How to Write a Paper from a Dissertation: A Template-Based Approach

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Note – Sometimes dissertations have a number of different contributions (particularly those associated with a PhD or an Ed.D), so one of the first steps we should do is to pick one contribution we will be the focus of this paper (and there may be other papers for other contributions). There's no need to give away all our work in just one paper. This one contribution becomes the focus, and we have to formulate a new research question that focuses on it. Also, we should pick a specific journal or conference that we are going to submit this paper to, and look at past papers from that venue to have a clear idea of who the audience are that we are writing this for, both in terms of content and tone.

The approach in this paper is to respond to each question presented below with a one sentence answer, and that will give us a good first draft of a paper. It may be the case that further redrafting is required to reduce the size of the paper, as it is difficult to cut of work that we have done for our dissertation, but we have to be prudent and practical about how much we can fit in a single paper.

***Abstract*—The abstract is an overview of the entire project, so it covers everything from the reason for doing the project to the results we have obtained and what those results tell us. Typically the following sentences make a good structured abstract:**

- **The first sentence(s) presents an overview of main objective of this paper.**
- **The next sentence(s) situates the project in terms of where the research fits with the overall discipline of study, for example we might say "*The project sits in the area of Natural Language Processing within the field of Artificial Intelligence*".**
- **Next we cover the specific research problem that we are tackling in this paper, in other words, what is the specific research question being explored? We might mention the research paradigm we are using.**
- **Next we outline a few of the challenges or roadblocks that make the research question an exciting and challenging piece of research.**
- **Following that we articulate the specific approach that we are taking in this paper, mentioning any relevant implementation details.**
- **Lastly, we outline the results or findings of the research, and we give some context as to why these are important and exciting outcomes.**

***Index Terms* — Research Papers, Research Paradigms, Research Questions, Research Challenges.**

I. Introduction

THE Introduction section in a research paper is a combination of two things: (1) a detailed overview of research, and (2) a review of some of the key relevant literature.

The overview includes restating some of the things we have already mentioned in the Abstract, so a big challenge we will have here is how to restate the same information in different words, it may help to begin with a relevant statistic or very short anecdote, for example, "*The amount of data that is stored doubles in a little over every two years* [1]" or we could say it alternatively as, "*To begin with, it is worth noting that well over 90% of the world's data has been created in the last two years* [1]". By doing this we are giving a simple introduction to the topic of the research project, as well as hinting at the idea that this research is a relevant, important, and interesting topic that is worth exploring.

Following this initial sentence, the overview continues with sentences covering the following themes:

- We need a sentence reminding the reader of the main objective of the paper, and we will try to state it in a (slightly) different way than in the Abstract.
- Next we can explain why this research is important, and represents a contribution to knowledge, so we might say something like: "*This paper advances the current body of knowledge by providing novel insights into* [specific area], *offering a comprehensive analysis that addresses previously unexplored dimensions and proposes new solutions to* [specific problem]".
- The next sentence(s), which is also in the Abstract, situates the project in terms of where the research fits with the overall discipline of study. We will try to write it differently from how it is stated in the Abstract, for example we might say "*The project is focused specifically on Computer-Based Text Translation, which is in the area of Natural Language Processing, which itself is in the field of Artificial Intelligence*".
- Next we should discuss the nature of the research process that is being used in this paper. We might need to look at Creswell and Creswell's 2017 book on "Research Design" [2] to help us with this sentence. It may include any combination of the following views that will be discussed more in Section 3: *Research Paradigm*, *Research Category*, *Research Type* and *Research Objectives*

- Next we might mention the scope of the paper, and we could mention a few things that will not be considered as part of the research paper, as well as some of the things that will be considered
- Following that we can include a sentence that delves into the goals of the research, potentially stating these as a set of hypotheses or milestones.
- The next sentence(s) can explain the design of the research, which could include the methodology and the methods that will be used to design this paper. For example, we could mention that we are using Case Study Research, Longitudinal Research, Action Research, Grounded Theory, or Ethnographic Research. We could also discuss the design of the experiment in terms of the components we need, and how we will construct the experimental set-up. We should also outline how the design of the experiment will clearly allow us to explore the research question.
- Finally we will outline the results that we intend to collect for this paper, and how we will validate (and evaluate) those results. We can also discuss the implications of the results in the broader context.

