

Academic Research a Guide for the Perplexed

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Branch: For-restructuring

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Contents

| | |
|---|----------|
| Contents | i |
| Foreword | iii |
| How to use this book | iv |
| IThe Literature | 1 |
| 1 Writing a full draft of your literature review | 5 |
| 1.1 Key skills for synthesising | 6 |
| 1.2 Core practice for academic writing | 12 |
| 1.3 Develop your arguments! | 19 |
| 1.3.1 The BCW model | 19 |
| 1.3.2 Arguments and narrative | 22 |
| 1.3.3 Logical fallacies and cognitive bias | 25 |
| 1.4 Developing your literature review from your theme summaries | 28 |
| 1.4.1 Developing the main body of your literature review | 28 |
| 1.4.2 Choosing headings and sub-headings | 33 |
| 1.4.3 Writing your review introduction and critical summary | 34 |
| 1.5 Assessing your literature review | 35 |
| 1.5.1 Your own assessment | 35 |
| 1.5.2 Getting others to help you | 36 |

| | |
|---|-----------|
| CONTENTS | ii |
| 1.6 Widening your literature review | 38 |
| 2 Research design foundation | 40 |
| 2.1 Researcher mindsets | 42 |
| 2.1.1 Positivist and post-positivism | 42 |
| 2.1.2 Anti-positivist (interpretivism) | 43 |
| 2.1.3 Constructivism | 44 |
| 2.1.4 Critical Theory | 44 |
| 2.1.5 Indigenous | 45 |
| 2.2 What’s your mindset? | 46 |
| 2.3 Research strategies | 48 |
| 2.4 Developing the research design | 49 |
| 2.4.1 Types of evidence and data | 49 |
| 2.4.2 Classes of research methods | 51 |
| 2.5 Developing your understanding of research design | 53 |
| 2.5.1 Research methods | 53 |
| 2.6 Research strategies | 54 |
| 2.6.1 Summary of research strategies | 55 |
| 2.7 Understanding research methods and strategies in articles you have reviewed | 55 |
| 3 Managing risk in Stage 2 | 58 |
| 4 Reflecting and reporting in Stage 2 | 59 |
| 5 Stage 2 Takeaways | 63 |
| Closing | 65 |
| Glossary | 67 |
| References and further reading | 70 |

Foreword

You have just about embarked in your very first Masters research project. That's both exciting and daunting.

Exciting because you will be able to focus on a topic of your own choice and to investigate in depth an issue or problem which is of particular interest to you, either personally or professionally. In doing so, you will acquire a deep knowledge of that topic, conduct a unique and novel research study, and develop and apply a wide range of research skills.

Daunting because your success will depend on you demonstrating your mastering of the topic and of the research process, that you can exercise competently a wide range of research skills, and can communicate your work effectively through an academic dissertation, possibly the largest and most demanding piece of writing you will ever undertake.

The aim of this handbook is to support you in taking your first steps into academic research at Masters level. It will provide you with a solid scaffolding for you to become a competent and confident researcher. It will demystify the language around academic research and, through practical advice and activities, will help you plan, manage and execute your project work successfully from start to finish.

But the benefits don't stop with the completion of your Masters project. In succeeding in your research project, you will have also gained and demonstrated a wide range of skills which are professionally relevant and valued by employers, from problem solving to effective communication, digital and information literacy, self-management and resilience. These transferable skills will serve you well in your profession and your life, regardless of the path you will take after your Masters course.

How to use this book

Content here; should also cover how much time studying the book may take stage by stage (although this may go into each stage table?)

Stage I

The Literature

We now move onto Stage 2 of our 5-stage framework. Stage 2 assumes you have completed your work at Stage 1 and have discussed it with your supervisor, who will have helped you assess whether it is appropriate for your course. Stage 2 also assumes you have now a fair idea of how the research process works, having been through one iteration in Stage 1, and that you have gained sufficient basic research skills to be able to carry on your research somewhat more independently, albeit with your supervisor’s support.

The good news is that this assumption means that there is less to read in Stage 2 and we will not take you through the research process step by detailed step, but focus on *additional* knowledge and skills you’ll need to progress.

The research activities which are in focus in Stage 2 are shown in Table ??, which also provides some guidelines for your interaction with your supervisor during this stage. As you can see, the focus of this stage is on completing your literature review and developing your understanding of the basic blocks of research design.

- If the scope of your project is still unclear at this point, then you should spend more time in defining it before moving on.
- The bad news is that if you haven’t picked up everything, you may need to refer back to Stage 1. We will leave breadcrumbs throughout the chapter to help you do this if you need to.

Table 0.1: Stage 2 Research Activities (15% of project length)

| Deliverable | Writing Outcome: by the end of this stage you will | Effort | Supervisor Interaction |
|---|---|--------|--|
| Identifying the research problem | | | |
| Research problem statement, refined as needed | be able to express a research problem | 3% | |
| Reviewing the literature | | | |
| Substantial draft of your literature review | know key skills and practices in academic writing, and the elements of an academic argument; be able to write academic arguments, to structure the narrative of your literature review and to assess and improve your current draft | 25% | Suitability of literature review scope, structure and narrative, including appropriate logical argumentation, and demonstration of critical thinking |
| Setting your aim and objectives | | | |

Continued on next page

Table 0.1: Stage 2 Research Activities (15% of project length) (Continued)

| Deliverable | Writing Outcome: by the end of this stage you will | Effort | Supervisor Interaction |
|--|--|--------|---|
| Aim and objectives, refined as needed | be able to express aim and objectives which relate to your research problem | 2% | |
| Developing the research design | | | |
| Candidate research strategies and methods for your project | know the building blocks of research design, and common research strategies and methods; be able to understand research strategies and methods applied in articles you have reviewed | 40% | Suitability of candidate research strategies and methods |
| Reflecting and reporting | | | |
| Stage 2 report | be able to assess your research progress and to write up a substantial report | 25% | Any further improvements required, particularly in relation to critical thinking and academic writing |
| Planning work and managing risk | | | |
| Updated risk and work plan | be able to assess risk and draw a work plan | 5% | Any major adjustment required to address deficiencies or manage risk |

Activity: Understanding the effort needed in this stage

#1

Consider Table ?? carefully, taking notice of the entries in the ‘Effort’ column. Make a note of the activities which will be the most time consuming in this stage and what is expected – the suggested focus – for each. Update your work plan accordingly.

Discussion

As 40% of your study time, developing the research design will constitute your major effort in this stage. There are two other research activities at 25%

- Reviewing the literature, which will get to an almost complete form; and
- Reporting, critical reflection and conclusions, which will complete Stage 2.

To update your work plan, you should use the effort percentages to estimate the actual study time you will need to dedicate to each.

Chapter 1

Writing a full draft of your literature review

In Stage 2, you will build on your Stage 1 work to write a substantial draft of your literature review. Although it won't be in its final form, this draft will be close to complete – as you work through later stages, you might find a few more papers[•] to consider, but you'll probably be able to count them on one hand.

While in Stage 1 your main focus was on gathering and assimilating relevant articles, understanding their relationships and emerging themes, in Stage 2 your focus will be on consolidating all that you have learnt into a coherent, well-structured and critical review.

This is the essence of *synthesis* – the act of bringing ideas together into a cogent whole. That cogent whole is the spell-binding story you create to convince your readers[•] that *you have a contribution to knowledge to make*, based on the literature you have read and the knowledge gaps that you have found there.

Given the number of articles you'll have to read, and the complexity of the relationships that exist between them, there's a long (and sometimes winding) road from the literature to your dissertation. The knowledge, process and techniques you acquired and applied in Stage 1 will still be relevant[•]: you can make best use of the time you spend reading the literature by using the Keshav workflow[•], iterating quickly between papers, and keeping notes that refine what you have as your understanding develops, and will eventually turn into text you can use for your dissertation, too. However, once you have selected, read and understood[•] a good number of relevant articles, and identified and summarised relevant emerging themes, you can also start develop the narrative to include in your literature review.

For this you will need further synthesis skills and techniques, which we consider in this section.

While we present them in the context of writing your literature review, these synthesis skills and techniques apply more widely to any form of academic writing, so they will be essential when you write your

- Depending on how thorough you've been, of course.
- Eventually, your examiners, first your supervisor, family, friends, anyone else that will read it. . .
- If needed, refresh your understanding by rereading Section ?? in the previous chapter.
- Introduced in Section ??.
- At this point, you may have only a rudimentary understanding, but that will develop as you bring your synthesis together.

narrative across your whole dissertation.

1.1 Key skills for synthesising

There are key skills you will be able to demonstrate through your synthesis of the literature. They are:

Critical thinking You must demonstrate that you have maintained an objective position by weighing up all sides of an argument, evaluating its strengths and weaknesses, and testing how sound the claims made and their supporting evidence are.

At its essence, critical thinking is the skill of systematically asking questions that get you “under the hood” of the research – perhaps into the hidden crevices into which no one has looked before. Part of this is searching for a lack of evidence or poor reasoning behind an argument, evidence or the application of other research tools, instead of accepting what you read ‘at face value.’

Critical thinking develops with time and practice. The trick is a balance of scepticism: choosing the arguments or evidence to take issue with – those that are less solid – and leaving the rest.

As an academic author, critical thinking will benefit your ability to build stronger arguments, avoid bias and link your claims to appropriate supporting evidence, so it is well worth picking it up as a skill.

Establishing connections You must be able to draw links between the articles that you have found, a process you started in Stage 1 by constructing a summary-comparison matrix[•] and identifying emerging themes.

As you have experienced in Stage 1, this is more than summarising each article in turn: it is about identifying the things that two articles agree and disagree on, then do the same for three, then four, etc., and begin grouping articles together under the various different themes that you have found, those themes being relevant to your research problem.

At some point, you’ll arrive at a collection of more or less definitive unifying themes to which you can assign the papers you are reading. At this point, you’ll have moved on from an article-based process to a theme-based process and your synthesis will be really coming together. So much so that, perhaps[•], the themes that you have found could be used as the titles of sections of your literature review. Your thematic critical reflection on the literature will then be the content of those sections, which will continue to grow and grow into the completed literature review.

• Refer back to Section ?? if necessary.

• We’re getting a little ahead of ourselves here – you won’t have a complete literature review at this point, but you may start to feel that you can see how, eventually, it could come together...

Critical writing Many authors of fiction use descriptive writing to give vivid, detailed descriptions of their characters in the hope you will feel some empathy for them. Being able to write descriptively is a great skill for a fiction author to have.

Descriptive writing is also an essential part of academic writing, but its use is very different: in academic writing descriptive writing is used to set the context and to provide any existing evidence behind an argument you are developing. The keyword here is *existing*: your descriptive writing should not change the sense of what someone else has written.

This does not mean that you shouldn't interpret or reinterpret what someone else has written if your additions add value to what someone else has written.

A certain amount of description is therefore necessary in any academic writing. But to present new knowledge, your examiner will be looking for something more than description – they will be looking for a critical approach, by which you will build new arguments using what has gone before by, for instance, analysing, synthesising, and evaluating.

- You will be able to add in your generated evidence too, of course.

A perfect critique of an article will have the following components:

- your introduction to the paper, by saying what is involved, where it takes place, or under which circumstances.

The perfect critique – introduction

Kirlappos and Sasse (2012) discuss the implications of users visiting fake websites, concluding that trying to get them to stop doing so could prove difficult without appropriate user awareness training. [...]

- your analysis, which gives your perspective on the paper, perhaps highlighting how the paper comments on your focus in reading, including its strengths and weaknesses from the perspective of the topic.

[...] analysis

This training should be automated, involving 'fake' phishing e-mails being sent to users in order for them to compare the fake e-mail to a legitimate e-mail and understand the differences. [...]

- your synthesis, which explains how the parts fit into your research context, giving reasons, making comparisons, and highlighting relationships with other papers.

[...] synthesis

This can be contrasted with San Nicolas-Rocca & Olfman (2013, p.84) who state that users should be trained on understanding laws and regulations as well as organisational policies and guidelines which define their specific responsibilities. [...]

- your evaluation of the strengths and weaknesses of the paper from your perspective, the implications that can be made for your purposes, and the impact and value to your research.

[...] evaluation

This false dichotomy is in danger of losing something, however, in that training can be both instructive on the nature of ‘fake’ emails and on the formal understanding of users’ responsibilities in regards to cyber breaches.

