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HOW TO SUPERVISE (AND BE SUPERVISED) ON A RESEARCH DEGREE

Tips and tools for supervisors and students

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Chapter 7:
Interpreting the data

Establishing the storyline

One of the first things that both the supervisors and the research students need to remember is that although the dissertation is the justification of an academic thesis, it also needs to tell a good and convincing story. There is little point in making a wonderful discovery if you cannot properly communicate with other people to tell them about it. Research is about discovering something unknown, and like any good mystery story, there needs to be an introduction to set the scene for your readers, (the literature review) there needs to be a storyline to develop the research agenda (starting with the methodology) there need to be clues discovered as the story develops (the results chapter(s)) and there needs to be a moment of final revelation of the object of your search (the analysis and conclusions).

The delivery of this story requires a certain writing style – it needs to follow the academic conventions of the subject discipline; it is not a novel – but that should not mean that the ‘story’ that the researcher wants to tell should not be easy to read. There are some simple tips, such as to first lay-out using numbered subheadings, the main headlines in the ‘story’. The separate sections can then be written under these headings and linked together to form the chapters. A good idea is to begin by drafting the contents page of the dissertation, listing the chapter headings (1. Literature Review, 2. Methodology… etc.) and then entering the various headings of likely sub-sections. In addition to helping to establish a coherent storyline (which can be amended as the writing progresses) this enables the dissertation to be written in a manner which is not necessarily linear (sub-sections can be skipped and returned to at a later date) and built up piece-by-piece while still keeping within the framework of the story. It is also a good tool for discussions between the research student and the supervisor about the stage-by-stage progress (This technique might be combined with red (not-done) green (completed) and amber (working on it) highlights, to help

students prioritise what bits of writing need to be tackled next).

The bottom line is that the research student needs to craft a good story to introduce, explain, and discuss their research project, and if this is easy to read, then it will be easier for readers to follow and perhaps build-upon in subsequent projects. This includes correct spelling, good grammar, and simple tactics such as to avoid l-o-n-g and cumbersome sentences (We had one student who wrote a sentence containing the word ‘and’ seven times! This was really three separate sentences and would have been far easier to understand if it had been written in a simpler style.) Another avoidable error is to include sentences which give ambiguous comments. If there is a way in which your comments can be misinterpreted, it is human nature that someone will take the wrong meaning, and this can be easily avoided by actually saying what you really mean and keeping this in simple language that cannot be misunderstood. Using hierarchical numbering for the chapters, sections, and sub-sections not only helps to

create a clear storyline, it also helps to allow cross-reference to earlier (or future) comments in the dissertation.

It is the role of the research supervisor to read and give comments to help improve the direction of the writing process. The student does not need to like these comments (and indeed, at their own risk, may chose to ignore them) but they should heed them because it is the duty of the supervisor to direct the work of the student to ensure that they give the very best presentation possible of their work for examination and further scrutiny.

Building on existing knowledge

A key role of any supervisor is helping the research student to bridge the gap between the fundamentals about what is currently known about the research topic, and the new results which have been generated through the research activities of the student. All research is built upon some level of pre-existing knowledge of the subject, even if existing knowledge is patchy or otherwise insubstantial. In the literature review chapter, the student will have built up the profile on what is already known about the research topic

and how that information can be backed-up by evidence from the academic literature available. In the analysis chapter, the first task is to provide some interpretation for the new, primary research conducted by the student, but a significant secondary task is to relate this back to the previously discussed evidence and underpinning theories which were explained in the earlier chapter(s). This can be a tricky task because the new research results might either fully support earlier work (in which case, what's new about the research?) or else directly contradict it (in which case how do you prove the superiority of the new results?).