Moving onto the other main part of the Introduction section, which is the literature review, and we are in a great position with this part, since we have done a review already.

Note – We aren't simply trying to summarize the Literature Review chapter(s) we have already written into a section in this paper, we have to be very selective in terms of what content we use. As we are focusing on only one of the contributions of the dissertation, we should focus only on the papers relevant to that contribution. Sometimes I find the easiest thing to do is to read the parts of the Literature Review chapter(s) relevant to the paper, and take the next day off from writing this section, and then a day later come back and write down the key aspects of the review that we can remember to help start the process.

So the majority of the work we will have to do in this section is to pick which parts of the literature review we are going to take from the dissertation and put into this paper. It could be the case that we need to rephase or further summarize some of the reviews. It may also be the case that we could take this opportunity to search for a few further papers that might be relevant to this research that we didn't find during the development of our dissertation. It might be also useful to check if any papers have been published recently that are relevant.

We will remember that the Literature Review should have three main sections: Beginning, Middle and Ending, as follows:

- *Beginning*: This section introduces literature related to the project topic, typically it includes 2-3 definitions relevant to the topic, as well as reviewing 3-4 papers that are important papers in this field. The objective is to "set the scene" for our research by showing the breath of the topic, and where our research fits into the broad research area.
- *Middle*: This section is the heart of the review, and will be 10-15 papers, reviewing papers that are more closely related to our research topic. The reviews will present a summary of the key points of each paper, and can be grouped together by research trend, so they might not necessarily be in chronological order.
- *Ending*: This section is a summary of the content covered in the previous two sections. It can be just a sentence or two long, and the key goal of it is to say that there has been a great deal of work done in this area, but there is a gap in the work that our research will address.

II. PROJECT DESIGN

It is important to check if the journal or conference typically has a Project Design section, and if it does, even if your dissertation doesn't have one, you should definitely include one in the paper. This section will include things like the research philosophy we have, the specific methodology we used to manage the project, and the models and methods we are using in the project.

Note – Again although we have already written a dissertation with a design chapter, it can be challenging to compress that chapter into a section of a single paper, so rather than trying to summarize the entire content of the chapter, instead just focus on the elements relevant to the research question of this paper, and answer each of the questions below, with only one sentence per question (when possible), and that should cover the major themes of the first draft of the paper in a comprehensive way.

Also, it is worth considering how the research contributes to the overall good of society, by exploring issues such as the Legal, Accessible, Sustainable, Ethical, Reliable, Secure ones, outlined below.

2.1. Research Philosophy

The degree to which we specific our research approach varies from research field to research field; some fields make implicit assumptions about the type of research being undertaken whereas others prefer if the research approach is fully articulated. We will know how much of this content is required by looking at other similar papers in the domain. With this in mind we will discuss some of the common themes to reflect on to explore our approach.

- **Research Paradigm**: Positivism, Postpositivism, Pragmatism, Participatory and Advocacy, Social Constructivism.
- **Research Type**: Primary or Secondary Research.
- **Research Objectives**: Qualitative Research, Quantitative Research, Mixed-methods Research.
- **Research Category**: Theoretical Research, Empirical Research, Descriptive Research, Problem-solving Research, Explanatory Research, Constructive Research.

2.2. The LASERS Model

At some point in the Design Section we should discuss themes such as the ethical, sustainable, and legal issues that may be relevant to our project; some disciplines leave it towards the end of the Design Section, but I really prefer to have it early in the section, just so that the readers can be thinking about those issues while we are discussing the models and methods in the rest of the Design Section.

To help us remember some of the key themes for this part of the Design Section, I have a model that I use for computer science papers, that might be useful, called the **LASERS** model [4], which stands for **L**egal, **A**ccessible, **S**ustainable, **E**thical, **R**eliable, and **S**ecure. Some of these considerations are:

- *Legal* – Are there any Laws, Acts, Statutes, Regulations or Rights that might be relevant to our project? For example, for computer science projects this might include ensuring compliance with industry standards and laws such as GDPR and the EU AI Act.

- *Accessible* – Do the concepts of Universal Design, Inclusiveness, or Usability apply to our project? For example, for computer science projects that means ensuring software is usable by people of all abilities, including those with disabilities.