The boundary between these critique elements can sometimes be fuzzy, of course, in the sense that in-depth descriptions may well start to be analytical and synthetic, and some analysis and synthesis may include a level of evaluation. Table 1.1 provides some practical examples which may help you distinguish between description, analysis, synthesis and evaluation in academic writing.

Revisiting the academic writing in our theme summary

In Stage 1, we produced the following summary around the theme of modelling learning trajectories with curriculum analytics. This summary uses a mix of all the kinds of academic writing indicated in Table 1.1. You will consider the details in the next activity.

Several authors have considered modelling and analysing students’ learning trajectory through a programme of study, in order to understand how students progress or otherwise through their study and the learning outcomes they achieve in doing so. Such an understand-

Table 1.1: Types of academic writing (adapted from Cottrell2005.)

| Descriptive | Analytic | Synthetic | Evaluative |
|---|--|--|--|
| Describes what happens or what something is like or how something works | Explains why things happen or work the way they do | Makes comparisons | Identifies significance |
| Tells a story or the order in which things occur | Shows relations between pieces of information, parts of a system | Gives reasons for choices | Demonstrates relevance |
| Indicate how to do something | Demonstrates how a theory works | Structures information based on established criteria | Draws conclusions |
| States what a theory says | | | Weighs pieces of information against one another |
| Lists things, alternatives and options, etc. | | | Highlights strengths and weaknesses |
| Describes a system or its components | | | Considers wider implications |

ing can then be used to inform scholarship and reflection around curriculum and its design, and inform possible changes.

For instance, Dawson and Hubball (2014) deploy social network analysis techniques to identify and visualise the most common learning pathways followed by students within complex curriculum structures, in which many links may exist between the various curriculum components. They suggest that their proposed tool could be used by curriculum practitioners to study student progression and completion across different pathways, and the extent students acquired the expected learning outcomes, although their study does not evaluate the extent that might be the case.

Similarly, Salazar-Fernandez et al. (2021) use process mining to extract students’ educational trajectories from historic data: in this case, their aim is to understand which trajectories are more likely to result in late dropouts. In their proof-of-concept tool evaluation over a specific data set, they achieve some positive results with the tool providing a strong indication that students taking a study break before resitting a failed module are most likely to drop out. Further research is needed to apply and evaluate their tool in other settings.

Somewhat distinct from these studies is the work of McEneaney and Morsink (2022),

who propose a simulation tool, based on Coloured Petri Nets, to be used as a design tool to help curriculum practitioners to test the possible effect on learning of envisaged curriculum changes, such as including or removing modules or study pathways in an existing programme. As another proof-of-concept tool, the work still requires wider application and evaluation.

Finally, both Greer et al (2016) and Molinaro et al. (2016) focus on potentially useful visualisations for curriculum practitioners. In particular, Greer et al (2016) introduces the “Ribbon tool”, based on Sankey diagrams, for visualising student flows through academic programmes, with interactive capabilities which allow practitioners to study and compare specific student demographics. The same tool is recommended by Molinaro et al. (2016), alongside other visualisation tools, based on both students and course data, to allow practitioners explore both curriculum features and students’ attainment. Both articles are part of the proceedings of the very first Curriculum Analytics workshop, in 2016, which also explains why they contain primarily poof-of-concept work and suggestions for future research.

Overall, this collection of articles contains some interesting ideas as to how curriculum and student data could be combined and analysed through the application and development of bespoke Curriculum Analytics tools. They all appear, however, quite preliminary studies, which is also an indication that this remains a young field of study where much research is still needed.

Activity: Distinguishing between different types of academic writing #2

Consider the summary above. Write down examples of each kind of academic writing you can find with reference to Table 1.1.

Discussion

We’ve picked the following examples:

- descriptive: “Dawson and Hubball (2014) deploy social network analysis techniques to identify and visualise the most common learning pathways followed by students within complex curriculum structures, in which many links may exist between the various curriculum components”. This simply summarises what those authors did.
- analytic: “Several authors have considered modelling and analysing students’ learning trajectory

through a programme of study, in order to understand how students progress or otherwise through their study and the learning outcomes they achieve in doing so. Such an understanding can then be used to inform scholarship and reflection around curriculum and its design, and inform possible changes.” This highlights the connections between modelling, understanding and scholarship across the different articles.

- synthetic: “both Greer et al (2016) and Molinaro et al. (2016) focus on potentially useful visualisations for curriculum practitioners. [...] Both articles are part of the proceedings of the very first Curriculum Analytics workshop, in 2016, which also explains why they contain primarily poof-of-concept work and suggestions for future research.” This brings together work which shows strong similarities.
- evaluative: “Overall, this collection of articles contains some interesting ideas as to how curriculum and student data could be combined and analysed through the application and development of bespoke Curriculum Analytics tools. They all appear, however, quite preliminary studies, which is also an indication that this remains a young field of study where much research is still needed.” This expresses a judgement on the maturity of the work summarised and more widely its field of study.

You should do a similar analysis of something you have written.

Activity: Types of academic writing in your summaries

#3

Consider a couple of theme summaries you have written. Which kinds of academic writing have you used?

Guidance

If you find primarily descriptive writing, you should consider having another go at your summaries to improve the balance between description, analysis, synthesis and evaluation.

Having mastered these key skills, your completed literature review will be a self-contained piece of academic writing, which shows your critical thinking and mastery of academic writing skills, and through which

you:

- demonstrate your understanding of key ideas and their significance to your research, particularly to framing and justifying your research problem
- relate different ideas to each other, including arguments and counter-arguments,
- reason through the evidence to argue the possible contribution to knowledge your research can make.

In this way, a completed literature review demonstrates your ability to synthesise from the academic literature.

1.2 Core practice for academic writing

Academic writing has certain core practices that you should be aware of and apply consistently in your project work. They are:

Use critical rather than descriptive language Your writing should be based on well-formed arguments, i.e., on claims that are supported by evidence[•], on comparing and evaluating alternative arguments, and on forming judgements on the basis of that evidence. Your writing will therefore favour analysis, synthesis and evaluation over descriptions.

In your descriptions you should also focus on essential details and keep general background information to a minimum.

Be clear and precise Your writing must make it easy for the reader to follow your arguments and grasp the points you are trying to make. You should:

- avoid long, over-complicated, poorly punctuated sentences;
- be accurate in what you report;
- be precise; avoid ambiguity and vagueness;
- clearly define terms and concepts that may be open to more than one interpretation to avoid misunderstanding;

- Either that of others or that you have discovered yourself. We look at academic arguments in detail in Section 1.3.

- keep your audience in mind: avoid jargon and, when using technical terms[•], explain any that your readers are unlikely to be familiar with.

Order your topics appropriately You need to consider carefully which information your readers need to read first to make best sense of the topics you will introduce[•]. Start with less complex[•] topics and build on them towards more complex ones. Later topics may depend on earlier ones, and this can give a hint to their presentational order, too.

You can make your reader’s life easier if similar topics are grouped together in your writing – otherwise, they may get the impression that you are repeating yourself, or they may miss important connections between them. So, group similar topics together.

Signpost your narrative Another way of making your reader’s life easier is to *signpost* your writing, i.e., provide explicit clues to avoids the reader getting lost while reading your work. It applies both to the overall structure of your document and to individual arguments within each of its sections.

Common signposting practices at chapter, section or document level are:

- careful choice of headings and sub-headings
- ‘setting the scene’[•] at the start of a chapter or major section to provide a roadmap of what comes next
- summarising key points at the end of a section/chapter.

Another form of signposting is at the level of an individual argument, when appropriate words or phrases (see Table 1.2) are used to help the reader understand where they are in an argument.

- If there are a lot of technical terms, you might consider keeping a glossary.

- We get to how to structure an argument later in this stage
- You will have experienced which are the simpler and which are the more complex topics in your reading so you will already know in which order to place them.

- Journalists will often structure their narrative in the following way: they will
 - tell you what they’re going to tell you
 - tell you
 - tell you what they’ve told you.

This is signposting at is best.

Activity: Signposting in our theme summary#4

Consider, once again, our summary on modelling students’ learning trajectories. Write down any form of signposting you can identify.

Discussion

This is what we have noted:

- there is an opening statement to set the scene

Table 1.2: ‘Signal words’ used in academic writing, inspired by Cottrell2017

| Function | Possible word or phrase to use |
|--|--|
| introducing an argument, a description, a section or a chapter | first, firstly, first of all, to begin with, initially |
| reinforcing similarities/arguments | similarly, equally, in the same way, also, for example |
| adding further evidence/arguments | furthermore, moreover, in addition |
| introducing alternative evidence/arguments | alternatively, however, on the other hand, differently |
| highlighting choices | either/or, neither/nor |
| contrasting ideas/arguments | instead, by contrast, conversely, on the one hand [...] on the other |
| drawing conclusions | therefore, as a result, as a consequence, in conclusion, consequently, because of this |

- ‘For instance’ is used to introduce a specific example which illustrates a point previously made
- ‘Similarly’ is used to introduce work with a similar aim as the previous work mentioned
- ‘Finally’ introduces the remaining work reviewed
- ‘Overall’ opens the concluding statement, which offers some summary observations

You can do the same for your own summaries.

Activity: Signposting in your summaries

#5

Consider a couple of theme summaries you have written. Which forms of signposting have you used?

Guidance

Consider whether your signposting could be improved by applying the guidance in this section.

Write good, grammatical text This is an essential characteristic of all written work you are expected to produce. You should therefore proofread carefully all your writing before submission to remove as many grammatical errors and typos as possible.

With modern tools, producing good grammatical text isn't difficult and your examiner will appreciate good grammatical writing. In fact, given the availability of good tools[•], they will, most likely, expect you to write perfect natural language prose.

- Misquoting Star Wars: "Use the tools, Luke, use the tools."

Use an appropriate format You should be sure to understand the required final format for your dissertation. For instance, all your citations and references should comply with the bibliographical style required. Your dissertation pages should be numbered, and all your figures and tables should also be numbered and accompanied by appropriate captions.

Dissertation format requirements

#6

Check the requirements your course places on the final form of your dissertation then answer these questions^a:

1. How many words should your dissertation be?
2. What font size should you use?
3. What should the line spacing and margins be?
4. How should you number your dissertation pages?
5. How should you number figures and tables?
6. Are there any stylistic requirements on headings and sub-headings?
7. Are you allowed to include additional material in appendices?
8. How should references and citations be formatted?
9. Is there specific information that you should include in your dissertation title page?

Discussion

Our university has no single format for all Masters courses. However, looking at one specific capstone project guidelines, we have found the following:

1. The dissertation should be between 10,000 and 15,000 words, excluding references and appendices
2. The font used should be 11 or 12-point Times New Roman, with 11 points recommended
3. 1.5 line spacing should be used and margins should be approximately 2cm
4. Pages should be numbered, including references and appendices. Lower-case Roman numerals – iii, iv, v, etc., should be used on the preliminary pages, and Arabic numerals starting from page 1 should be used from the beginning of Chapter 1
5. All figures and tables should be numbered, with sequential numbering within each chapter, for instance, the figures in Chapter 2 would be Figures 2.1, 2.2, 2.3, etc. Also, they should have descriptive captions: below them for figures and above them for tables
6. Headings and sub-headings should be numbered with sequential numbering within each chapter, for instance, in Chapter 3, you could have sections 3.1, 3.2, etc. each with sub-sections, say, 3.1.1, 3.1.2, etc. You should avoid sub-subsections
7. Appendices are allowed and should be used to provide extra materials in support of the dissertation body. Appendices are not assessed and should be used sparingly
8. References and citations should use the Harvard bibliographical style
9. The title page should include:
 - the full title of the dissertation
 - your full name
 - your university identifier
 - the qualification for which it is submitted
 - the date (consisting of month and year) of your submission

- the total word count.

In addition, there should be a short statement declaring that no part of the dissertation has been submitted for any other qualification.

^a It may be that you can't answer these questions because they are not part of the requirements. In this case, we've suggested an answer for you.

Avoid plagiarism like the plague! In describing your research, you will need to distinguish it from the work of others.

Part of this is to identify clearly the new contribution to knowledge your work makes: you can't make a new contribution to knowledge that someone else has already made[•].

