

Writing a good thesis, dissertation or research report

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by

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Acknowledgements

I do not claim that all of the ideas that appear in this document are my own or that they are “new”. All I have tried to do here is to put things down in an organised and accessible manner.

I spent a lot of time “surfing the web” to clarify my understanding of some of the grammatical errors and tips that I present in this document. I decided not to list the various sites that I visited in my references/bibliography as this would make the document too long and it would be difficult to ascribe an idea to one or more sites without missing others. I do, however, acknowledge that there are many such sites, I thank their authors for their efforts to assist us all and suggest that students should consult these sites if my document proves to be insufficient.

Thank you to everyone who has contributed directly or indirectly to me being able to “write this down”.

Contents

1	Introduction	1
1.1	Overview	1
1.2	Writing up does not only happen at the end	1
1.3	Conclusion	2
2	The structure of a thesis, dissertation or research report	3
2.1	Introduction	3
2.2	Detail of suggested structure	4
2.2.1	Title page	4
2.2.2	Dedication	4
2.2.3	Declaration	4
2.2.4	Preface	5
2.2.5	Acknowledgements	5
2.2.6	Abstract	5
2.2.7	Table of Contents	5
2.2.8	Chapter 1. Introduction	6
2.2.9	Chapter 2. Literature review	6
2.2.10	Chapter 3. Research Methodology	7
2.2.11	Chapter 4. Results	7
2.2.12	Chapter 5. Discussion	7
2.2.13	Chapter 6. Conclusion	7
2.2.14	References	8
2.2.15	Appendices	8
2.3	Variations	8
2.4	Finally	8
3	Tips for a good document	9
3.1	Introduction	9
3.2	The Golden Thread	9
3.3	Sections and subsections	10
3.4	Leading your reader	10
3.5	Presentation	11
3.5.1	Consistent layout	11
3.5.2	Use of language	11

3.5.3	Fonts	11
3.5.4	Widows, orphans and lonely headings	11
3.5.5	Figures	11
3.5.6	Tables	12
3.5.7	White space	12
3.6	Conclusion	12
4	Stylistic Issues	13
5	Common grammatical errors	17

Chapter 1

Introduction

1.1 Overview

There are two very important aspects to passing your Honours, Master's or PhD – doing good research at the appropriate level and writing up in a fashion that convinces your examiners that you have met the requirements for the degree.

Typically you are required to have

- read and shown understanding of the literature in your field of study,
- developed a focussed research question (or aim or hypothesis),
- identified and adopted an appropriate research approach,
- presented your results in a clear form,
- discussed your results and their relationship to the research questions,
- discussed your results in the context of other work in the field,
- argued that you have made a contribution in the field (this is crucial for a PhD thesis), and
- written up your research in an appropriate document.

This document concentrates largely on the last bullet point (assuming that – with the guidance of your supervisor[s] – you have done good research).

1.2 Writing up does not only happen at the end

You cannot leave the writing up of your thesis, dissertation or research report to the end. Writing up is something which begins pretty much as soon as you have completed your proposal and continues as you work on your research. You should be updating your literature review section as you encounter more related work. You should also be writing up your research as you go along. If you are developing new methods or algorithms, or proving theorems then you should

be recording the process and presenting your work in a clear and understandable fashion. If you are doing empirical research then you should be recording what you done and updating your methodology and even your results chapters as you do your experiments. By the time you have completed your experiment, whatever that is, and have collected and analysed all of your data, you should almost be in a position where all that you need to do is to write your introduction and conclusion chapters and polish your final document.

It is also useful to have a research journal in which you can record thoughts, ideas, notes about things you have read, notes about what you have been doing as you do your experiments or make your measurements, reflections on what the results could mean, etc., for later consideration for inclusion in your final document.

1.3 Conclusion

There is no “one-size fits all” format for a thesis, dissertation or research report. Your document, like your research, is unique. There are, however, some things that are common for all theses, dissertations and research reports. In the next chapter a generic structure for a thesis, dissertation or research report is given. In subsequent chapters I give some tips on how to write a good document (Chapter 3), discuss some stylistic issues that should be kept in mind (Chapter 4), and then discuss some grammatical mistakes that are commonly made and explain how to avoid these (Chapter 5).

