correctly and, above all, to be consistent. The correct way is to leave a space between units, although it is not uncommon to use a full stop to separate units. For example:

mol ℓ^{-1}	or	mol.ℓ^{-1}
g ℓ^{-1}	or	g.ℓ^{-1}
ℓ s^{-1}	or	ℓ.s^{-1}
km ℓ^{-1}	or	km.ℓ^{-1}
J K^{-1} mol^{-1}	or	J.K^{-1}.mol^{-1}
m^3 kg^{-1} s^{-2}	or	m^3.kg^{-1}.s^{-2}

It is clear that the space is important to separate different units to avoid confusion. Compare ms (milli seconds) and m s (metre second) when units are com-

bined. Although it is possible to use "/" when referring to a simple unit such as *g/l*, it becomes more difficult to use it in the last two examples provided above.

TABLE B.1: Base and dimensionless SI units

Physical quantity	Name	Symbol
length	metre	m
mass	kilogram	kg
time	second	s
electric current	ampere	A
thermodynamic temperature	Kelvin	K
luminous intensity	candela	cd
amount of substances	mole	mol
*plane angle	radian	rad
*solid angle	steradian	sr

*dimensionless units