• Duh!

Another part of this relates to behaving ethically in acknowledging all sources you have used. This is known as attribution and its role is to give credit where credit is due, avoiding any possible accusation of plagiarism, that is passing off the work of others as if it were your own. In a dissertation, the correct form of attribution is through referencing, and there are two common ways to report cited work:

- Paraphrasing, that is rephrasing in your own words what an article says, still ensuring that the article is appropriately cited.
- Using quotation marks to identify text reproduced without change from a cited article. In this case you can use the words of the article *verbatim*, as long as they are enclosed within those quotation marks.

Both can be used, but an excessive use of quotations may interrupt the flow of the narrative making it harder for the reader. As a rule of thumb, you should use quotations in your literature review if the wording used by the authors of the article really matters, perhaps because they introduce a significant new term or concept or use particularly suggestive language. Otherwise, we recommend paraphrasing, which may help you convey the essence of what you have read more concisely or even more clearly.

If you follow these simple practices consistently, you will avoid most unintentional plagiarism and your work will more likely comply with your course requirements and expectations.

Ways to report cited content

#7

Consider the following statements:

“A summary-comparison matrix, introduced by **Sastry2013**, can be used as an efficient tool to keep track and compare the content of articles reviewed. Similar information is recorded for each paper, such as the research aim, research methods or key findings, organised in a matrix form which facilitates their comparison.”

and

“**Sastry2013** define a summary-comparison matrix as ‘a data organizer that helps students to extract relevant information from research papers, categorize those extractions and visualize how these disparate extractions are related to each other’ ”

Write down how they differ in the way they report the cited work.

Discussion

The former uses paraphrasing; the latter includes a verbatim quotation from the article.

A third part is to avoid *accidental* plagiarism, which may result from not keeping tabs on where ideas/arguments/logic/processes/etc. came from, and what your knowledge contribution to those is. This is to show that while intentional plagiarism is a deliberate attempt to deceive, something that both universities and publishers take very seriously and may have severe consequences, plagiarism doesn’t need to be intentional to be classed as plagiarism. Accidental plagiarism is usually the result of poor organisation or sloppy review practices, and can be avoided by being careful and systematic when reading articles, and writing and organising your notes and summaries.

The final part is to avoid self-plagiarism, which is where you re-use already existing material that you yourself have published, without clear attribution[•].

- Clearly, this is not relevant if you haven’t published before.

Tip

The guidance we give above is much easier to implement at the time of creation than at the end of the writing up process. Imagine not knowing where a quote on page 35 came from when you’re writing up and the difficulty you could have in trying to find it retrospectively.

Given the importance academics place on plagiarism, the risks of not being proactive in avoiding it are

very high. Universities take plagiarism very seriously. You should too.

ACTIVITY: Looking up your University's plagiarism policy

#8

Look up your university policy on plagiarism and any disciplinary processes related to it.

Discussion

Our university has strict policy on plagiarism. Intentional plagiarism can lead to severe disciplinary actions, from failing study modules to be expelled from a course. Early on in study, poor academic practices can be addressed by providing extra study support. Repeated offences will incur in disciplinary action, decided on by an Academic Conduct Officer, including failure.

1.3 Develop your arguments!

The development and presentation of academic arguments forms the core of academic writing. But what exactly is an academic argument? To answer this question, we look at the model proposed by Booth, Colomb and Williams in **Booth1995**: we will refer to this as the BCW model.

1.3.1 The BCW model

In the BCW model, an academic argument has at least 2 parts – the *claim* and the *evidence* – and might, in more complex arguments, have up to 3 other parts – called the *reason*, the *warrant* and any *qualifications*.

Their model is shown in Figure 1.1, and the parts are:

1. The *claim*, which is a point of view and needs support with...
2. ... *evidence*, which provides the grounds on which the claim is made, and ...
3. ...the *reason*, which is why we believe the claim to be true.
4. The *warrant* explains how the reason is relevant to the claim.

5. The *qualifications* are concessions which may limit what is being claimed, for instance by acknowledging objections, alternatives, etc.

In dealing with qualifications, you might need to make further arguments, in which case the process of building an argument may become recursive and so much more complex to develop and present.



Figure 1.1: The five elements of an academic argument, adapted from Booth et al., 1995.

LR: Needs redrawing as it is currently a merger from a couple of illustrations in that book - also needs to bring out which parts are mandatory.

A fully developed BCW argument is a beautiful thing. Here's a short example[•]

[•] Adapted from **BCW1995**.

The need for a TV ‘watershed’**Claim**

showing violence on TV should be allowed only after the 9pm

Reason

TV violence can have harmful psychological effects on children

Evidence

Smith (1997)**Smith1997** found that children ages 5–7 who watched more than three hours of violent television each day were 25 percent points more likely to say that what they saw on television was “really happening”

Warrant

If children are protected from watching violence on TV they will be less likely to see violence as a normal part of day-to-day life

Qualifications

The following are qualifications that I have considered:

- that a child interprets something on TV as “really happening” does not necessarily mean that they will try to emulate it.
- Not all children are impressionable.
- Violence *is* a normal part of day to day life.

Qualifications can improve a claim – reducing its scope, for instance, making it more acceptable – but may also require further arguments to be made. For instance, a rebuttal to “Violence is a normal part of day to day life” might be the counterclaim that “To reduce violence in day to day life, we should insulate children from it so that the next generation isn’t so likely to see violence as a justified response to problems.” and so to other arguments. These might be structured the same way until all qualifications are discharged to your satisfaction.

Activity: Differentiating between reason and evidence

#9

Consider the example above and write down what you think the difference between reason and evidence is.

Discussion

According to Booth, Colomb and Williams (1995), reasons are things we think up in our mind, while evidence is somewhat “out there” for everybody to see and examine. While in everyday casual conversation, we can often support a claim with just a reason, that should not be the case in academic research where reasons should be backed up by evidence, as your research audience is unlikely to accept your reasons at face value.

1.3.2 Arguments and narrative

In your literature review, and your dissertation as a whole, your arguments won't be presented in the BCW form above, of course: the model is only a useful device to help you distinguish between the essential elements of an academic argument. Your dissertation presentation will be in the form of a continuous narrative instead. However, it is essential that there is a strong connection between your narrative and your academic arguments. In this section, we consider ways the BCW model can help you write narrative which allows your arguments to shine.

We can start for the theme summaries from Stage 1. Let's look at an example.

Finding the academic argument in our theme summary

Let's consider once again our summary around the theme of modelling learning trajectories with curriculum analytics. Let's 'extract' from the narrative the argument made using the BCW model. It goes like this:

Claim

modelling and analysing students' learning trajectories can inform scholarship and reflection around curriculum, its design, and possible improvements.

Reason

such modelling and analysis helps us understand how students progress or otherwise through their study and the learning outcomes they achieve in doing so

Evidence

the works cited demonstrates how this can be done

Warrant

if we understand which curriculum characteristics prevent students from succeeding on a programme of study, then we could re-design the curriculum to address the problem

Qualifications

All cited work is based on limited case studies, so that we have no evidence of wider applicability or generality; also some of that work is little more than a proof-of-concept aimed at suggesting new avenues for research rather than proposing a mature approach.

In this example, by matching our summary narrative to the BCW structure, we can check that all necessary elements of the argument we were trying to make, particularly its claim and evidence, are in place. In the example, our argument was complete with respect to the BCW model, in that all elements were present. Should that not be the case, however, the BCW model would have helped us identify how the argument could be developed further.

It's now time for you to have a go. To do so, you can start from the theme summaries you have already written:

Activity: Constructing your academic arguments

#10

Consider your current theme summaries. Extract and write down their academic arguments according to the BCW model. Identify those which are already well developed and those which require further work, indicating what is still needed.

Guidance

Don't worry if you can't include all the five elements for each argument, but try to capture both your claim and any reasons and evidence in support in all cases. It is possible that your summaries contain more than one academic argument each: in such case, ensure you apply the BCW model to each of them.

Constructing academic arguments is a fundamental skill which becomes easier with practice. Therefore we suggest you spend up to 2 hours on this activity.

You have seen how, given some narrative you have written, it should be possible to clearly identify all the elements of the argument you were trying to convey. Vice versa, given an argument based on the BCW model, the real skill of writing it down is to find a form of narrative that combines all components together in prose that is easily digestible[•]. If you find this conversion difficult, you could start with the following template[•] for creating a narrative around a BCW model argument:

I claim *my claim*, because *my reasons*, based on *this evidence*. The warrant that allows me to connect my reason and claim is *my warrant*. I acknowledge the following qualifications to my claim (which I deal with later):

- *qualification 1*
- *qualification 2*
- ...

• Meaning that your reader – cough, examiner, cough – can easily engage with it.

• Adapted from Figure 1.1

Activity: Beginning an evidence narrative #11

Put the example TV violence argument into the BCW narrative form based on the template.

Discussion

You should have something like:

“ I claim showing violence on TV should be allowed only after the 9pm, because TV violence can have harmful psychological effects on children, based on Smith (1997)**Smith1997** found that children ages 5–7 who watched more than three hours of violent television each day were 25 percent points more likely to say that what they saw on television was “really happening”. The warrant that allows me to connect my reason and claim is that if children are protected from watching violence on TV they will be less likely to see violence as a normal part of day-to-day life. I acknowledge the following qualifications to my claim (which I deal with later):

- that a child interprets something on TV as “really happening” does not necessarily mean that they will try to emulate it.

- Not all children are impressionable.
- Violence *is* a normal part of day to day life.

”

As you can see, the model gets close to a narrative, but there are some grammatical errors – “... based on **Smith1997** found that ...” – which need smoothing out, and it could get very repetitive if each and every argument you present has this form.

There are many techniques for improving your narrative. One of the most powerful is to read what you have out loud to a live listener and have them try to follow your argument.

Activity: A willing audience

#12

Read the result in its raw form – **as written** – to a willing family member/friend/colleague and ask for their opinions on it. Reflect on both their reactions to your reading and the feedback they provide.

Guidance

In your reflection you could consider the following questions. Was your audience engaged or did they fall asleep? Did their feedback help you understand how the narrative should improve? Will they come back and help with future versions? Did the template work for you?

It’s unlikely that your first cut at creating a narrative using the template will result in something you can use directly in your dissertation. Instead, you should iterate to make it more compelling, using the feedback from your ‘critical friends’ to help you to do so.

1.3.3 Logical fallacies and cognitive bias

The BCW model is a useful device to help you structure your academic arguments. In making you think deeply and critically about what you are trying to claim and why, you have a better chance to write good arguments. There are, however, things you still need to guard against.

Firstly, there may be logical fallacies in your arguments: these are errors of reasoning that can undermine your claim. The most common ones are:

- Many more exist – you may like to do a web search to find out more.

- circular reasoning[•], in which the supporting evidence is just a restating of the claim. As a result the claim is not supported by evidence at all. • A.k.a. begging the question or begging the claim.
- hasty generalisation, in which a claim is made based on insufficient evidence. As a result, more evidence may be easily generate which contradicts it.
- sweeping generalisation, in which a claim obtained from evidence within a specific situation or contest is assumed to be true in other situations/contexts. Again, the claim could be easily dismissed by considering counterarguments from other contexts.
- *post hoc ergo propter hoc*[•], which claims a causal relation between two phenomena because one happens after the other. Only because two things happens one after the other does not necessarily mean that the first causes the second: it may be just random chance, or maybe there are other factors which may cause both. • This is a Latin phrase meaning “after this, therefore because of this.”
- false dichotomy[•], in which an either–or claim is constructed which assumes two phenomena are mutually exclusive where that’s not the case — there may be other phenomena which have not been considered. • AKA black and white fallacy or false dilemma.

Activity: Logical fallacies

#13

Think of each definition above and write down a possible example.

Guidance

If you struggle to think of appropriate examples, do a web search to get some inspiration. However, you should still try and come up with your own examples too.

Discussion

This is what we have come up with:

- circular reasoning: collecting quality data is difficult (claim) because quality data are difficult to collect (evidence, restating the claim)
- hasty generalisation: camomile tea cures insomnia (claim) because when I drink camomile tea in the evening I sleep well (insufficient evidence).