- *Sustainable* – Have we considered all aspects of sustainability including Social, Environmental and Economic concerns? This includes trying to minimize the environmental impact, and anticipating the future impacts of our project.

- *Ethical* – Have we considered important themes such as Fairness, Accountability, Respect, and Responsibility? For computer science projects that means respecting user privacy, user autonomy, and avoiding user manipulation or exploitation.

- Reliable – (*this theme may be specific to Computer Science, if so, feel free to ignore if it doesn't apply to you*) Does our design consider important themes such as Availability, Scalability, Efficiency, and Maintainability? In other words, the system must still function correctly and perform adequately under various conditions.

- *Secure* - (*this theme may be specific to Computer Science, if so, feel free to ignore if it doesn't apply to you*) Does our design consider security issues including concepts such as Validation, Encryption, Auditing, and Privacy? In other words, the system must be able to safeguard the data and prevent unauthorized access, breaches, or malicious attacks.

2.3. Models and Methods

In our dissertation we will have mentioned the specific models and/or methods that they use to inform the design of experiments for that discipline. For a research paper, these can be described by answering the following questions:

- Are these models and methods used by researchers thar are doing similar research to us?
- Are these models and methods going to address the stated research aims of our project?
- How can we explain the models and methods we are going to use in our project as succinctly and clearly as possible?
- Could other researchers replicate our experiments based on the details we have supplied?
- Have we identified the strengths and weaknesses of the models and methods that we are using?
- Have we clearly identified the assumptions and limitations of the models and methods?
- What alternative models and methods did we consider, and do we explain why we rejected them?
- What details have we considered in terms of the participants, materials, procedures, and data analysis techniques we will use in this research?
- Are we using a design approach that has some form of triangulation built into it (designing the gathering of data in a number of ways to ensure robustness of data collection)?
- Are the models and methods sufficiently robust to deal with unexpected (or outlying) results?

2.4. Data Collection

We may need to outline how we intend to collect data from our experiments; and in some experiments we may need to provide a lot of detail about the data collection process, whereas in other cases it may only require a sentence or two. So we might answer some of the following questions:

- Why were we collecting this data?
- What insights were we looking for?
- What are our dependent and independent variables?
- What are our control variables?
- How did the experiment collect data?
- What tools or devices did we use to collect data?
- Who was the data collected from (if applicable)?
- What was the data collected from (if applicable)?
- How was the sample data collected from the population?
- How did we choose the sample size?
- How long did the data collection process take?
- How did we ensure all data was collected consistently?
- How did we try to prevent bias in the data, and bias in the data collection process?
- How did we store the data?

III. EXPERIMENT

In this section we are giving a sufficiently detailed description of what occurred during the process of actually doing the experiment, so that other researchers will be able to replicate this process.

Note – We have to be very disciplined in the experiment section, and focus in on the one contribution of the dissertation we are considering, so we need to see that specific contribution as the research question of this paper, and focus only on the aspects of the experiment that address that research question. The experiment can be thought of as consisting of three phases: the Set-up Phase (preparing to do the experiment), the Execution Phase (the details of doing the experiment), and the Data Phase (where we describe how the data was collected and outline what results we got).

3.1. Experimental Overview

The overview of the experiment first reminds the reader of the research question, then summarizes the design of the experiment, highlighting what is being tested and how. Some helpful questions to consider include:

- What is the research question?
- What was the experimental approach taken?
- What were the variables of interest?
- Who were the participants (where applicable)?
- What data was collected and how?
- How long did the experiment last?
- Can we create a simple diagram to represent an overview of the experiment?

3.2. Experimental Configuration

The configuration of the experiment details the set-up and conditions under which the experiment was conducted. This is a key section to make the experiment reproducible. Some helpful questions to consider include:

- What were the environmental conditions?
- What was the room temperature, audio conditions, lighting conditions, etc. (where applicable)?
- What time of day (or times of day) was the experiment run at?
- How were the evaluation metrics configured?
- What were the hardware settings (e.g. for computers that includes processor specs, processor speed, memory, peripheral devices specs)?
- What were the software settings (e.g. for computers that includes OS versions, programming languages, Libraries and Frameworks)?
- What were the data considerations (e.g. for computers that includes datasets, processing, cleaning, parameter settings)?