It is a useful tip to bear in mind that hindsight is a wonderful perspective, so try to avoid feeling too smug about the wonderful flashes of insight produced by the new research. Always assume (unless proven otherwise beyond doubt) that the earlier researchers did the best job that they could with the information, equipment, and currency of information at the time they were doing their research. It is easy to look back in history and wonder why our predecessors could ever have believed some of the accepted wisdom and 'common sense' of the time, but in

fact we are no different: we simply have much more information in a greater level of detail, but it would be a fool or a knave who would claim to know every last thing about the chosen subject. In most circumstances the research will tweak prior definitions, and then throw a clearer light on an existing area or a way of understanding. Alternatively, it might provide new data to enable the researcher to propose a different way of thinking about the existing data and justifying that new approach with new evidence (or a new way of interpreting the existing evidence).

Either way, the first stage of research analysis is to compare the new information with what has already been understood, and then go beyond this to open up a new area that is worthy of further research (and/or proposing a different way of understanding the subject). Two common failings at this stage of the research process are either to appear to present the conclusions as if nothing important had ever preceded the current research (thereby inventing a whole new branch of epistemology) or else failing to restrict the conclusions to the ***actual*** results of the current research, and instead attempting to make grand

conclusions for the whole of the discipline (rather than just for the current research project). Either way, understanding the real importance of the new research, and using it to build upon earlier research results to improve our knowledge of the subject, is a fundamental step in the dissertation.

Going beyond

Perhaps surprisingly to most novice researchers, a research degree does not need to provide 'the complete answer' to a problematic question, only to demonstrate the competence of the researcher in their ability to conduct a systematic investigation and to 'make an original contribution' to the disciplinary area. Getting an 'answer' might be a nice way to demonstrate some added value, but more than likely the results of the research will only clarify a small area of interest, and will probably raise a whole lot of new questions which require investigation. An essential aspect of presenting and interpreting the results of a PhD or Master's research project is to show clearly what is known about the specific topic at the start of the research,

and what can be added to the sum total of knowledge by the time the research is concluded. This ‘original contribution’ might be quite small, and it could appear in a variety of ways, such as a new method of experimentation, or more detailed results than have been presented previously, or simply being able to contrast and compare with prior studies to accentuate the similarities and differences which allow us to form a clearer image of the ‘big picture’. All the same, there needs to be something new which is contributed to the subject by the research, even if it is only to be able to challenge or verify previous ideas from an enlarged sample or from a different angle. Simply reviewing the existing state of knowledge on the subject, or repeating exactly a previous study, will not generally qualify for a doctorate. There needs to be a clearer demonstration that the sum of knowledge is being advanced.

This is what we might call the ‘So what?’ stage.

The student has usually progressed step-by-step through the research project, following the normal, familiar stages that have been identified between the student and the

supervisor(s) and is now lining up for a big finale. Already, good documentation will have been provided on the nature of the research problem, as well as a critical review of the existing academic literature, a detailed explanation of the methodology used in the study, ways of gathering and analysing new data, and an extensive section presenting the results of the study. All of this has taken a lot of work to produce the dissertation to this stage. So what? What does all this mean? Why does it matter?

To answer these questions, the researcher needs to show that the study has been based on the quality work of previous researchers, but has now gone beyond this, even only in a modest way. The result should have something new and significant to say about this research topic. This is perilous ground, because the research student needs to show that they have extended the pool of knowledge, but not gone so far out on a limb that the conclusions are hard to justify and support. Partly it is about having confidence in the revelations uncovered by the study (and the researcher's interpretation of these) and partly it is about not being too cocky about what the results *really* mean in

the great scheme of things. Yes, there are PhDs which dramatically change the course of the discipline by careering off in a completely new direction, but those are quite rare, and most research can be shown to be a clever and intuitive progression on existing research which pushes just a little further. The research methods and the resultant conclusions need to be based on the evidence collected and need to be defendable. All studies have their limitations, so these need to be acknowledged and then shown how they have been minimised. Do not claim to have found the alchemist's stone just because it looks like the results might be heading in that direction. It is much better to keep the claims modest and stoutly defendable, rather than stretch the imagination (and the credibility) of the readers without being able to provide the required evidence to substantiate the claims or justify the conclusions.