- sweeping generalisation: universities don't generate quality student data (claim) because I have observed this is the case in my university (evidence from a specific context)
- *post hoc ergo propter hoc*: I should not watch Italy playing rugby (claim), because every time I watch them they loose (assumed causal relationship).
- false dichotomy: during a pandemic we either save lives or preserve the economy (claimed false dichotomy), because to save lives we must shut all economic activities down.

Secondly, everybody is susceptible to cognitive bias, which prevents people from processing information objectively due to limited capabilities of our mind, or due to emotional responses or social norms and conditioning. You have already encountered cognitive bias in Section ??, alongside examples of various forms of bias. Among them, confirmation bias is particularly relevant to the construction of academic arguments.

Activity: Revisiting confirmation bias

#14

Go back to Section ?? and revisit the definition of confirmation bias. Write down ways in which it may affect you when constructing your academic arguments.

Discussion

Confirmation bias may result in cherry-picking information which agrees most with our beliefs, opinions or preconceptions, and ignoring that which may support opposite views. This can lead us, as researchers, to conduct selective searches, actively looking for articles whose positions is in alignment with ours, or recall and interpret evidence in a way which reinforces our position, rather than maintaining an objective stance by weighing and contrasting available evidence.

1.4 Developing your literature review from your theme summaries

You should now have a collection of summaries based on the themes you have identified from the literature. You will have also revised those summaries to ensure that the academic arguments within are well-formed in relation to the BCW model. Congratulations! You now have some basic building blocks to put together your very first literature review draft.

1.4.1 Developing the main body of your literature review

In piecing together your literature review it is important you consider the order in which different topics are introduced. Your main goal in doing so is to ensure that the reader of your dissertation will find it easy to follow the ‘story’ you are trying to tell — one which provides sufficient context and justification for your research.

In doing so, you should think of your literature review as made of three distinct parts:

- an introduction, which gives the reader, in outline, a sense of the detailed review you have conducted
- a main body, which provides a detailed account of such review, and
- a summary conclusion, which provides the academic argument in support of your research, based on the evidence you have presented in the main body.

Your theme summaries are your starting point to populate the main body of your literature review. In doing so, we suggest you take the following steps[•]:

- list all the themes you have identified in no particular order

- You should have both your theme summaries and concept map (see Section ??) at hand

Listing the themes

In our Stage 1 review of the Curriculum Analytics (CA) literature we identified the following themes:

1. stakeholders and CA tool development
2. modelling study trajectories and progression

3. benefits of CA tools
4. deriving insights from data
5. curriculum metrics and quantitative assessment
6. success factors for CA adoption
7. capturing student voice
8. CA definitions

- consider whether there are themes whose concepts overlap, and could be merged. If so, merge their themes summaries into a wider theme

Merging themes

We found that stakeholders were prominent both in the development and adoption of CA, so we merged those two themes; we also found that the ‘capturing student voice’ could be seen as a particular instance of the ‘benefits of CA tools’, so we merged those two themes as well. As a result, we ended up with the following (changes in bold, also illustrated in Figure 1.2) :

1. **importance of stakeholders in CA development and adoption**
2. modelling study trajectories and progression
3. **benefits of CA tools, including capturing student voice**
4. deriving insights from data
5. curriculum metrics and quantitative assessment
6. CA definitions

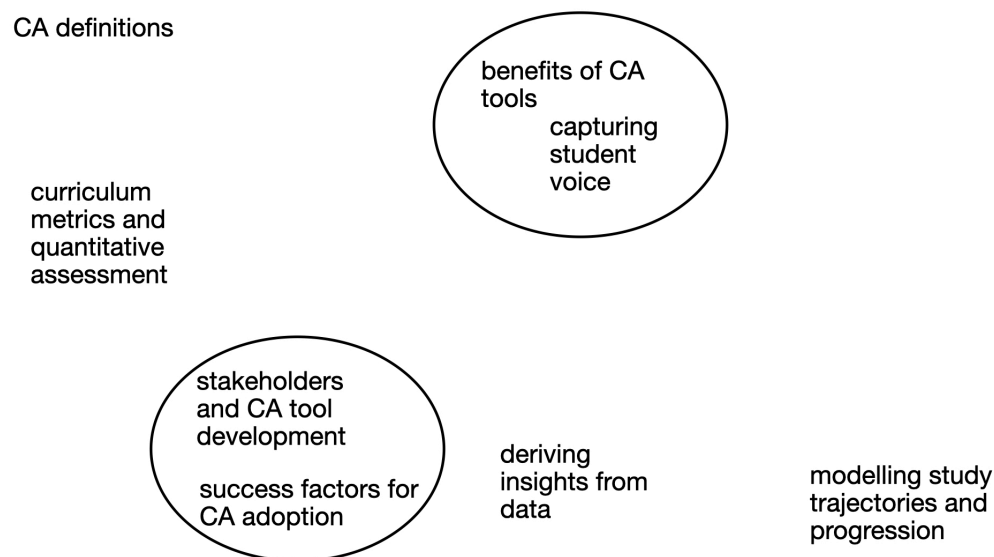


Figure 1.2: Merging themes

- consider whether there are themes which rely on concepts introduced by other themes. If so, the latter should come first, and the former could follow closely. You should re-order your themes accordingly

Identifying dependencies between themes

All themes assumes an understanding of what CA are, so that CA definitions should come first. Also, ‘deriving insights from data’ expands on some issues around stakeholders and CA adoption, so it should follow soon after that theme. This led to the following (changes in bold, also illustrated in Figure 1.3):

1. **CA definitions**
2. importance of stakeholders in CA development and adoption

3. deriving insights from data

4. modelling study trajectories and progression
5. benefits of CA tools, including capturing student voice
6. curriculum metrics and quantitative assessment

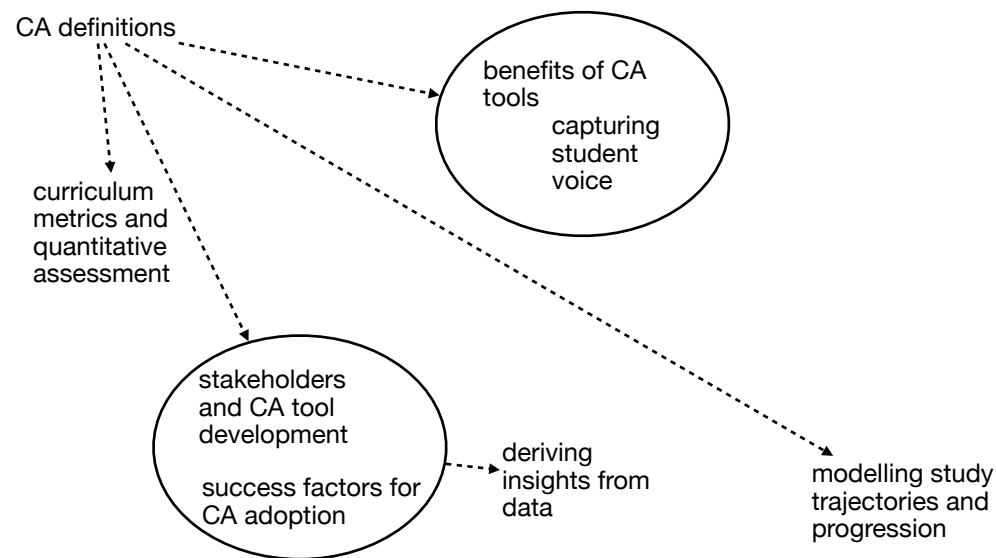


Figure 1.3: Theme dependencies

- consider which themes may be broad and generic vs those which may be narrow and specific. Re-order the themes so that your narrative goes from the generic to the specific, while maintaining any

dependencies you have already identified.

From generic to specific

Both CA benefits and metrics are quite generic theme, so that they could come early: this is illustrated in Figure 1.4, from more generic in top left to more specific in bottom right. Different re-ordering are possible. For instance:

1. CA definitions
2. **benefits of CA tools, including capturing student voice**
3. **curriculum metrics and quantitative assessment**
4. importance of stakeholders in CA development and adoption
5. deriving insights from data
6. modelling study trajectories and progression

By the end of this process, you should have a structure for your literature review body: each of the themes in your list can be a sub-section which you can populate with the narrative from your summaries.

Activity: Structuring the body of your literature review

#15

Consider your current theme summaries. Apply the above steps to arrive at a possible structure for the main body of your literature review. Once you are satisfied with the structure, populate it with your theme summaries and read it through. Make sure there is a good flow from one section to the next.

Guidance

You may have to re-apply the steps to improve both structure and narrative flow between sections. Being able to structure a narrative is yet another fundamental skill which becomes easier with practice and that will serve you well when writing up your whole dissertation. Therefore, you should tread this as a substantial activity which is likely to require you several hours if not days.

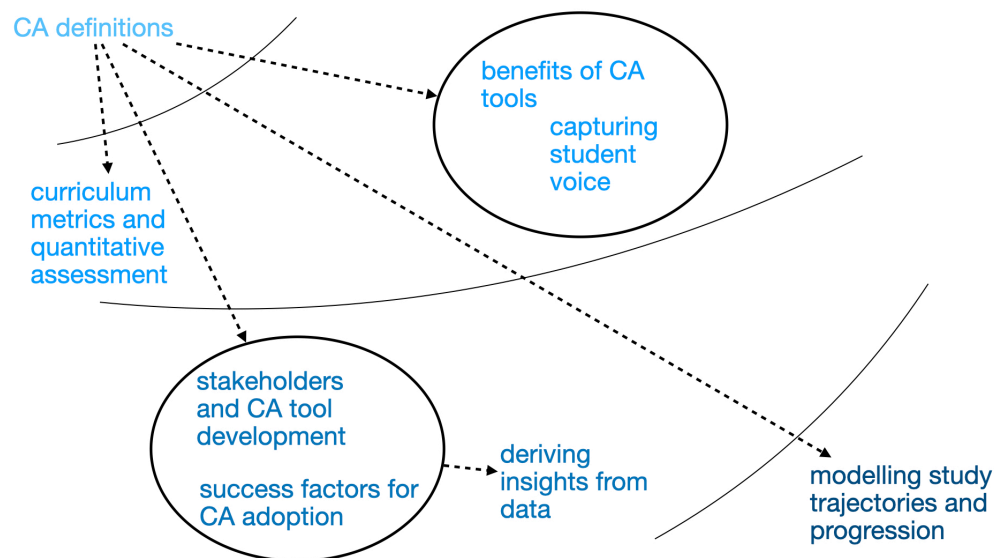


Figure 1.4: Theme generality

1.4.2 Choosing headings and sub-headings

You should now consider the headings of your review sections and sub-sections, to ensure they are appropriate. Your headings should:

- indicate, in outline, to the reader how the narrative develops from one section/sub-section to the next
- express clearly the purpose of each
- accurately reflect the content of each
- be concise

Activity: Improving your current headings

#16

Consider your current draft of the main body of your literature review. Apply the guidelines above to improve its headings and sub-headings.

Guidance

Your choice of headings and sub-headings should signpost to the reader where they are in your 'story', help them follow the thread of your arguments, and allow them to locate efficiently specific content they wish to return to.

1.4.3 Writing your review introduction and critical summary

Now that the main body of your literature review is in place, at least in draft form, you can top-and-tail it with a brief introduction at the beginning and a critical summary at the end.

Activity: Writing the introduction

#17

Write a brief introduction to your literature review to introduce the topics you are going to cover in its main body, and their relevance in relation to your research problem.

Guidance

Your introduction should be brief and indicate in outline the main topics you are going to cover and why. This section should be straightforward to write now that the literature review main body is in place.

Activity: Writing the critical summary

#18

Write the concluding section of your literature review which summarises the main findings from your reading in support of your proposed research.

Guidance

Your critical summary should take the form of an academic argument which supports your claim that there is a knowledge gap your research is going to address. You should skim through Section 1.1 to

remind you of the key elements of an academic argument. Writing this section may take some time and require you to iterate until your argument is well-formed.

1.5 Assessing your literature review

It is time to assess whether you have done enough work on your literature review and can move on. If not, you will need to widen it to include what is currently missing – there may be topics which you haven’t explored sufficiently, or even some you haven’t address yet. This means iterating the literature review process by searching, gathering, assimilating and synthesising more published work.

The best person to assess your literature review is YOU! The following activities will help you assess your progress and guide any further work required.