Chapter 2

The structure of a thesis, dissertation or research report

2.1 Introduction

As mentioned earlier there is no fixed structure for a thesis, dissertation or research report. Typically one adopts a structure that serves the purpose of “selling” your research. It is, however, useful to begin with a basic idea of what is required and adapt that appropriately. A typical document could be of the form below.

- A title page in the required format
- A dedication page
- A declaration page
- A preface
- An acknowledgements section
- An abstract
- A table of contents (plus a list of tables and a list of figures)
- An introductory chapter
- A literature review chapter
- A research methodology chapter
- A results chapter
- A discussion chapter
- A concluding chapter
- References

- Any appendices

Note that in some instances institutions have their own requirements for theses, etc., which may be quite different from the framework given above. The information which should appear in any thesis is, however, the same.

The details presented here give a skeleton for you to work from in your document. These are guidelines only – they will not apply and probably cannot be forced to apply to all research. Part of your task as a student is to decide how to use these guidelines in preparing your document. You should discuss your ideas for the structure of your document with your supervisor.

For each page/chapter, some details of what should/could appear are given below.

2.2 Detail of suggested structure

2.2.1 Title page

The layout of the title page is typically defined by the university. The university's or the faculty's postgraduate division typically has documents that describe what is required.

2.2.2 Dedication

Typically one dedicates one's thesis, dissertation or research report to someone who has played a significant part in one's (academic) life. The dedication is short – a sentence or so – and personal.

2.2.3 Declaration

The declaration is again something for which various universities have their own required content and layout. Again this is typically available from the university's postgraduate affairs division.

The intent is that you state that

- you did the work yourself,
- you have properly and completely acknowledged sources that you have used, and
- the work in the thesis, dissertation or research report has not been submitted or examined elsewhere.

It is basically your “honesty” pledge.

2.2.4 Preface

A preface in your thesis is useful and appropriate if there is anything you need to tell the reader before they actually start reading the document.

One instance where a preface can be very useful is if you have published work from the thesis before you actually write up and submit the thesis. In that case, you give the details of the publication and describe how the publication relates to the thesis.

2.2.5 Acknowledgements

In the acknowledgements section of the thesis you would typically thank those who have helped you complete the research and the write up. This could include friends, family, supervisors, students, colleagues, etc. In this section, you could also acknowledge any funding or other assistance that you received while doing your research.

Note that some funding bodies have specific wording that they require be used when acknowledging their support.

2.2.6 Abstract

The function of an abstract is to allow a reader to determine whether a document is relevant, and hence the major points of the document should be covered including scope and conclusions. It should be short, informative, specific, self-contained and written for a general audience in that research area. It should not include abbreviations or citations. Your document should not refer to the abstract and your abstract should not “point” to any part of the body of the document.

In the abstract of your document, you should

- briefly set the scene (this is essentially your problem statement),
- say what you did,
- explain briefly how you did it,
- say something about your data and your results,
- say what you learnt, and
- say something about your contribution.

But do not use a list! And do not write something that reads like a list.

2.2.7 Table of Contents

In most instances the table of contents can be generated automatically by the typesetting software that you use to prepare your document. If it isn't, get different software. The same applies, for a *List of Tables* and a *List of Figures*.

2.2.8 Chapter 1. Introduction

There are two important aspects in writing a good introduction chapter – *level* and *scope*. This means for whom you are writing the chapter and what should you be telling them in that chapter.

The introductory chapter of a thesis should be written at a level that could be understood by any intelligent outsider (anybody with a degree in any area is a good target to aim at). Obviously in doing this you must realise that you cannot include everything and that you should not get into technical details.

In terms of scope, the chapter should cover enough about your research so that anyone reading it will be able to understand what problem you were interested in; how you reduced that to a focussed research question or research aim; what that question or aim was; how you set about answering the question or achieving the aim; what you actually did; what results you achieved; what is the significance of your results; and how this work furthers knowledge in the area. In a PhD thesis, this is the first place that you should make an argument about your *significant and novel contribution*.

