Research Methods and Professional Practice

7BUIS019C

Handout 4: Elements of Academic Writing

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Overview

- Writing Research Proposal and Dissertations

Academic Writing Recap ..

- Argumentative, analytical, critical
- Highlights a point of view and a line of reasoning to support it.
- Highlights an alternative point of view and demonstrates an understanding of the debate.
- Offers evidence and examples to support a particular view in order to convince the reader that it is the right view to hold.

Academic Writing Recap ctd..

i. Aim for precision. Do not use unnecessary words or waffle. Get straight to the point. Make every word count.
   - If there is any uncertainty about a particular point, use cautious language (such as 'may', 'might', 'could', 'potentially'). - Tutorial 4 experience?

ii. It is best to avoid over-long sentences and to aim for a mixture of long and short sentences for variation and rhythm.

iii. Avoid repeating the same words

iv. Avoid abbreviations and contractions. Abbreviations and contractions are informal, and are best avoided in academic writing.

    For example:
    - 'Department' should be used instead of the abbreviation 'dept'.
    - 'Is not' should be used in place of the contraction 'isn't'.

i. Avoid slang words and phrases

ii. Avoid conversational terms

iii. Avoid vague terms

iv. Be Impersonal. No first and second person

Masters level work

- At Masters level you are expected to be able to :
  - Demonstrate knowledge of domain
  - Apply theory to practice
  - Analyze relevant material
  - Evaluate theory and evidence within the context of study
  - Synthesize new information and knowledge.
  - Reflect – critiquing and critically reflecting on your learning and using this to improve practice.

Academic Writing: Deep Learner Approach

- Effort to understand material for themselves
- Critical and thoughtful about idea and information
- Relates ideas to own previous experience and knowledge
- Sees the big picture
- Relates evidence to conclusions
- Examines logic of arguments
- Interested in wider reading and thinking

Thesis/Dissertating Title

- Create a working title
- Title should be informative
- Keywords of the title may be refined as the project progresses
- ** Generally, 'dissertation' refers to the body of work at the end of an undergraduate or master's degree, while 'thesis' refers to the body of work produced at the end of a PhD

Typical Tasks in Dissertations

- Review basic concepts, theories, tools, etc.
- Justify the significance of what is planned to achieve/achieved
- Review of Literature - history of relevant body of knowledge.
- Develop a methodology to solve the problem
  - What methods, tools, and techniques were used and WHY (justifications- what key options are available and why – Link to Lit Review)
  - Design
  - Design Assumptions(if any)
  - Implementation
- Conduct Evaluation Experiments (Pilot Experiments and Final Experiments)
- Present and explain the results.
- Critically analyze the outcomes.
- State strengths and limitations
- Justify the Contribution of work

Academic Writing Recap

- The language has to be clear, concise and neutral/objective.
- The material is to be well researched.
- Appropriate theories should be used.
- It should be supported by relevant literature.
- All literature should be correctly acknowledged.

Writing Research Proposals

- Generally, starts with a broader topic and narrows does as research progresses
- Contents include
  - What- Problem Statement, Aims and Objectives, Research Question(s), and Scope
  - How- Methodology
  - Why- Rationale/Significance of study
  - When – Timeline and deliverables

Research Proposal

- A thesis proposal is a document that outlines the thesis topic, defines the issues that the thesis will address, and explains why the topic warrants further research.
- It should identify a problem and provide a proposed approach to the investigation to address the problem.
- Demonstrate that
  - The project contributes to existing/prior research
  - Understanding of conducting discipline-specific research within a feasible timeline
- All sections/chapters need to have a good flow and coherence

What is a Research Proposal?