3.3. Experimental Procedure

The experimental procedure details that exact steps and processes followed during the execution of the experiment to ensure that others can replicate the experiment. Many of the details will have been mentioned in the Design section, so all we have to do is remind them of the broad ideas for content we have already explained, but for new content, we should describe it in detail. Some helpful questions to consider include:

- Do we present an overview of the experiment and how it ties to the research question?
- Do we explain the timeline of the experiment, when it started, how long it took, how long it task took, and were there any breaks during the experiment?
- Have we described the details of each step in the experiment, typically laid out in chronological order?
- Does the details of each step include a ***Set-up Phase*** (including any preparatory steps (e.g., loading data, setting up hardware, initializing variables)), an ***Execution Phase*** which explains how each task was carried out, and a ***Data Phase*** where we describe the results and data collection process?
- Do we mention any control variables, i.e. variables that are held constant so that the results are only influenced by the factors being tested? Additionally, do we explain which variables were manipulated (***independent variables***) and which were measured (***dependent variables***)? Finally, were there any steps taken to randomize inputs or experimental groups to reduce bias?
- Were the trials repeated? And, if so, how many times? And do we explain the rationale for the number of repetitions?
- Have we explained the measurement process, including the instruments, sensors, or software used for measurement, as well as how they were calibrated? If relevant, mention how often measurements or data samples were taken?
- If there were people involved in the experiments, do we explain how we choose them, and how we obtained their consent to do the experiments, and do we detail any instructions we provided to them?

This section is vital for ensuring that others can replicate our experiment as closely as possible, so clarity and detail are key in terms of fully explaining the experiment.

One additional and very important consideration is to ensure that we describe some of the constraints and challenges we encountered during the experiment phase of the project [7]. We don't want to sound like we are complaining or coming up with excuses when we are listing these issues, instead we need to emphasise that these were exciting challenges that allowed us to learn more about the research area!

3.3.1. Practical Constraints

This sub-section considers aspects of the experiment had to be simplified or changed because of practical constraints?

- If we ran a pilot, did we uncover any issues that need to be corrected, e.g. incorrect experimental set-up, ambiguous instructions, or improper metrics?
- Did we discover that the initial methodology is too complex or unfeasible in practice?
- Did any equipment, hardware, software, or tools malfunction in some way or limit what we actually implemented?

- Did any of the parameters need to be changed, maybe through trial and error to optimize the results? Also did any of the evaluation metrics need to be changed because they were not effective?
- If there is a dataset involved, did it prove to be too large and need to be split, or in some other way require modification?
- Did the estimate of how long tasks will take prove to be incorrect, and was there a need to simplify the procedure, reduce the number of runs, or decrease the complexity of the model?

3.3.2. Unexpected Challenges

This sub-section considers aspects of the experiment had to be simplified or changed because of unexpected challenges:

- When doing the experiment, did any new variables or confounding factors appear, requiring us to modify our experimental design to account for them or minimize their impact?
- When generating the results or data, do they contain random noise that was not considered during the design phase, requiring us to adjust our analysis techniques to filter or account for this?
- Were there any additional, unforeseen ethical concerns or security issues that required us to adjust the experiment or the approach?
- Were there any logistical Issues, for example, shipping delays, malfunctioning equipment, or resource availability that required changes in our timeline or other changes?
- If people are involved in the experiment, were there difficulties in recruiting the number or type of participants we originally planned for? Did they follow instructions as expected, or were there variations in behaviour that could skew the results or require adjustments in the methodology?
- Were there any environmental factors that altered the experiment (e.g. weather, location constraints, or equipment malfunctions)?

IV. PROJECT RESULTS

In this section we describe the findings of our experiment as clearly and concisely as possible. This section focuses on stating the results of the experiment with a minimum of interpretation or discussion (which we will save for the Discussion Section).

4.1. Results Overview

The Results Section varies from discipline to discipline, but it is generally best to start off with an overview of the results with one or two sentences highlighting the key outcomes of the experiment; and focusing on the results that closely tie to the research question. Following this it would be helpful for us to have one more sentence that explains how the rest of the Results Section will be presented, including mentioning how the detailed results will be discussed, so we generally present the results based on some theme, for example, they could be presented chronologically, or presented by different evaluation approaches, or presented by the data used, or by some other suitable theme. Some questions to help develop this section:

- What are the key 3-5 findings of the experiment?
- Which of those findings are surprising and which ones are as expected?
- Do each of those findings address some aspect of our research question?
- What is theme, or themes, that we will use to explain and layout the detailed results?