In this chapter, you must also give a good idea of the overall structure of your document but do not write something that reads like a “table of contents” – you should already have one of those in your document. Try to write something that is interesting and engaging for your reader (see Chapter 4, point 4)

Writing a good introduction is difficult – expect it to take time and be prepared to rewrite and to do a lot of “polishing”. Note also that the introduction and conclusion will typically be the last chapters of your thesis, dissertation or research report that you finalise – once you (and your supervisors) are happy with everything else.

2.2.9 Chapter 2. Literature review

In this chapter you should elaborate on (or give details of) the problem and discuss why it is an important problem to tackle. You should then discuss related literature in the area.

The aim here is to give your reader a detailed picture of what has been done in the past and how it relates to what your research was about. You should discuss the background to the problem, alternative and related approaches and why they are significant to your problem (what they are, what you learnt from them and how they could be used to solve your problem).

The literature review has to be broad enough to cover all of the related research, but it also has to be at sufficient depth to convince the readers (or examiners) that you really understand the theories or methods in the area. This includes discussing seminal papers in depth and then tracing the progression or development of ideas or concepts over time. If any theory, method or approach is to be used in your research, then details of these must be presented in sufficient depth to convince the examiner that you understand the background, use and limitations of these.

2.2.10 Chapter 3. Research Methodology

Choosing an *appropriate* strategy for, or approach to, addressing the research problem (questions and/or aims) is a crucial part of doing research that is accepted in the academic community. In this chapter the proposed research strategy should be presented (see I. Sanders, Pilkington, and Pretorius (2022) for an argument of why research approaches should be made explicit and Pilkington and Pretorius (2015) for more details about research strategies in the computing disciplines). This should start from the researcher's philosophical world view and then present an appropriate research design and methods to verify the hypothesis, answer the research questions or achieve the aim.

This chapter will make the problem more explicit and outline an approach to solving it. Here you should spell out in detail exactly what problem you were trying to solve and how you set about tackling this.

The first part of this can be accomplished by formulating a clear and precise hypothesis which can be tested. It could also be accomplished by coming up with a clear and precise research question which can be answered. Your research hypothesis or question should be justified – it should be made clear why you have chosen that specific hypothesis or question.

The second part of this is accomplished by designing an experiment to attempt to verify your hypothesis or answer your research question. Here you must give details of what you did, why you did it and how it will answer your research question or lead to acceptance or rejection of your hypothesis. Exactly what appears here depends on what type of research you are doing.

2.2.11 Chapter 4. Results

Here you should discuss the raw results which arose as a consequence of what you did to answer your research question or accept/reject your hypothesis. This could be graphs or tables of measurements, proofs, lemmas, an algorithm you developed, etc. (again this depends on the type of research that you are doing). You can highlight the main findings but should delay discussion of the results to the next chapter.

2.2.12 Chapter 5. Discussion

In this chapter you should discuss in detail the significance of your major results – how they answered your research question or led you to accepting/rejecting your hypothesis, whether there were any surprises or whether the results were in line with what you expected, etc. In the case that your results are different to your expectations, you should explain why these differences occurred.

2.2.13 Chapter 6. Conclusion

Note that this chapter is largely a summary and a reiteration of ideas, concepts, theories, etc. You should not be introducing new material in this chapter.

In this chapter you should

- remind your reader of the problem you have tackled – from the wide view to the focussed problem that you actually tackled,
- remind your reader why this problem is worth tackling,
- explain briefly what you did,
- explain why you did it that way,
- revisit your major results and your discussion of them,
- discuss the contribution of your research to the research area,
- suggest what additional work could be done in the general area or what specific extensions or improvements could be made to your work, and
- finish with a “take home” message – essentially a summing up of what you have accomplished.

2.2.14 References

Often your university, school or department will require or suggest a particular referencing style be used for citations and for your reference list. Sometimes this is not the case and you can select a style. Either way, it is your responsibility to apply the style used accurately. This means including all of the required information for each type of source and making sure that the formatting of each item is correct.

There are reference management tools that can help you with this task but these tools are not a “silver bullet”. It is still your responsibility to check that you input the correct and complete information for each source into the tool and you must carefully check the output from the tool.

2.2.15 Appendices

The appendices of your thesis should contain material that is relevant and important to your research. This material includes ethics clearance certificates, proof of language editing, copies of your research instruments, details of data that were collected in the research, etc.