Areas for future research

There comes a time in drawing together the conclusions of any piece of research, whether it is a long PhD study or a shorter project, when there is a realisation that there is SO

much more to do. This is not necessarily a bad thing, although a novice researcher might consider it a sign of weakness. Every single study has its own set of limitations relating to the level of accuracy, comprehensiveness, and study conditions. In the normal course of events, the research team needs to consider carefully these possible limitations, then attempt to minimise or eradicate them, or perhaps just simply acknowledge the limitations and explain their concerns. It is much, much better to be able to recognise the limitations and try to reduce them, than to blissfully (and mistakenly) soldier onwards as if there are no limitations whatsoever.

Normally, towards the end of the concluding chapter of a dissertation, it is wise to include a short section which identifies ‘opportunities for further research’. This only needs to be two or three pages long, because longer might suggest that there are too many things unknown about the study, (and one short paragraph might suggest that there is nothing more to find out), which will be interpreted as either arrogance or ignorance, and either way is bad. A common term which is used in this context is that our own research

has been ‘built on the shoulders of giants’ which implies that we are able to see further or in more detail, not simply because we are more intelligent, or have better vision, but because we have benefitted from the work of the people who have explored these issues prior to our research.

Analysing further research opportunities brings into sharp focus three important aspects of the PhD award. Firstly, it helps to make clear the new contribution of the researcher towards a better understanding of this research topic and the discipline as a whole. Remember, making ‘an original contribution to the subject knowledge’ is one of the two key requirements of a PhD (the other being to demonstrate that it is the student’s own work). Secondly, this section of the dissertation identifies other possible research projects which can build upon the present study. It might be to recommend an extension of the study – more participants, a wider geographical area, more samples analysed etc. – or it might refer to various offshoot projects on tangential ideas which were revealed during the present study, but the researcher did not have the time (or the money, opportunity, equipment etc.) to undertake at the time. Highlighting this is

useful because it helps to demonstrate that the researcher is aware of other possible research directions (and potential limitations to the current study) rather than blindingly missing obvious avenues to explore in the future (which might provide a greater depth of knowledge on this topic). Thirdly, in identifying potentially fruitful areas for further research, the researcher is helping to place the current dissertation in the context of the bigger picture of ongoing work on this topic. It is effectively offering this PhD dissertation as another 'shoulder' on which future researchers can build upon to gain a better understanding of this subject area. It is effectively adding another level onto the foundations of earlier research.

So, for a brief flash of time, the student is a world-leader in this particular research topic, a state-of-the-art expert in the why, wherefore, and significance of this very specific research question – only to be eclipsed by the next upcoming researcher who will take this a stage further. A good reason to celebrate and enjoy the celebrity while it lasts!

Conclusions and recommendations

For the award of a PhD, indeed for most academic research, the researcher is judged as much on the quality and justification of the research method, as for getting 'the answer'. The interpretations of the results, the conclusions, and any possible recommendations are also a pretty important part of the outcome. There are three common mistakes made by early career researchers for which supervisors must be on the lookout, but basically they all revolve around the one question – do the conclusions relate directly to the evidence produced by the research?

It might seem a rather obvious question, but it is important to address this first. Frequently the writer of the conclusions will have very weak, generic conclusions that seem to fade out and say nothing in particular. Sometimes it seems that an experienced researcher could write those sorts of conclusions before even starting the research – they lack clarity and do not really say very much at all. Secondly, is the opposite extreme, the temptation to read too much into the data and make conclusions or predictions for which

there is no real evidence. This is almost worse than understating the results, for a critical reader would begin to wonder if the whole of the research project had been influenced by this optimistic speculation and the evidence tailored to fit the conclusions. It would certainly make us re-read the data analysis more carefully to see if the researcher displays any suggestion that they 'knew the results of the research' in advance, and looked favourably on the data in order to 'find' the answers that they wanted. In this phase of the research, the supervisor has a crucial role as a critical friend, to challenge the research student into justifying their conclusions, and relating these directly back to the evidence displayed by the analysis of the data.