4.2. Quantitative Results

So, as mentioned above, the details of the results are reported by some theme, and for quantitative outcomes, it would be typical to use Tables and Figures to accompany the discussion of each of the sets of results. If the results are based on large datasets, it may be worth reporting additional metrics such as accuracy, precision, recall, or other relevant measures based on our evaluation criteria. We may also wish to report the outcomes of any statistical analysis we undertook of the results, possibly presenting the significance levels (e.g., p-values) and the confidence intervals to indicate trends in the data. We may also have run comparisons between results, if we ran different trials within our experiment, and we can compare the differences in performance using metrics and visualizations, noting which trial performed better. We may also do statistical tests on these comparisons to explore whether these differences are statistically significant. So some useful questions may include the following:

- Does the theme, or themes, we have selected divide the results up into approximately even chunks?
- What Tables and Figures (or other visual aids) will we use to present our results?
- Is each Table and Figure referenced in the text?
- Which aspects of the results need to be discussed in a lot of detail, and which can be summarized?
- What metrics can we use to evaluate the results (e.g., accuracy, precision, recall)?
- What Tables and Figures (or other visual aids) will we use to present comparisons between trials?
- How will we highlight which trial, approach or technique performed better in our comparisons?
- Are the differences between trials, groups or conditions statistically significant?
- What important patterns or trends in the data have statistical relevance?

4.3. Qualitative Results

If the results are qualitative (e.g., case studies, interviews, textual data), then it makes sense to present the results by starting with a brief outline of the key findings and themes (and sub-themes) that have emerged from the analysis of the results. It may be worth including a sentence reminding the reader what techniques we used to do the analysis, and what steps we took to ensure rigour.

There is a saying that a picture is worth a thousand words, and I feel that a quotation is more impactful than a thousand words, so please add the participant voices to our results by using direct quotes from them to illustrate key points. I think it brings a real authenticity to the findings, so in terms of the quotes to select, we need to ensure that they are representative of our data, showing both typical and divergent views. Additionally, it is often overlooked in qualitative results, but we can create visual aids to accompany the results, clearly Tables and Figures are applicable, but also things like Mind Maps and Word Clouds can be an extremely effective way to communicate the relationships between content. So some useful questions include:

- What are the key insights or patterns observed from our results?
- Which aspects of the results need to be discussed in a lot of detail, and which can be summarized?
- How did we categorize or label our qualitative data, and what were the outcomes?
- What are some good quotations from participants that are both representative and atypical?
- What Tables and Figures (or other visual aids) will we use to present our results?
- Is each Table and Figure referenced in the text?
- Which aspects of the results need to be discussed in a lot of detail, and which can be summarized?
- How will we highlight which trial, approach or technique performed better in our comparisons?
- Have we over-generalised our findings in our explanation of the results?

4.4. Unexpected Results

Whether the results are quantitative, qualitative, or both, inevitably there will be some results that are unexpected or outlying in some way. It is very important to report these here in the Results Section, so that it is clear we are reliable and trustworthy researchers. So we will highlight the unexpected results in this section, and we address them in more detail later in the Discussion Section. This is particularly important if those results differ from our research question, because this shows our integrity as researchers. This just needs to be one or two sentences long in this section.

4.5. Key Takeaways

It is best to finish off the Results Section with a summary of the key findings of the research and how they relate to the research question. Remember, it is important that we avoid interpreting the meaning or implications of the results here, we are just presenting the findings clearly with sufficient detail and clarity. We should make sure that we include a sentence on the unexpected data, and another one on the limitations of the experimental approach. Our key takeaways will be concise, relevant, and provide a clear understanding of our research outcomes.

V. DISCUSSION

In this section we interpret and explain the implications of the results, connecting them to the research question and the experiment. We also need to compare them and contextualize them with respect to existing results from the Literature. This section is very important as it helps make sense of the findings and demonstrates their contribution to the field.