2.3 Variations

Note that there are possible variations on the suggested structure. For example, in the thesis, future work could be discussed in a separate chapter before the conclusion. For some types of research, it may make sense to combine the results and discussion chapters. It is up to you to make reasonable decisions, and your supervisor will be able to advise you on this.

2.4 Finally

In the next chapters more ideas about writing and presentation are discussed.

Chapter 3

Tips for a good document

3.1 Introduction

The previous chapter of this document presents a possible structure for your thesis, dissertation or research report. A good clear overall structure in terms of the breakdown of chapters is an important starting point but is not enough to ensure that you have a good document to send to your examiners.

You want your document to convey to your readers what you did, why you did it, how you did it and why it was important. In order to do this well you must:

- Present material in a logical and coherent fashion.
- Lead your reader through the document.
- Write clearly (and preferably simply) with no errors or inconsistencies.
- Make good use of tables and figures.

3.2 The Golden Thread

Guiding your readers (the only ones who are really important are your examiners) requires coherence and completeness.

Coherence means that the message that your document conveys is consistent from the title page to the end of your appendices. If your title says that you are tackling problem X then everything else should also apply to X. Your thesis, dissertation or research report should be tied together by a clear and consistent theme (the golden thread¹). This should link your problem statement (what you are interested in tackling); to your literature review (what has already been done in that field/area); to your research question[s] (what in particular you wish to find out about); to your methodology (how you plan to answer your question[s]); to your results and discussion; and to your conclusions. This *golden thread* ties the whole document together.

¹Courtesy of Ruth de Villiers, Unisa

Completeness means that you have done all that you are required to do (and that you set out to do based on your proposal). Often the completeness is judged against the assessment criteria that are given to the examiners.

3.3 Sections and subsections

Your document should not have a flat structure. Each chapter should be broken up into appropriate sections and subsections – this adds to the readability of the document. One way to see if you have a reasonable structure is to look at your table of contents – does the level of each section or subsection make sense in the overall document structure? As an example, if any section has only one subsection then that is a strong indication of a flawed structure. Very short subsections are also indications of problems.

3.4 Leading your reader

It is your job/task as the author of the thesis to lead your reader through your document. Nobody will read your whole thesis in one sitting so doing this – besides showing that you have a good picture of your own research – will remind them of what they have already read and thus make it easier for them to digest your work.

A big part of leading your reader through your document is that each chapter needs to be linked to the previous and next chapter. Typically this is done by means of an introductory section and a concluding summary section to the chapter.

In the introductory section you should

- remind the readers of the broad story line (what is this research/thesis about?),
- remind the readers of what you told them in previous chapters,
- explain how the current chapter fits into the overall story,
- tell them what the current chapter is going to cover,
- tell them why this material is going to be covered, and
- explain the structure of the current chapter.

In the concluding section you

- remind them of what you covered in the chapter,
- explain why they should know this,
- tell them how the current chapter fits into the overall story, and
- give them some idea of what will be covered in the next chapter and why this will be done.

3.5 Presentation

3.5.1 Consistent layout

The “look” of the document should be the same throughout. This means the same font, line spacings, paragraph breaks, and chapter and section headings.

3.5.2 Use of language

A thesis, dissertation or research report is typically a large document and will take any reader a long time to work through. You can make your reader’s task much simpler by writing in a clear and easily understandable manner. Keep your sentences short. Do not use a “fancy” word if a simple word will do. Use punctuation to assist in making your sentences clear. Make sure that your grammar and spelling are correct – there are tools that can assist you with this.

3.5.3 Fonts

Use the same font throughout the document and do not change font sizes unless there is a good reason to do so. The font used in figures and tables should be the same font as in the body of the document.

3.5.4 Widows, orphans and lonely headings

In typesetting terms, *widows* and *orphans* are lines or parts of lines at the beginning or end of a paragraph that appear on their own at the top or bottom of a page of text. They are thus separated from the rest of the paragraph. The APA style² defines an orphan as being a line of text at the beginning of a paragraph that appears on its own at the bottom of a page and a widow as the line (or part of a line) that appears on its own at the top of the page. There seems to be some confusion as to whether a widow or orphan is at the top or bottom of a page – different sources define these differently. You should, however, always try to make sure that you do not have these “dangling” lines.