- Of course, others can help too, as we shall see.

1.5.1 Your own assessment

At this point, your literature review should be sufficient to describe the boundary of knowledge in the area of your research problem, including the knowledge gap you hope to fill.

Does your current review draft achieve this? To be able to answer this question, we recommend you apply the criteria in Table 1.3.

Activity: Assessing your literature review

#19

Assess your current draft of the literature review by applying the criteria in Table 1.3.

Guidance

For each criterium, use the prompts to write down your own assessment and to record what is still missing: the latter will help you identify further work you will need to carry out.

Table 1.3: Criteria for assessing your literature review

| Criteria | Prompts |
|-------------------------------------|---|
| Research problem underpinning | To which extent does it demonstrate your understanding of different facets of your research problem? |
| Research problem justification | To which extent does it argue that the research problem is worth investigating? |
| Potential contribution to knowledge | How clearly does it expose what the knowledge gap? How clearly does it articulate why it is significant to address it? |
| Logical progression | Do sections and sub-sections structure the narrative appropriately? To which extent does it include a logical progression of arguments? |
| Critical writing | Are connections between ideas appropriately explored? Is there a good balance between description, analysis and evaluation? |
| Supporting references | To which extent are all key arguments supported by appropriate references? |
| Format and proof reading | Have you reviewed your writing carefully to remove typos and grammatical errors? Are all citations and references in correct bibliographical style? |

1.5.2 Getting others to help you

There are people around you that will be able to help. Gathering others’ feedback will not only help you understand what still needs to be done, but it can also help you to find value in your work so far. Even if you feel the draft is scrappy[•], for instance, others might be able to bring out things they like about it.

[•] It certainly won’t be in its final form as yet.

Among them, the most important person to help you is your supervisor, as an experienced academic writer and topic expert.

ACTIVITY: Sharing your literature review with your supervisor

#20

Before going further with your literature review, it would be wise to ask your supervisor for comments on what you have already achieved.

Share your current draft with them and ask them to find holes in your coverage and your arguments. Carefully gather any and all feedback you receive.

Guidance

As this point, it's unlikely that your supervisor will say "It's perfect!"^a so be ready to hear one or more of the following comments^b:

- "you should read/add the following papers to your review"
- "this section seems out of order, perhaps it would be better elsewhere"
- "you've missed this topic"
- "this argument would be better expressed this way"
- "Author X also made this argument"
- "other comments"
- "your conclusions are wrong because ..."
- "you might like to speak to this colleague about this issue"

Make sure you consider their feedback carefully and take notes of all remaining work needed to develop your literature review further.

^a Although they may say "Well done!", but don't worry if they don't:)

^b Or something close.

Other help might come from family members/friends/colleague that you can talk to. Like you did in Activity ??, read what you have out loud to a live listener and have them try to follow your arguments.

Activity: A willing audience

#21

Read your current draft to a willing family member/friend/colleague and ask for their feedback on it. Take notes of improvements that may be needed.

Guidance

Write down their comments as they make them (but try not to interrupt the flow too much). What was their reactions? Were they engaged or did they fall asleep (again)? Will they come back and help for future versions? Make sure identify ways you could improve your draft for your readers.

1.6 Widening your literature review

Our 5-stage framework assumes you develop a comprehensive initial draft of your literature survey by the end of Stage 2, with the bulk of gathering and assimilating articles happening in Stage 1. However, even if you hit gold first time with your literature search, you are likely to require more than one iteration of the literature review process in order to develop a full draft to your own satisfaction and that of your supervisor. Therefore, expect some iterations also in Stage 2. The focus of such iterations is to help you widen or deepen some aspects of your review — something you and your supervisor will have identified while assessing your current draft.

Activity: Widening your literature review

#22

Select a number of topics or sub-topics for further exploration and iterate through the review process in order to gather further articles, assimilate and synthesise their content, and integrate it within your current literature review draft. Reassess the content at the end and iterate if necessary.

Guidance

The topics or sub-topics to investigate may include:

- those you identified while assessing your current draft
- those from suggestions and feedback from your supervisor

- themes or concepts currently under-explored in your concept map^a
- interesting ideas or sub-topics you came across in previous reading, but yet to explore
- articles cited in work you have already reviewed, or that cite that work

At each iteration, make sure you apply the wide range of review techniques you have learnt in Stage 1 and 2. In particular, record all new entries in your BMT, alongside your notes and summaries; take good notes as you assimilate new content; update your summary-comparison and concept matrices, and your concept map; and produce appropriate theme summaries.

As you integrate new content within your current draft, you may have to amend your arguments, or even rethink the structure of your draft.

Alongside widening the content you should also improve your draft based on other feedback you have received, for instance improving the narrative flow or clarifying points your readers may have found obscure or poorly expressed.

Importantly, make sure you take your supervisor's comments seriously. We don't mean just taking note of what they say and implementing it, but – and this is a good habit to form – writing a response: thank them for each of their comments, and tell them how the literature review has changed because of their input. Your response doesn't have to be long – the shortest response to a comment could be “Thank you, done!”. Doing this will make them – or anyone that comments – feel really valued.

This is a substantial activity which, depending on how much material you still have to review, may take you several days, if not weeks.

^a The concept map was introduced in Section ??.

Chapter 2

Research design foundation

To make a contribution to knowledge we do research. Practically, to do research, we combine a number of research tasks into a framework. Designing such framework is what we term research design. The framework will depend on the research area, the type of knowledge contribution you wish to make, your mindset as a researcher, and the opportunities and difficulties you may face along the way.

A research framework has many levels. At its foundations are its “ontology”, “epistemology”, and “methodology”:

Ontology is the philosophical study of the nature of existence and addresses the question: “What is the reality that I will research?”. Practically, ontology translates to determining what *phenomena* exist in the context of your research, the *relations* that exist between them and how they group together into *categories*.

Epistemology is the philosophical study of knowledge and addresses the question: “How is knowledge generated and from what sources?”. Practically, epistemology is about finding out “What people know?”, “What does it mean to say that people know something?”, and “How do people know that they know?”.

Methodology is the system of principles and methods by which you conduct research, that is, investigate, measure, and analyse your research’s aim and objectives. Methodology operationalises the “how” question of knowledge generation, so it is about devising concrete strategies to answer “How will I make my contribution to knowledge?”.

As you might have guessed, given that the goal of research is to make a contribution to knowledge, epistemology and ontology are incredibly important in defining what knowledge is in any particular research context and what, in that context, can be known about. Once this choice is made, an appropriate methodology can be devised: hence, methodology depends on choices made in relation to ontology and epistemology.

Fortunately, many others have thought very deeply about ontology and epistemology[•] and, in most areas and for the vast majority of masters-level research, their thinking will suffice. If not, we'd be left in a situation in which even an ostensibly simply statement like "That hat is blue" becomes in need of complex debate (**steup2020epistemology**).

Methodology, on the other hand, is something we will spend some time on, particularly how individual research methods combine to produce knowledge contributions through research strategies.

You should be aware that 'methodology' has many meanings in the literature, including the study of research methods, which questions the assumptions that underpin their creation and application. Wikipedia says[•]:

Quote

[...] A few theorists reject methodology as a discipline in general. For example, some argue that it is useless since methods should be used rather than studied. Others hold that it is harmful because it restricts the freedom and creativity of researchers. Methodologists often respond to these objections by claiming that a good methodology helps researchers arrive at reliable theories in an efficient way. The choice of method often matters since the same factual material can lead to different conclusions depending on one's method. Interest in methodology has risen in the 20th century due to the increased importance of interdisciplinary work and the obstacles hindering efficient cooperation.

These are not unimportant issues to consider. However, and as for ontology and epistemology, we will leave their discussion to others, content to stand on those giants' shoulders – we take an unapologetically practical approach to research methods, limiting our discussions to what, we feel, are their important characteristics for practice. This doesn't ignore philosophical issues, however: where there are important philosophical considerations to be considered, we address them. This includes questions as to how to choose a particular research method, and what an experienced reader will expect to be answered by it. You can then craft your dissertation to meet those expectations.

• For instance, if you're interested, you can find a fuller discussion of Ontology and Epistemology in the Stanford Encyclopedia of Philosophy.

• It could almost be seen as a warning!

2.1 Researcher mindsets

Depending on your background, you may have begun your research studies with a particular mindset – that of a scientist, for instance, or as someone embedded within an organisation. This mindset will flavour your approach to research, but it shouldn't constrain it – there are many options for research and the right one for you might be outside of your current understanding.

Over time, researchers in different communities and disciplines have developed differing mindsets, which are known in the literature as research paradigms[•]. You can think of a research paradigm as a philosophical way of thinking, a set of shared beliefs which shape a worldview.

We briefly outline the prevalent ones in this section — there is a lot, lot more to be known around this topic, and this introduction only scratches the surface! We provide some references for you to start your own investigation into this fascinating and complex topic, should you wish to.

Each paradigm comes with its own ontological, epistemological and methodological choices. It is important for you to be aware of their existence as this may help you guide your research design choices, even if in practice you will mainly focus on methodological considerations.

[ADAPTED from <https://proofed.com/writing-tips/the-four-types-of-research-paradigms-a-comprehensive-guide/>]

- A.k.a. philosophical traditions.

2.1.1 Positivist and post-positivism

The Positivist research paradigm assumes that there is a single, objective reality that can be accurately known, described and explained.

Positivism contributes knowledge as explanations of this reality, constructed from hypotheses which are confirmed through observations and measurements, hence becoming universal laws or facts. As an example, think of Newton's explanation of the action of forces on matter that is encoded as his Three Laws of Motion: these are meant as universal objective truths which apply to the natural world forever.

In assuming a single, objectively knowable reality, positivism removes the researcher as a variable in the research equation: research is necessarily limited to data generation, analysis and interpretation from an objective viewpoint as the basis of knowledge. As such, it befits research where a single objective reality can be assumed, such as the natural sciences, the physical sciences, or whenever very large sample sizes can be used to infer characteristics of a population. It leads the researcher towards quantitative methods.

Positivism emerged in the late eighteenth and early nineteenth centuries in Western societies, fuelled by a growing optimism on the role and power of the natural sciences – as witnessed, for instance, by the universal acceptance of Newton's Three Laws, and their explanatory and predictive capabilities backed up by empirical observations. So much so, that it was the predominant paradigm for almost a century and

a bulkhead against a growing number of worrying observations, including the movements of the planet Mercury[•], which didn't reinforce – indeed appear to contradict – Newton's Laws. How could an established truth lead that way? Indeed, Einstein's insight into the intimate connection between space and time inspired a substantial move away from the established Newtonian “laws” and “facts”, which were neither any longer **lakatos2014falsificationlaka**.

The need to rethink positivist objective truths was something of a crisis in the positivist movement (see, for instance, **kuhn2012structure**), leading to post-positivism[•] which introduced the idea of falsification: any posited theory must make predictions which are testable, the currency of a theory being determined by whether or not it had yet been proven false[•].

So, both positivism and post-positivism accrete knowledge by formulating generalisations and cause-effect linkages, based on objective, verifiable observations and measurements, and expressed as theories and laws. However, post-positivism acknowledges some of the limitations in such observations and measurement, so that a theory or law will only remain true for as long as it is not falsified by new observations or measurements. There is therefore a shift from certainty (positivism) to probability (post-positivism), with post-positivist researchers encouraged to take multiple measurements and observations, including triangulating their data, to arrive at an objective truth. Thus you might take a post-positivist approach to establishing the linkage between a drug and the alleviation of symptoms: once a generalisation or cause-effect linkage is established, it applies for as long as it remains un-falsified.

Both positivism and post-positivism assume an objective reality and do not admit that the researcher's own mindset and values may influence true knowledge: in being objective and verifiable, different researchers must necessarily arrive at the same truth, as long as the research process is reliable[•], that is different researchers can follow the same process to arrive at the same conclusions.

This denial of the researcher's influence on the research is often levelled as a criticism of these paradigms, particularly by social scientists, and has led to new paradigms.

2.1.2 Anti-positivist (interpretivism)

The shift from positivism to post-positivism still preserves the absolute objectivity of reality. In contrast, anti-positivism asserts that different people experience and understand reality in different ways: while there may be only “one” reality, everyone interprets it according to their own views. Simply put, this might mean that generalisations and even cause-effect relationships are subject to individual experience. Think of the

• See **enwiki:1193607156**, for instance.