A third common error in writing research conclusions is that the writer describes very plausible conclusions, which actually have little or nothing to do with the research project that has been undertaken. The researcher has become so immersed in the research that they have lost a sense of the boundaries of the project. Everything seems to be connected to everything else, and while some of the text

seems to make sense, there is a lack of focus on what is really relevant, or evidence led.

For the supervisor, this is the ‘so what?’ moment. The student has designed a research project, identified a key question and related it to the current knowledge of the subject, then gathered a load of new primary data which has been analysed to reveal some ‘results’. So what? What does this actually mean? Sometimes the results suggest what cannot currently be proved, and this can be almost as important as getting ‘an answer’. Knowing what the evidence does ***not*** show, or where there are blind alleys in the data gathering, can be critical in the design of a new research project that advances our knowledge a stage further. What do the results ***really*** say? What claims can solidly be based on the research and what does it tell us about the research question that is an original contribution to the subject?

In this respect, the advice from a supervisor needs to be offered carefully, in order not to discourage or demoralise the student, for this is a time for honest self-reflection. It is

better to be slightly less ambitious in the research aims but be more robust in the collection and interpretation of data, rather than to strive for an idealistic but very ambitious research aim that is undermined by careless data collection, too many assumptions instead of hard evidence, or joining the dots to make speculative predictions rather than making comments based on robust evidence that can be justified by the data. We frequently tell research students to take a pause after they have written the penultimate draft of their data interpretation chapter, then go back to the very start of the dissertation. Read every section afresh, as if for the first time, and make the final tweaks to the narrative. Then, fresh with this knowledge of where they are and how they got there, try to write the conclusions by answering the 'so what?' question.

The abstract

The curious thing about an abstract is that although, after the title, it is the first text to be read, it is usually the last thing to be written in the dissertation. The reason is quite simple. Writing an abstract is a highly developed skill. On

one page, or less, the author needs to summarise the entire body of the research work, describing the research question(s), the methods used to gather new evidence, how this evidence was analysed, list the key findings, and say why these are important. This is a tall task, demanding a number of difficult decisions about what to include and what to leave out of the text. The added pressure is that this might be the one and only part of your research that a browsing researcher of the future will read, so you need to captivate their interest in half a page or so. On websites such as https://ethos.bl.uk/ which is the British Library catalogue of the entire output of completed UK PhDs, are the abstracts that researchers consult to decide whether to read the whole PhD dissertation, or not. This is a good site to consult to gain an idea of what is needed, but creating a good abstract takes practice.

For this reason, a good supervisor will encourage the research student to finesse their skill at abstract writing by trying several versions before the culminating attempt. It is sometimes said that to ask a research student what their PhD is about at the beginning of their studies is to get a

verbal paragraph in response, but to ask the same question at the end gets a succinct response of five or six words. This is because over the intervening period, the researcher has honed their analytical skills and (hopefully) their ability to separate what is really important, from that which is interesting but incidental to the main research question. The abstract is about what the reader needs to know, rather than the wider perspective on what might be nice to know.

Writing a concise abstract is a skill that will also serve an author well if/when they progress to submitting a paper to an academic journal. Again, the objective is to capture the essence of the article and grab the attention of the prospective reader. In a society awash with information, it is the ability of information to attract our attention that will distinguish it from the things that do not get noticed, and do not get passed onto future generations. In 'the attention economy' getting noticed is perhaps even more important than the information itself. If no-one ever reads your brilliant idea, it slowly moves to the graveyard of good ideas. There is a careful balance to be achieved between sensationalist headlines and dry-as-dust reporting, and though the title

needs to reflect this, the real meat of what the text is about is contained in a cleverly worded abstract. Ask yourself, what does this abstract ***actually*** tell us? For this reason, it is almost never too early for a research student to begin studying the structure of a useful abstract. According to Polonius (in Hamlet) 'brevity is the soul of wit' and it is also a very powerful academic skill.