A worse “crime” is to have a *lonely heading* – a section or subsection heading that appears on its own at the bottom of a page. APA also refers to these as *orphans*. Once again you should try to ensure that you do not have these in your thesis, dissertation or research report.

3.5.5 Figures

All of the figures in your thesis, dissertation or research report should be produced using the same tool – cutting and pasting from various sources looks sloppy. There are many of these drawing tools available. Find a tool that you like and can use easily and create all of your figures using that tool. There are some good L^AT_EX drawing tools as well. All figures must be big enough that all annotations and other text are easily readable. Don’t try to save space by

²<https://blog.apastyle.org/apastyle/2017/10/widows-and-orphans-and-bears-oh-my.html>

making the figures smaller. The figures themselves should be crisp and clear – they must be drawn/produced at a high enough resolution. If colour is used in any figures, then care should be taken that grey scale printing is still clear.

3.5.6 Tables

All tables should be big enough to be easily read. Do not shrink the text in the tables to the point where it becomes close to impossible to read. If it really becomes a problem to present information clearly in a table then think of other ways to present the material.

Tables should not be split across pages. If this is necessary, then they should be explicitly labelled as continuations.

3.5.7 White space

In some word processing systems, Word in particular, when a figure or table cannot fit onto the remaining portion of the current page then the figure or table is moved to the next page. This causes a lot of *empty space* to appear at the bottom of some pages of the document. *White space* can be a good thing in a document to increase readability but this kind of white space makes the document look ugly.

L^AT_EX uses a concept of *floating environments* to place figures, tables, etc., in good places in the text. In some other systems the user has to do much more work to place these objects in sensible places and so avoid unnecessary white space. You should always make sure that the amount of unnecessary white space in your document is restricted as much as possible.

3.6 Conclusion

Doing good research is only part of the task of getting a research degree. It is up to you to “sell” your work. Heeding the tips above and in the next two chapters can help you do a good job of writing up your research.

Chapter 4

Stylistic Issues

When you are writing a big document – a thesis, dissertation or research report – then it is important to make the document look professional. It is also incumbent on you to make the document accessible to your readers. If the document looks good and is easy to read you are much more likely to get a good mark/result for it. Zobel (2014) gives some guidance on writing skills.

Below I point out some things that you can do to improve your document.

Referring to parts of the document Be consistent about how you refer to other parts of your document.

- *Chapter 3* is the first part of the name of a chapter. The full name of the chapter would be (for example) *Chapter 3 Research Methodology*. This is the equivalent of a proper noun (the name of a person, place or thing) so it must *always* have a capital “C”.
- Some people argue that sections should be treated the same way i.e. *Section 3.3*. Other people say *section 3.3*. The justification for doing this is that one never sees *Section 3.3 Data collection* in a document. You see *3.3 Data collection*. Whatever you do for sections, you must be consistent throughout the document.
- Figures and tables should be treated the same way as chapters because *Figure 3.1* is the name of the picture.

Captions Keep the captions of your figures and tables short! If you really need long captions then make sure that in your lists of tables and figures only “short” versions appear. It is quite easy to do this in L^AT_EX. I have no idea how to do it or if it is even possible in Word.

Lists You should be consistent with your use of lists.

Simple lists Make sure that all your simple lists look the same. For example, always use full stops at the end of the item or never use full stops.

For example, the list below looks untidy.

- this is a point.

- This is another point,
- This is the third point

This list looks neater.

- This is a point.
- This is another point.
- This is the third point.

Also make sure that you always use the same item indicator and that you use the same indicators for nested lists.

For example, if your list is

- Point 1
- Point 2
 - subpoint 1
 - subpoint 2
- Point 3

then you should always use a • and a –.

If you are using numbered lists always use the same number system (i.e. Roman numerals or Arabic numbers) throughout the document. And always do the same nested numbering. Do not chop and change.

Lists to replace long sentences If you are going to use a list as a way of saying which features are included in some situation then you would say something like the list below.

The difficulties that ODeL students have with their studies include

- isolation from peers,
- distance from lecturers,
- slow feedback, and
- variable internet service.