• Not the most creative name, you must admit.

• Note that falsifiable theories that have been tested and failed can still be useful, perhaps within a restricted context. For instance, Newton's Laws of motion provide a very good approximation at low energies.

• We will discuss reliability in the next section

way that people interpret the (single) power structure within your organisation: typically, different people will describe it in different ways, as it applies to them.

Explaining the name, anti-positivists believe that all research is influenced and shaped by researchers' worldviews, leading to differing interpretations of the same reality. Again, think of the questions you might ask of people within an organisation that leads them to describe the power structure. Different questions can lead to different descriptions.

As a result, anti-positivists gravitate towards qualitative research methods and techniques to understand the different perspectives, placed in an explicative context of their own perspective.

In moving away from objective knowledge, however, anti-positivism raises questions of research validity[•], that is of how trustworthy and generalisable knowledge generated as subjective interpretation might be.

- We will discuss validity in the next section.

2.1.3 Constructivism

The Constructivist research paradigm goes further and asserts that reality is a construct of our minds and so is absolutely subjective. Constructivists believe that all knowledge comes from our experiences and reflections on those experiences as formed in our mind. A distinction is also made between reality which is individually vs socially constructed, the latter being the result of social interaction within a specific cultural or historical context.

Due to its focus on experiences and subjectivity, this paradigm is also mostly associated with qualitative research approaches. The researcher focuses on participants' experiences, including their own, constructing knowledge through understanding, sense making and reconstruction.

Establishing research validity is an even more prominent issue with this paradigm.

2.1.4 Critical Theory

The Critical Theory research paradigm originated in the fields of sociology, philosophy and political theory, and asserts that social science can never be 100% objective or value-free. Therefore, like interpretivism, it assumes multiple interpretations of reality in social contexts. However, it goes a step further by asserting that reality is shaped by those who are powerful, who legitimate particular ways of perceiving the world: 'truth' is inherently political, defined by those in charge to the disadvantage of many, and challenged by those who wish to promote equality. As a result, critical researchers seek to challenge the status quo and perceive research as transformative at a social level[•], confronting ideology and trying to discover and challenge the mechanisms through which exploitation and disadvantage are perpetuated in society.

- As a result, this paradigm is also called 'transformative' in the literature.

This paradigm focuses on enacting social change through scientific investigation. Critical theorists question knowledge and procedures, and acknowledge how power is used (or abused) in the phenomena or systems they're investigating. Researchers using this paradigm offer historically situated insights into society and its power structures as the basis of knowledge, approaching knowledge contribution through inquiries which are both critical and transformative, aimed at emancipation and restitution to address historical injustices. The researcher values are acknowledged and welcomed as a formative influence on the research.

Rather than reliability and validity, the quality of critical theory research is judged in terms of how well it is situated in its historical context, and the extent it acts as a stimulus for transformation, and the diminution of ignorance and misconceptions

2.1.5 Indigenous

The paradigms just described have attracted criticisms in that they are seen as Western-European centric, imposed on indigenous cultures as a result of colonialism, hence marginalising indigenous traditions.

In counterposition, an Indigenous paradigm is emerging with the aim of decolonising research. This paradigm emphasises the connection between people, their culture, and the spiritual and natural worlds, valuing knowledge which is local to communities, and holistic in connecting all beings with nature and spirituality.

As a result, indigenous cultural practices and forms of expressions should be reflected in the way the research is conducted, including language, metaphors, oral traditions and indigenous knowledge systems.

From an ontological perspective, therefore, both physical and spiritual realities and their connection matter, alongside reciprocal relations among all living beings.

From an epistemological perspective, knowledge is relational, based on the connection between natural and spiritual worlds, and its generation is a fluid process based on oral traditions, such as storytelling, and inward exploration of personal experience in context. The codification of such knowledge is through community praxis, in which the 'Elders' are often seen as key actors in the epistemological process.

Finally, indigenous methodology is one that favours the collective involvement of indigenous people in developing, approving and implementing the research, leading to knowledge of practical use.

It is important to note that although we have tried to characterise this paradigm in relation to ontology, epistemology and methodology, some scholars reject any such classification, regarding this too as a form of colonialism imposed by a Western view of research paradigms. If you are interested in going more deeply into this debate, you could start from _____

add references: Hart, M. A. (2010). Indigenous Worldviews, Knowledge, and Research: The Development of an Indigenous Research Paradigm. *Journal of Indigenous Voices in Social Work*, 1(1).

2.2 What’s your mindset?

Table 2.1 summarises the main paradigms we have discussed based on their ontological, epistemological and methodological standpoints. From a methodological perspective, we have indicated the main tendency of the paradigm, although the quantitative vs qualitative distinction is not as stark in practice, and a mix of methods often applies.

Table 2.1: Summarising research paradigms

| | Positivism | Post-positivism | Anti-positivism (Interpretivism) | Constructivism | Critical theory | Indigenous |
|-------------------|---|--|--|--|---|--|
| Ontology | one discoverable external reality | one discoverable external reality that can only be known imperfectly | one external reality which is interpreted subjectively | reality as the construct of one’s mind | one external reality determined by socio, political and economic power factors | physical and spiritual realities and their connection; reciprocal relations between all living beings |
| Epistemology | objective laws and theories that can be confirmed empirically | objective laws and theories that can be falsified empirically | subjective interpretations | subjective constructions | social and historical constructions, acknowledging issues of power and social injustice | relational knowledge, indigenous knowledge systems based on oral traditions and inward exploration of experience |
| Researcher’s role | objective, neutral | objective, neutral, aware of cognitive limitations | subjective, bringing own values, experience and bias | subjective, bringing own values, experience and bias | subjective, aware of own social position | researcher as indigenous participant in collective research |
| Main methods | quantitative | quantitative, with triangulation | qualitative | qualitative | qualitative | qualitative |

Your own mindset may lead you to gravitate towards one or more of these paradigms, or even somewhere in between. The next activity should help you reflect on this point.

Activity: What kind of thinker am I?

#23

Consider the following question and describe how you would go about answering it:

“What is the colour of swans?”

Then compare your approach to each of the paradigm. Which one is it closer to and why?

Guidance

If you can think of more than one way to approach the question, then describe and reflect on each of them in relation to the paradigms.

Discussion

I can think of a couple of ways I could tackle this question.

The first would be to start by observing the swans that live on the lake near my home, and record my observations. From that I would put forward an initial hypothesis, say that all ‘swans are white,’ as those are the only ones I can observe locally. I would then look online for images of swans from around the world to see if they match my observations. Having found images of black swans alongside white ones, I would then revise my hypothesis to “All swans are either white or black.” This process would continue until I’m satisfied there is no further contradictory evidence I can find, hence conclude that in all probability swans are either white or black. I would have to admit that there may be swans of other colours I’ve yet to come across, so the statement is open to future challenges. I would also need to be convinced that I’m a neutral observer, able to determine the colour of a swan correctly and reliably. This approach closely aligns with the post-positivist paradigm, specifically: I’ve made observations, triangulated my direct swan observations with the review of online swan images, and formulated, rejected and then reformulated hypotheses as part of my enquiry process.

My second approach would be to ask other people. For instance, I could set up a crowd-sourcing survey inviting participants to answer the question. By analysing their answers I could then decide if there is enough consensus on the colour of swans: for instance, most participants may have identified swans to be either white or black, although some may have provided more nuanced answers, like yellowish or other. From my analysis I would draw my conclusions which may or may not be the same as in my previous approach. In this case, I would have to worry about who participated in my research. Were there enough participants from around the world to provide sufficient and diverse evidence? To which extent may their colour perception differ? What else could I do to check the validity of the outcome?

This approach aligns with the interpretivist paradigm: I have to accept that, like me, each observer in my study will make their own interpretation of what the colour of a swan is, so that I would have to account for this in my conclusions.

2.3 Research strategies

Each research discipline and area has its more-or-less well-worn paths to a successful knowledge contribution. In Stage 3, you're now at the point where you'll join researchers in your chosen area on one of those paths: as you get deeper and deeper into your research, the steps you'll take will become more and more specialised.

To identify and take such steps, you will need to devise a research *strategy*, by which we mean a collection of recipes for doing research that will, if followed accurately, lead to a contribution to knowledge *even in the presence of uncertainty*. When devised, a research strategy consists of research tasks that interact in more or less complex ways, but which are sufficiently detailed that the researcher knows what to do next, even if that means making a choice between two or more next steps.

There's good news and bad news in choosing a research strategy:

- The bad news is that there are many possible choices you could make at any point.
- The good news is that, for your particular area in Masters research, there will likely be only a small subset that you need to know about.

To help you in your choice, our approach in this chapter is unapologetically practical. In Section ??, we will layout the options that you have together with reasons for choosing them and reasons for not choosing them. Each comes with a list of key evaluation questions the answers to which you will be expected to present as part of your dissertation. Amongst other things, the answers you give will justify how and why your work makes a contribution to knowledge. These evaluative questions in turn give you targets to aim for throughout your research, you will need to answer each of them – they will be the driver for your research and your writing up.

Before we look at research strategy in detail, we are going to consider the importance of such choice in terms your ability to defend your claim that your research has contributed new knowledge.

2.4 Developing the research design

Developing a design for your research will help you summarise, explain, and justify how your research is conducted to your examiners and other readers of your dissertation. In addition, it will be a touchstone for you to refer to at times of difficulty and allow you to plot your progress against your objectives.

The research design will, like most other aspects of your project, evolve: at the start, it will be a collection of your initial ideas and intentions; by the end, it will be a detailed account of what you have actually done.

Your research design will depend on many factors, including the type of research problem you are trying to address, the intended outcome of your research, the sort of evidence you will need, the resources and expertise you have, accepted research methods applied by other researchers in your field[•]. As you are a key participant in your own research, your personal views and values will also affect the choices you make while developing your research design.

Research design is also a field of study in its own right, one which has grown out of many diverse academic traditions and ways of thinking across academic disciplines and subject areas, and which is still evolving[•]. As such, it is not an easy topic to digest and is one of the most challenging aspects of doing academic research. It can be puzzling for students embarking on academic research for the first time.

For this reason, in Stage 1, we will not consider research design in detail — that will happen from Stage 2 instead. However, so that you can start to think about your research design, in this section, we introduce a range of topics which concern research design and should influence your follow-up work.

2.4.1 Types of evidence and data

The phenomena upon which your research will be based must be observed and this gives rise to data. Data can be interpreted to give information and evidence.

Thus, most academic research will be based on data and evidence. Data is the raw observations with no interpretation attached — anything you may collect, observe or gather in your research. Evidence is information interpreted to support (or otherwise!) your academic arguments. Indeed, data forms the basis of evidence, so the two concepts are closely linked and often used interchangeably. This section recalls briefly the main types of data and evidence used in academic research.

Quantitative data are data that can be quantified or measured, and be given numerical values. They include the following types:

- **Numerical** data are numbers[•], such as the number of students registered on a module or the tem-

• And the philosophical beliefs which motivate them

• In this young research area, there is still a lot of post-rationalisation of a particular course of research as authors look for generalisable themes.

• Yes, they are!

perature in the UK in July. Simplifying a little, when numerical data has a whole-number value it is called discrete, otherwise it is continuous[•]. In either case, appropriate mathematical and statistical operations can be applied to them, values can be ordered, and the interval between two numbers can be calculated exactly.

- **Ordinal** data are non numerical data that can be arranged in an order. An example is the very widely used Likert scale[•] often used in questionnaires to elicit opinions. An example of a 5-point Likert scale is that ranging from ‘Strongly disagree’ to ‘Strongly agree’ with ‘Disagree’, ‘Neither Disagree nor Agree’, and ‘Agree’ in the middle. While these values can be arranged in order[•], mathematical and statistical operations can only be applied in a limited way, for instance, taking the mean (or average) score of responses on a Likert scale. •
- **Interval** data are data which can be arranged on a scale, so that we can calculate the distance between any two data points. All numerical data are also interval data, but interval data may not be numerical. For instance, calendar dates are interval data as we can calculate the time interval between two given dates, e.g., the number of days in between.
- **Ratio** data are numerical data with an absolute zero considered as a point of origin, that is no negative values are possible. Examples include a person’s high, weight or their wage from employment: none of these can take a meaningful value less than zero.