Note – If we are comparing the results of our research to existing results in the Literature, we may discover that we have add additional citations back into the Literature Review section, but this is not an excuse for a complete restoration, or recrudescence, of the entire Review from our dissertation, we have to be very disciplined, and ruthless about what literature we add back into the paper as a result of the Discussion section. If we focus on the questions below, with one sentence per question, we should end us with a clear and coherent Discussion section.

Here's some key questions to consider:

- Do we begin with a brief overview of the results, focusing on the most important findings, and how they support/refute the research question?
- Do we compare our findings to previous studies? Are our results consistent with or different from those found in the literature? Do we discuss possible reasons for any differences?
- Do the results have any implications for existing theories, models, or frameworks? Do the results suggest a need for changes in any of those?
- Do the results have any implications that could be applied to real-world scenarios?
- Are the limitations of our study discussed? Considering issues such as constraints in our data, methods, or experimental design.
- Are the unexpected findings of the research explained or are any hypothesis proposed? Why might these outcomes have occurred? Could they suggest something new or interesting about the research question?
- Based on the results have we proposed any areas for further research? Are there unresolved questions or new avenues that future work should explore?
- Do we end the discussion with a concise summary of the key conclusions drawn from the study

Some general suggestions on writing a research paper that I find helpful are as follows:

- *Emotional Engagement*: Social media algorithms know that if we can get people emotionally engaged (as opposed to just intellectually) they will be more deeply invested in a topic. So we should try to get ourselves emotionally engaged in writing this paper, if we can fall in love with the topic we are writing about, or hate it, or be really excited about learning more about it, then writing the paper becomes much easier. We should also introduce the topic of our research to readers in a way that will appeal to them emotionally.

- *Create a Schedule*: We need to develop a consistent writing routine that works for us, which means that we figure out when we work best. I find if I go to sleep for a few hours at night, and then I get up, my best writing times are 2am-5am. I love the peace and quiet at that time of night. So I guess I'm a "night owl", but other people are "early birds", and others like writing at normal times, So, develop a routine that suits you.
- *Writing in Chunks*: Break down the overall paper into small sections, and aim to complete one section at a time. This paper you are reading at the moment gives us a template to follow, so we can see as each section gets completed, and we don't necessarily have to write the paper in any specific order; we can write which sections we are interested in today. And we should figure out ways to reward ourselves as we are completing the sections.
- *Focus on Progress, Not Perfection*: We need to recognize that each step we take brings us closer to completion. As we are writing, we don't have to draft and redraft each sentence until we are happy with it, instead we should write as much as we can as quickly as possible.

VI. CONCLUSIONS

In this section there are six sentences we need to write:

- The first sentence needs to remind the readers of the research question.
- The second one is to summarize the key findings of the research.
- Next, we explain the implications of the research. We can also mention practical applications.
- Next, we highlight some of the possible limitations of the research. This shows transparency.
- Following that we suggest directions for future research in this area.
- Finally, we explain why this research is an important piece of work, and how it contributes to the field.

Note – Once we have completed our first draft of this new paper, we need to take a break from it for a few days, and then redraft it to remove anything that isn't directly germane to the specific focus of this paper. It may also help at this stage to ask someone to read this draft, and specifically someone who isn't familiar with our dissertation to check if the paper presents a clear and coherent stand-alone narrative; and also that it doesn't present any terminology or models that aren't explained sufficiently for this paper.

Research papers need to focus on a theme that includes some degree of novelty and practical relevance, and one that is part of the remit of the conference or journal that we are focused on. It may be helpful to read one or two more papers already published in this venue to determine if there any themes or perspectives that we are missing from the paper. Also, we need to reflect on the intended audience of this paper, are they the same people that our dissertation was aimed at, or is it a subset or superset of that group?

Remember, it might be useful to create some new diagrams to summarize things such as the Research Methods used or the Results obtained, that weren't in your original dissertation, because sometimes a picture really is worth 1,000 words, and if the venue has a specific word count, diagrams can be extremely helpful.

If our dissertation has already been published, we can cite it if the readers of this paper need additional detail, so, for example, if we have a particularly complex research methodology, but it not essential for this paper, we can say something like: "*For further detail on the data preprocessing steps, please refer to Gordon* (YEAR)" which allows readers to understand the full methodology without overloading them in this particular paper.

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