Note in this case we do not use upper case letters at the beginning of each item. We use commas at the end of each item (except the last where we use a full stop) and we use “and” at the end of the penultimate item. Essentially this list reads like a “normal” sentence but it is easier to see what is included.

Content free text Avoid using text that conveys no useful information.

For example, consider the text shown below.

This chapter set out the context and problem statement as well as the objectives of the study along with the main research question and sub-questions that the research set out to address.

This paragraph is totally generic – it could be used in pretty much any thesis. It is also *useless* because it tells the reader *nothing* at all about your research.

Consider now the text below.

This chapter started by presenting the argument that very few theoretical computing papers include an explicit discussion of research methodology. This means that readers of the papers need to formulate their own ideas of what methodology was used and why this was done. This fact leads to the main research question of this thesis “Why do computer science researchers not present details of their research methodologies in articles and theses?”.

This text reminds the reader of the main points in the chapter and reiterates the problem and the research question. It is more useful to your reader!

Lead your readers Related to the point above (and discussed in Chapter 3) is the fact that it is your task, as the author, to make your document accessible to your readers. This means telling them why they are reading various bits of material and how that content relates to the overall “story” of your document.

When you do this make sure that you provide *content* and that you avoid *repetition*. Both of these are hard to achieve so expect to rewrite these sections a few times to get them right.

Citing sources When writing academic documents it is always necessary to cite your sources. This can be done in two ways. You can cite *parenthetically* or *textually*.

When one cites parenthetically the name of the author appears (or the names of the authors appear) in parentheses in the text. The reader can skip over whatever is in parentheses and the sentence will still make sense.

For example, the L^AT_EX source

```
The axial line placement problem has been shown to be
NP-Complete\citep{sanders2002phd}.
```

would produce

The axial line placement problem has been shown to be NP-Complete (I. D. Sanders, 2002).

When one cites textually the name of the author becomes (or the names of the authors become) part of the text of the sentence – a reader would have to read the name[s] in order for the sentence to make sense.

For example, the L^AT_EX source

```
\citet{pilkington2015} presents a conceptual model of the
research methodology domain
```

would produce

Pilkington and Pretorius (2015) presents a conceptual model of the research methodology domain.

Some text processing systems working with reference management tools allow you to do this fairly easily but some require that you do more work. This is one reason for using L^AT_EX. Inserting the lines below is one way of accomplishing this in L^AT_EX.

```
\usepackage[natbibapa]{apacite}  
\bibliographystyle{apacite}
```

Note that if you are using a number based reference style then you typically need to do a bit more work to do textual citation. That is, to get something like “Sanders (2002) [21] proved that the axial line placement problem is NP-Complete”.

Tense When you write a thesis, dissertation or research report you are reporting on research work that you have completed and presenting this in a document that exists (as soon as you have finished writing it). This means that you typically use two tenses in your document. The *past* tense when you report what you did or what you learnt/discovered and the *present* tense when you refer to what appears in the document.

You would thus write things like “I measured the run time of the algorithm”, “I tested different parameters”, “I discovered that X is better than Y”, etc. when you are reporting on the research you have done.

When discussing the structure of your document or what appears in the document, you would typically write things like “Chapter 3 is the methodology chapter”, “section 4.1 presents the results of the experiment”, etc.

There may be instances when it makes sense to use different tenses. For example, in the future work section or chapter you could use the future tense. You should, however, be careful to ensure that doing so makes sense in the context of the document.

Chapter 5

Common grammatical errors

Concord You should always be aware of grammatical *concord* in your writing. By concord we mean the matching of the subject and the verb. If the subject of the sentence is singular, the verb must be singular. If the subject of the sentence is plural, the verb must be plural. Many people (especially non-first-language-English speakers) mismatch subject and verb. An example of mismatch is “The students is writing an examination”. In this case the subject of the sentence “students” is plural but the verb is singular. The correct grammar would be “The students are writing an examination” (unless you are talking about only one student in which case the correct sentence is “The student is writing an examination”).

A more complicated example of this appears in the sentence below:

“The number of students are greater in the second group.”

Here it seems as if the subject is “students” – that is the word closest to the verb. In fact, the subject is “number” and “of students” is a qualifier. The correct sentence is thus as below.

“The number of students *is* greater in the second group.”