Qualitative data, on the other hand, are descriptive in nature and defy ordering. Sentences, images, sounds, etc., are all examples of qualitative data. An important subclass of qualitative data is **nominal** data commonly used to denote categories, for instance, Dog, Cat, Alligator, etc. These data cannot be ordered and mathematical operations and functions don’t apply to them.

Note that in Statistics ordinal data and nominal data are called **categorical** data, exactly because they are used to denote categories, which may or may not be ordered. This also means that categorical data span the quantitative/qualitative divide.

Data and evidence are also classed as:

- **primary**, when newly generated or collected during research; or
- **secondary**, when already available from previous research, and re-used during new research.

The academic literature that will be at the core of your literature review[•] is secondary evidence, as are all other published academic and non academic documents, e.g., laws, policies and procedures, official reports, etc.

- Given the fundamental nature of energy, and the vagaries of quantum physics, it may be that we’re incorrect in stating that real-world temperature is actually a continuous variable. However, even if it isn’t, its values lie on a continuous scale.
- Almost certainly, the most recent survey you completed would have used the 5-point Likert scale mentioned here.
- This might be done by giving ‘Strongly disagree’ the numerical value 1, ‘Disagree’ the numerical value 2, and so on.
- Read more about Likert scales use (and misuse) in **carifio2007ten**.

- A bit or a hint for the next Activity :)

Curriculum Analytics example, cont'd

In our example, to conduct our research we would need to make use of a range of curriculum data which are likely to include both quantitative (e.g., number of students, pass rates, etc.) and qualitative data (e.g., components of a programme of study, learning outcomes, etc.). These will be all secondary data, in the sense that they will be provided by the target university for us to apply a range of modelling techniques. In terms of outcomes of our research, we are envisaging some form of stakeholders' evaluation of the effectiveness of the techniques, so we are likely to generate, as primary evidence, mainly qualitative data.

Activity: Considering types of data and evidence in your project

#24

List and justify the kinds of data and evidence your research will make use of or generate.

Guidance

Consider both existing data and evidence you will need and any new data/evidence your research may produce. Justify your answer in terms of the specific aim and objectives of your work.

2.4.2 Classes of research methods

Research methods are the means used in research to collect, analyse, synthesise or present data and evidence, and to derive findings from them. Their purpose is to help you conduct your research in a systematic, rigorous, repeatable and reliable fashion.

Research methods can be classes based on their purpose into:

- **data collection methods**, used to gather data and evidence
- **data analysis methods**, used to analyse data and evidence
- **modelling methods**, used to build models of complex real-world situations, where many interrelated phenomena are at play and a holistic understanding is needed.

Methods are also classed based on the type of data and evidence they handle into:

- **quantitative methods**, which – unsurprisingly – are used when dealing with qualitative data;
- **qualitative methods**, which – again unsurprisingly – are used for qualitative data.

Broadly speaking, quantitative methods are widely applied in the natural sciences, with their focus on measurement, natural phenomena and their simpler cause-and-effect relations, while qualitative methods are widely applied in the social sciences, with their focus on understanding human behaviour. In practice, however, this distinction is not as stark and often quantitative and qualitative methods are mixed in research, particularly when research spans several academic disciplines. Instead, modelling methods are often associated with design, computing, engineering and more generally the so-called ‘sciences of the artificial’ (Simon, 1969), which consider technology and its development in its wider social context, focusing on addressing complex, messy socio-technical problems.

Within these broad classes, you will encounter several methods from Stage 2 onwards.

Curriculum Analytics example, cont’d

In our example, we may need both quantitative and qualitative collection methods to extract relevant data sets from the data provided by the target university. In addition, modelling methods may be required in the application of the selected techniques to those data set. Qualitative data analysis methods should apply to stakeholders’ evaluation data.

Activity: Considering research methods in your project

#25

List and justify the kinds of research methods you may apply in your research.

Guidance

You should relate your choices to the kind of data and evidence you have identified in the previous activity.

2.5 Developing your understanding of research design

Your literature review has set you on the right course to begin your research – you now know that there’s a hole in knowledge into which a contribution can be made.

While this tells you *what* you are going to research, your research design should tell *how* you are going to do it. As you learnt in Stage 1, your research design will summarise, explain and justify how your research is conducted, developing into a detailed account of what you have done by the end of your project. An appropriate research design is one which allows you to make your contribution to knowledge in a way which meets the expectations of researchers in your field of study.

In this section, we consider fundamental concepts in research design to help you develop your understanding and inform your project choices, and to prepare you for the detailed work in Stage 3 where you will apply your learning to your own project.

The basic building blocks of research design are research methods and research strategies. *Research methods* are standard ways to collect, analyse, synthesise and present data and evidence, and to derive findings. You can think of them as basic techniques and procedures that researchers have come up with over time to deal with different kinds of data and evidence. Instead, *research strategies* are ways to systematise how research methods can be used together. You can use them to guide you in selecting and combining research methods to address specific kinds of research problem. Both methods and strategies are therefore practical tools to do research. Those you will encounter in this section are summarised in Figure 2.1.

At a theoretical level, strategies and methods are motivated and justified by different sets of beliefs on the nature of what we can study, how knowledge can be generated, and what is of value in research, called *philosophical traditions*: although practically you could apply strategies and methods without referencing them, it is important for you as a researcher to be aware of the beliefs and values they embody, and the extent they align to your own – something which may influence your own research design choices. In this section you will also read about the more prominent philosophical traditions.

2.5.1 Research methods

Research methods are the means used in research to collect, analyse, synthesise or present data and evidence, and to derive findings from them. They help you conduct your research in a systematic, rigorous, repeatable and reliable fashion. So, research methods are important because they underpin how sound[•] your research is.

• This is the topic of research *validity*, which will be covered in Stage 3.

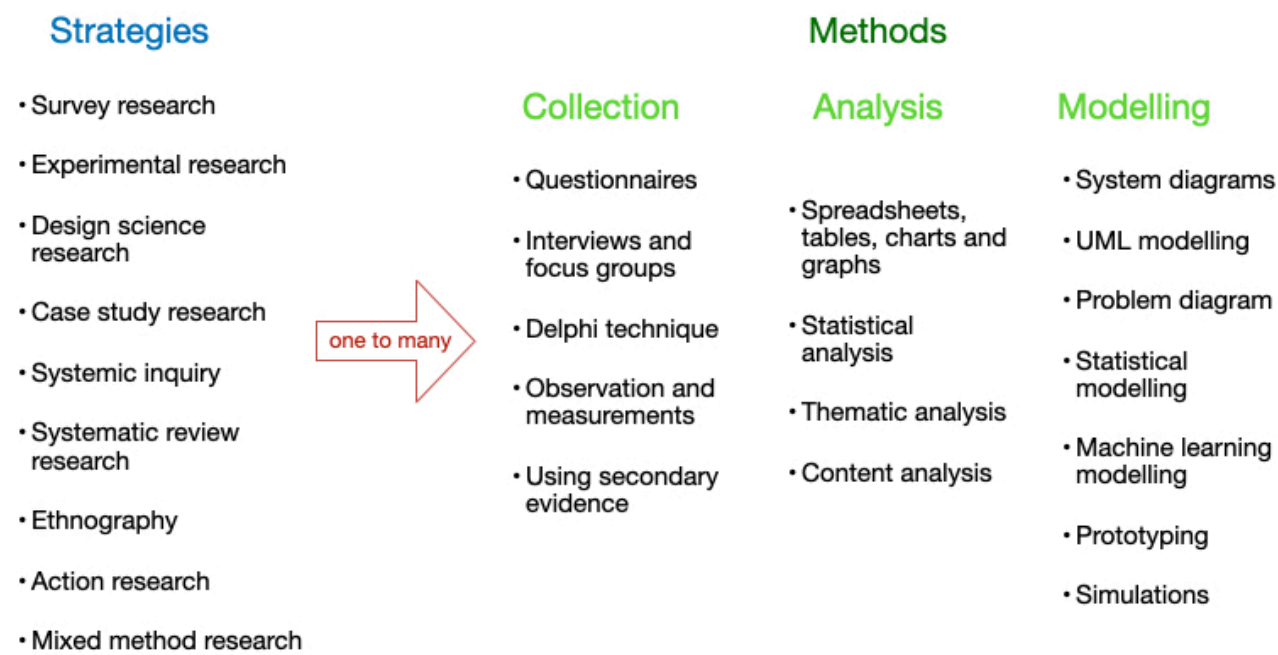


Figure 2.1: Research strategies and methods

Research methods are many and vary greatly, which can be confusing to the novice researcher — and even the seasoned one at times! One source of confusion is that the same term is often used to indicate both specific techniques and procedures, and broad research strategies combining many.

In this handbook we will use the term research method as a synonym for research technique/procedure, but be aware that you may encounter other meanings while reading the academic literature.

In this section, we recall a wide range of research methods commonly applied in research, particularly at Masters level. They are categorised as collection, analysis and modelling methods.

2.6 Research strategies

A research strategy[•] is a systematisation of a set of research methods, which can be applied together in order

[•] Our favourite take on *strategy* is: “The essence of strategy is choosing what not to do” from the economist *Michael Porter*. Your research strategy should do this – by giving you a focus – so choose carefully, and use its guidance wisely.

to address research problems of a particular kind. As such it can help you select and apply an appropriate mix of research methods. The term *methodology* is also sometimes used in the literature with a similar meaning[•], although methodology also means the study of research methods, so it is an overloaded term this handbook will avoid.

• And, confusingly, also as a synonym of 'method'...

This section provides an overview of some of the best known and most commonly applied research strategies.

2.6.1 Summary of research strategies

Table 2.2 provides a summary of research strategies introduced in this section. As you did for methods, in the next activity you should reflect on those which are most relevant to your project.

ACTIVITY: Identify candidate research strategies

#26

Consider the strategies in the table and which you may be able to use in your project. For each, write down why you think they are applicable.

Guidance

In considering candidate strategies you should think about your research problem, aim and objectives. Their descriptions in the previous sections, which you may like to revisit, should be sufficient for you to carry out this activity. In Stage 3, you will return to some of those strategies, investigating them in greater depth and for their application to your project.

2.7 Understanding research methods and strategies in articles you have reviewed

To ground what you have learnt so far on research methods and strategies, you should look back at some at the articles you have reviewed to see how they describe and use them. This may also give you some ideas on how to apply them within your own project. You should be aware, however, that terminology used in the literature may different from that of this handbook[•].

• We have already noted how some terms are used differently by different authors.

Table 2.2: Research strategies introduced in this section

| Name | Description |
|-----------------------------------|---|
| Survey research | to gain insights which are valid across a target population, by collecting data from a predefined sample in a standardised and systematic way |
| Experimental research | to investigate cause and effect relationships between factors by testing hypothesis or proving/disproving causal links |
| Design science research | to generate new knowledge about a significant problem or its solution via the design of an artefact |
| Case study research | to investigate in great depth a notable instance of what is under study, in its real-world context |
| Systemic inquiry | to explore complex, messy problematic situations involving multiple and often contrasting perspectives, with the aim of transforming the situation for social improvement |
| Systematic review research | to generate new insights from published academic work |
| Ethnography | to study the culture of a group of people in their natural setting |
| Action research | to improve the researcher’s own professional practice |
| Mixed-methods research | to combine quantitative and qualitative research to gain different perspectives on phenomena of interest |

Considering research methods and strategies in published work

Looking back to our curriculum analytics example, one of the papers we reviewed was:

Gray, G., Schalk, A. E., Cooke, G., Murnion, P., Rooney, P., & O’Rourke, K. C. (2022). Stakeholders’ insights on learning analytics: Perspectives of students and staff. Computers & Education, 187, 104550.

In this paper there is a ‘Methodology’ section which describes the study research design in detail. Specifi-

cally, it states that a mixed-methods strategy was used to collect and analyse qualitative and quantitative data. For data collection both questionnaires and a focus group were. For qualitative data analysis, thematic analysis was applied; for quantitative data analysis, tables and charts were used, including some calculation of differences in scores obtained from questionnaire answers.

The paper usefully includes some descriptions of the specific steps the researchers took to recruit participants and analyse the data, something that could be replicated in new studies.