Articles In English there are two articles: *a* (or sometimes, based on other grammar rules, *an*) and *the*. In English most singular countable nouns are preceded by an article or by some determiner. In some cases, plural nouns are also preceded by an article.

The definite article (*the*) is used before a noun to indicate that we are speaking about a specific instance of the noun. For example, we would say “I have found the key.” In this case, we mean the specific key that we needed. Based on the context it could be the key to the door or the key that unlocks a chest of gold, or the key that we lost last year.

The indefinite article (*a* or *an*) indicates that we are speaking about one arbitrary instance of the noun. If we say “I have found a key”, we simply mean we have found one of those things that in English is called a key. We know nothing more about the key. Context does not help us get more information about the key.

“I gave the boy an apple” simply means I gave the boy one of the items of fruit that we know as an apple.

If I said

I bought a bag of apples. One of the apples fell onto the ground. I gave the boy the apple.

then the apple that was given to the boy would be the apple that fell onto the ground.

Note that in English it is possible to say “I found keys” meaning that I found some of the things (more than one) that we call keys. It is also possible to say, “I found the keys” meaning that I found the specific keys that were needed.

It is never acceptable to say “I found key”. One has to say “I found a key” or “I found the key”.

Possessives One use of the *apostrophe* (’) is to indicate the possessive form in English. For example, “The boy’s ball”, “The children’s toys”, or “The students’ results”.

If the noun is singular then the usage is ’s (e.g. “boy’s ball”). Note that this rule applies even if the singular noun ends in an ‘s’. For example, “Tom Jones’s first album” or “Ian Sanders’s cv”.

If the noun is a plural then the usage is s’ (e.g. “cars’ engines”).

Note that there are exceptions to the above rules – for example, one would not say “The Beatles’s first album” but would rather say “The Beatles’ first album”. This is done because the last word in the singular noun – the pop group called *The Beatles* – is in the form of a plural.

Contractions A second use of the apostrophe is in forming *contractions*. For example, “let’s” for “let us”, “don’t” for “do not” and many other examples. Ideally contractions should not be used in academic writing but sometimes they are required.

it’s or its? A contraction that confuses many students is “it is”. In this case the contraction is “it’s” – following the form in the point above.

“It is cold today” becomes “it’s cold today”.

“Its” is the possessive form. For example, “the car will not start, its battery is flat”.

Plurals and the apostrophe Sometimes one uses an apostrophe to avoid confusion when using certain abbreviations, letters, or words.

For example, one could say “the student got two A’s and three B’s in their exams” because “As” could look like “as”.

In all cases, unless the apostrophe is *needed* to avoid confusion, one should avoid using it. So, for example, use the “1980s” rather than the “1980’s”.

Use of etc. Often when one is writing a document, one wants to give a list of items and show that the list is incomplete and could include other items. To do this we use the Latin term *et cetera* (meaning “and the rest”) or more commonly its abbreviation *etc.*

For example, one could say “tennis, squash, racquetball, etc., are all sports”.

Note that there is always a comma before *etc.* when it appears in a sentence in this way and there is a comma after the *etc.* unless it is the last word in a sentence.

That versus which A very difficult grammatical concept in English is when to use *that* and when to use *which*. The correct usage depends on whether the clause it introduces is *restrictive* or *non-restrictive*. A restrictive clause means that the information in the clause is necessary to understand the preceding noun. A non-restrictive clause means that the sentence makes sense even if the clause is ignored. For a restrictive clause, use *that*.

Consider the sentence

The proof that shows that binary search is $\lg n$ time is well known to all computer scientists.

Here the clause *shows that binary search is $\lg n$ time* is restrictive. We are referring to one specific proof (in a vast collection of proofs). Thus *that* is the correct usage.

If the sentence had been

The proof, which shows that binary search is $\lg n$ time, is well known to all computer scientists.

Then the implication would have been that there is exactly (only) one proof all computer scientists know.

Consider now the sentence

The program we were studying, which calculated the square root of each of a sequence of numbers, took an hour to complete.

The main point of the sentence is that the program we are interested in took an hour to complete. The function that the program performed can be ignored (it is not really important to us at this point) and the sentence still makes sense.

Note that we always use commas to indicate the non-restrictive clause in sentences that use *which*.