We found differences in terminology:

- mixed-method ‘approach’ is used for what we call mixed-methods strategy, and
- ‘survey’ is used to mean a questionnaire: this is actually rather common in the literature, where the term survey is found to mean both.

Activity: Considering research methods and strategies in articles you have reviewed

#27

Go back to two or three articles you have reviewed, perhaps those you have found most interesting or closest to the research you intend to do.

Look for research methods and strategies they use, and consider how these are presented and applied. Try to establish links to what you have learnt so far, including noting any differences in the terminology used. If appropriate, write down specific points which may help you apply them in your own project.

Guidance

Often articles include a ‘Methodology’ or ‘Methods’ section where research methods and strategies are discussed: that was the case in our example. That’s the section you should start from. It may be, however, that more relevant content is described elsewhere, so also look for sections that summarise data or evidence collected and analysed.

You may want to skim through few articles before deciding which ones to consider in detail.

Chapter 3

Managing risk in Stage 2

[More here](#)

Chapter 4

Reflecting and reporting in Stage 2

Well, you've reached the end of stage 2. You're really speeding along now.

Before carrying on, it's time to reflect and write up your Stage 2 report.

Activity: Reflecting on your learning and practice

#28

As you did at the end of Stage 1, in this activity you are asked to stand back and reflect deeply on what you have learnt and done, the wider context of your work and your own attitude to it. Specifically, you are asked to think deeply about each of the following:

- your study this far
- the way you work. Are you tidy and systematic, or let things happen organically? For instance, how does
- the context of your research
- your feelings about your project

You should also think of any significant changes with respect to your reflection in Stage 1

Guidance

You should refer back to the guidance to this activity in Stage 1, Section ??.

Your end-of-Stage 2 report will help you consolidate your work so far, and develop your dissertation incrementally. Its recommended structure and content is indicated in Table 4.1, which builds one that of your Stage 1 report.

Activity: Writing and assessing your report for Stage 2

#29

Using your word processor of choice, revise and expand your Stage 1 report by applying the structure and guidance in Table 4.1.
Assess your report by applying the criteria in Table 4.2. Revise and iterate until you are ready to move on.

Guidance

In completing your report, you should make good use of notes and summaries you wrote as part of the activities in this chapter. In evaluating your report, for each criteria, you should consider the related prompts, write down any further work needed for your next stage, and update your work plan and risk assessment table accordingly.

Table 4.1: Report structure and guidance

| Report template | Guidance |
|---|---|
| Proposed title | Your title should continue to capture succinctly your research problem and aim. <i>It is likely this is the same as, or very similar to, that in Stage 1</i> |
| Sect 1 - Introduction 1.1 Background to the research 1.2 Justification for the research 1.3 Fitness of the research | This section should continue to provide an introduction to your research topic in its wider context (as background) and your justification of why the research is worth pursuing. Its purpose is to introduce and justify your intended research in overview, before entering the detailed work of the subsequent sections. It should be well argued and supported by appropriate citations. In this section, you should also argue how the research fits within the scope of your qualification, and meets any other personal, professional or organisational criteria. <i>You may review this section from Stage 1 to reflect your growing understanding of the topic in context derived from your literature review.</i> |
| Sect 2 - Literature review 2.1 Introduction 2.2 Main body 2.3 Critical summary | <i>This section should consist of your current literature review, developed in this stage by following the advice in Section 1.</i> At this point, it should be a substantial, almost complete, draft, well structured and articulated through solid academic arguments. It should demonstrate your understanding of the main literature which relates to your research problem, clearly identifying the knowledge gap your project will address. |
| Sect 3 - Research definition 3.1 Problem statement 3.2 Aim and objectives 3.3 Knowledge contribution | You should continue to ensure that your research problem is well articulated and appropriate for your course and your personal and professional circumstances, that your aim and objectives are consistent with research problem, and that the intended knowledge contribution of your research is clearly articulated. <i>You may revise this section from Stage 1 in view of your increasing understanding from your literature review.</i> |
| Sect 4 - Research design 4.1 Evidence and data 4.2 Research strategies and methods 4.3 Ethical, legal and EDI considerations | <i>This section should extend your Stage 1 work with your considerations of candidate research strategies and methods for your project, based on the guidance in Section 2.5.</i> |
| Sect 5 - Work planning and risk assessment 5.1 Statement of progress 5.2 Key priorities in follow-up stage 5.3 Risk assessment | In this section you should reflect on the progress you have made in Stage 2 and establish your priorities for the next stage. You should also review your risk assessment as appropriate. |
| References | You should keep your growing references in good order and ensure you apply the required bibliographical style consistently. Ideally, you should use a BMT to generate and integrate your references within your report |
| Appendix - Work schedule | You should include your revised work plan as an appendix |
| Appendix - Risk assessment table | You should include your updated risk table as an appendix |

Table 4.2: Criteria for reviewing your research proposal

| Criteria | Prompts |
|-------------------------------------|--|
| Completeness | Are all sections included and their content complete? What is missing? |
| Academic writing | Have you applied good academic writing practices throughout? Which main issues do you still have to address? |
| Logical structure and flow | Have you structured your writing appropriately to ensure a logical flow of arguments? Which restructuring may be needed? |
| Supporting evidence | Are your key arguments supported by appropriate references or other evidence? Which further evidence is needed? |
| Citation and reference style | Do all your citations and references comply with the required bibliographical style? |
| Avoiding plagiarism | Have you acknowledged the work of others and distinguished it from your own appropriately? |
| Grammar and spelling | Have you proof-read your report carefully to remove all typos and grammatical errors? |

Chapter 5

Stage 2 Takeaways

- the fundamental skills for synthesising the literature are critical thinking and writing, and the ability to establish connections between ideas and arguments
- academic writing requires you to observe a number of practices, which ensure your writing is clear, precise, logical and well-structured
- an academic argument is a structured argument whose key elements help you ensure your claims are carefully reasoned and supported
- your theme summarised from Stage 1 are your starting point when writing your literature review
- your literature review will be adequate if it contextualise and justify your research in the context of related academic literature, and is well structured and logically argued
- the building blocks of research design are research methods and strategies, together with their underlying philosophical traditions
- several research methods exist to help you collect and analyse data and evidence, or model real-world scenarios or systems and artefacts
- several research strategies exist to help you meet your research objectives

- philosophical traditions capture different ways of thinking about knowledge generation and values in research
- knowing the building blocks of research design helps you understand how research reported in academic articles was conducted
- the template provided can help you structure your Stage 2 report

Closing

Your dissertation submission concludes your Masters project work. If you have come that far, then you deserve much praise and this is a significant intellectual achievement. A successfully project is a strong indication that you have mastered a wider range of research and transferrable skills, which are of great value to your professional development and provide a strong foundation for any future academic or professional research you may choose to pursue, including doctoral studies.

We hope you have found conducting your own research rewarding, despite, and perhaps because of, the challenges that undoubtably you will have encountered and overcome during your project. We also hope you will have found this handbook valuable in supporting you throughout your project.

We wish you all the best for your future career and studies!

Glossary

Academic literature: the collection of all published research and scholarly work.

Active reading: engaging with written materials in a way which allows you to assimilate the important points in an effective manner

Artificial Intelligence (AI): a sub-discipline of Computing, aimed at creating software systems able to simulate human intelligence processes.

Bibliographical database: a searchable collection of academic literature.

Bibliographic Management Tool (BMT): software tool used to collect and save searchable information concerning articles and other literature sources reviewed during research, including digital copies of articles and personal notes, and to generate references, reference lists and bibliographies in a variety of bibliographical styles.

Bibliography: a separate section, usually towards the end of a document, which collects full bibliographical information of sources, whether cited or not, which are relevant to the content of the document.

Bibliographical style: a set of rules which determine what citations and references should look like in academic writing.

Categorical (or nominal) data are qualitative data corresponding to categories that cannot be ordered and on which mathematical operations and function don't apply, e.g., full-time vs part-time study.

Citation: a short-cut that appears in the main body of a written academic piece to refer to a specific source in the academic (or other) literature.

Citation searching: a technique for exploring the literature based on citations in academic articles.

Critical writing: writing displaying a good balance between description, analysis, synthesis and evaluation.

Correlation: statistical relationship among two or more measures, concerning how changes in one measure are reflected in changes in the others.

Data analytics tool: sophisticated digital tools which extend spreadsheet capabilities for collating and visualising data to include some degree of automated analysis, both statistical and based on Machine Learning algorithms.

Descriptive statistics: measures used to provide meaningful summaries of data points within a dataset.

Gantt chart: a scheduling chart used to plan, organise and monitor activities and work over the duration of a project.

Google Scholar: a web search engine specialising in scholarly content.

Grey literature: collection of information produced by organisations whose primary or commercial remit is not publishing, such as universities, government bodies or businesses (other than publishers). It includes pre-publication and non-peer-reviewed articles, theses and dissertations, research and committee reports, government reports, conference papers, accounts of ongoing research, etc.

Interval data are ordinal data, but for which we can calculate precisely the interval between any two data points. For instance, calendar dates are interval data in the sense that we can calculate precisely the interval between two given dates, e.g., the number of days in between.

Kanban board: an agile project management tool to help individuals or teams organise and track their progress on specific tasks during a project.

Machine Learning (ML): a branch of Artificial Intelligence aimed at creating software systems able to learn autonomously and improve from experience.

Numerical data are numbers, either discrete or continuous, e.g., the number of students on a module (discrete) or the average temperature in the UK in July 2023 (continuous). Numerical data can be ordered, and mathematical and statistical operations and functions apply.

Nominal data: same as categorical data

Ordinal data are data that can be arranged in an order, but are not necessarily numerical, e.g., a 5-point Likert scale from (1) Strongly disagree to (2) Disagree to (3) Neither agree nor disagree, to (4) Agree to (5) Strongly agree. While these values can be arranged in the order indicated, mathematical and statistical operations and functions don't apply.

Plagiarism: passing off someone else's work, words or ideas as your own, often as a deliberate attempt to deceive.

Research asset: information which is needed, gathered or generated by your research, including articles, data, images, tables, notes, etc, organised and managed in a disciplined and systematic manner.

Qualitative data: descriptive data, like texts, words, images, sounds, etc., including categorical (or nominal) data, e.g., full-time vs part-time study or employed vs unemployed.

Quantitative data: data that can be quantified or measured, and be given numerical values, including numerical, ordinal and interval data.

Reference: the full bibliographic information of a source in the academic (or other) literature which is cited in an academic text.

Risk: the likelihood of something going wrong combined with the impact that may have on a project.

Spreadsheet: a digital tool used to capture, display, analyse and manipulate data arranged in tables.

Version control system: a set of conventions or tools to keep track of different versions of documents and other research assets.

References and further reading

Cottrell, Stella. Critical Thinking Skills : Effective Analysis, Argument and Reflection, Bloomsbury Publishing Plc, 2017. ProQuest Ebook Central, <https://ebookcentral.proquest.com/lib/open/detail.action?docID=6234915>.

A practical handbook to develop your critical thinking skills, packed with activities and practical advice.

Cryer, Pat. The Research Student's Guide to Success, McGraw-Hill Education, 2006. ProQuest Ebook Central, <https://ebookcentral.proquest.com/lib/open/detail.action?docID=316264>.

A comprehensive introduction to research skills for post-graduate research students. Some elements are more relevant than others to Masters research, so this is a good reference book to dip in and out.

Potter, Stephen (ed.) (2006) *Doing postgraduate research*, SAGE study skills, 2nd edition., Los Angeles London New Delhi, SAGE.

Another comprehensive introduction to research skills for post-graduate research students, possibly more suited to PhD students than Masters students.

Etzold, Daniel 2020). My Workflow for Reading Scientific Papers. <https://betterhumans.pub/my-workflow-for-reading-scientific-papers-d4b27dbb38a6>

Some practical advice from a practitioner. This is a personal account, rather than a tried-and-tested method. Nevertheless, it contains some good tips that you may find useful.

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Data Protection in the EU, https://commission.europa.eu/law/law-topic/data-protection/data-protection-eu_en (Last accessed: February 2023)

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UKRI Equality, diversity and inclusions key principle. <https://www.ukri.org/about-us/policies-standards-and-data/good-research-resource-hub/equality-diversity-and-inclusion/> (last accessed: November 2022)