Less and fewer Whether to use *less* or *fewer* depends on whether what is being described is countable or not. For example, students are countable so we would say “There are fewer first year students this year than there were last year”. Water is uncountable so we would say “There is less water in the dam this season than there has been in the past”.

Semicolons and colons A *semicolon* can be used in two ways.

1. In a list where there are already commas. For example,
On the table he could see a book, which had a red cover; a pencil with a broken point; a small, silver pencil sharpener; and a big, pink eraser.
2. To join together two sentences. For example,

The program was written in Python; it was easy to debug.

These two sentences could have been separated by a *period* but the semicolon makes the connection between them stronger. In this case, implying that the program was easy to debug because it was written in Python.

A *colon* can be used in a few different ways

1. To introduce a list, a noun phrase, a quotation, or an example/explanation.

List We covered many of the basic programming concepts in lectures: variables, assignment, arrays, and lists.

noun phrase The absence of my family gave me the two things I wanted most: peace and quiet.

Quotation Bob Dylan had it right: “What’s money? A man is a success if he gets up in the morning and goes to bed at night and in between does what he wants to do.”

Example/explanation Academia is not always that wonderful: low pay, lots of marking, high stress, and unsympathetic management.

2. To join sentences when the second sentence summarizes or explains the first. For example,

Life is like golf: you have to learn to accept bad bounces and unfavourable lies.

3. In numbers, titles, and other writing conventions.

Time – 04:55:00

Titles – Space: The final frontier

Letters – To whom it may concern: Please accept my application for ...

Biblical references – Matthew 2:24 for Chapter 2, verse 24

Dashes There are two common types of dashes: en-dashes and em-dashes.

UK English typically uses en-dashes with a space either side of the dash. US English uses an em-dash that is longer and does not include a space.

UK English usage : word – another word.

or

US English usage : word—another word.

Whichever you use, you should use consistently throughout your document. I will use the UK English style for the remainder of this discussion as SA uses UK English.

Note that dashes should be used sparingly because they can make your writing seem stilted.

There are typically three ways to use *dashes*.

1. For emphasis. For example,

The car was John's favourite colour – bright red!
The students – armed with placards – lined the streets.

2. To indicate sentence introductions or conclusions. For example,
Computers, internet, data – many students lack the resources for online learning.
3. To add information or clarify ideas when there are already commas in the sentence. For example,
Some students find even the simplest of algorithms – linear search, bisection search and bubble sort – extremely challenging to code.

Numbers When using numbers in your document, the general rule is to spell out small numbers and write large numbers as numerals. The definition of “small” can depend on the style guide you use – one to nine or one to ten are common options.

One would thus say, “The respondents will be required to complete two tasks...” and “There were 143 respondents to the survey”.

Some interesting writing resources

- Laurie Rozakis's book (Rozakis, 2003)

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Index

- a, 17
- abstract, 3, 5
- acknowledgements, 3, 5
- an, 17
- apostrophe, 18
- appendices, 4, 8
- article, 17

- captions, 13
- chapter, 13
- citing, 15
- colon, 19
- concluding chapter, 3
- conclusion, 7
- concord, 17
- contractions, 18

- dash, 20
- declaration, 4
- declaration page, 3
- dedication, 4
- discussion, 3, 7

- em-dash, 20
- en-dash, 20
- et cetera, 18
- etc., 18

- fewer, 19
- figure, 13
- figures, 11
- font, 11

- golden thread, 9

- introduction, 6
- introductory chapter, 3, 6
- it's, 18

- its, 18

- language, 11
- layout, 11
- leading your reader, 10
- less, 19
- list of figures, 3
- list of tables, 3
- lists, 13, 14
- literature review, 3, 6

- numbers, 21

- orphans, 11

- philosophical world view, 7
- possessive, 18
- preface, 3, 5
- publication, 5

- reference management tools, 8
- references, 3, 8
- research design, 7
- research methodology, 3, 7
- research methods, 7
- results, 3, 7

- section, 13
- sections, 10
- semicolon, 19

- table, 13
- table of contents, 3, 5, 10
- tables, 12
- tense, 16
- that, 19
- thesis structure, 3
- title page, 3, 4

which, 19
white space, 12
widows, 11

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