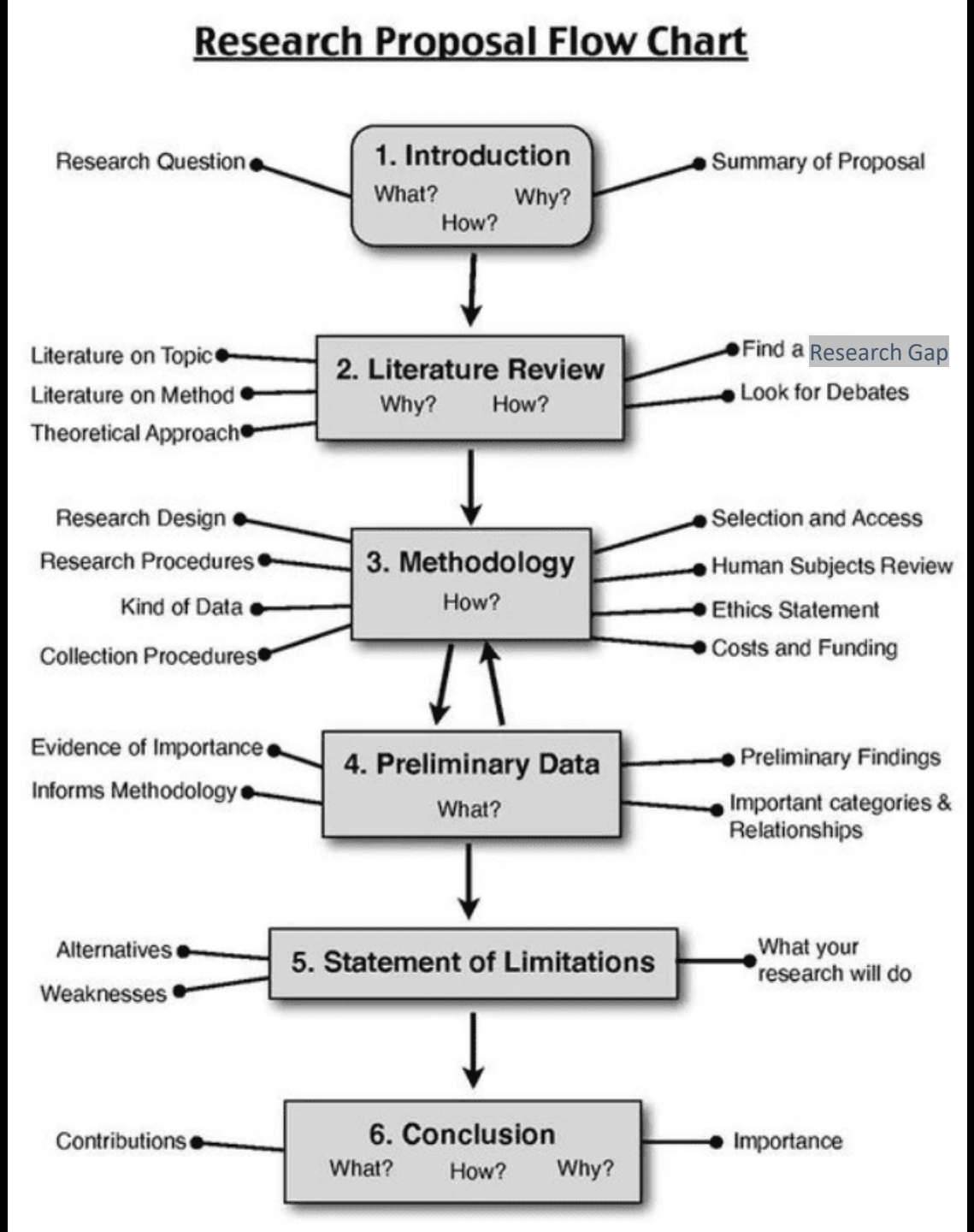
- A concise and coherent summary of the proposed work.
- A proposal need to clearly express a research idea.
- Presents research questions that work intends to address.
- Presents background including prior relevant work
- Presents the potential contribution of the proposed work.
- The author is expected to demonstrate domain knowledge of the author, state-of-the-art in the select topic
- Presents the feasibility of the proposed research.
- Author is expected to demonstrates the ability to communicate complex concepts clearly, concisely and critically.
- Presents the rationale, motivation of the work

Sample Project Proposal Structure

A. Front Matter/Preliminaries	• **Title Page** • **Abstract** • **Table of Contents** • **List of Figures** • **List of Tables** • **Acronyms**
Body of the Report	• Introduction Motivation/Rationale, Problem Statement, Significance(Potential Contribution), Aims and Objectives, Research Questions, Scope, Structure of the Report Background Literature Review Theoretical Foundations • Methodology • Plan of Work (time Line and Deliverables) • Conclusions
End Matter	• References

Sample Thesis Structure

Front Matter/Preliminaries	• **Title Page** • **Abstract** • **Table of Contents** • **List of Figures** • **List of Tables** • **Acronyms**
Body of the Report	• Introduction (Motivation/Rationale, Problem Statement, Significance, Aims and Objectives, Research Questions, Scope, Structure of the Report(Chapter Overview)/Dissertation) • Background (Literature Review, Theoretical Framework(if applicable)) • Methodology • Results • Conclusions
End Matter	• References • Appendices



https://assignmentpay.com/img/slides/proposal/writing-research-proposal.png

Abstract

- A brief summary of the entire report, generally around 150 - 200 words.
- Write the abstract after you have written the report/thesis.
- Summary of important elements of work
  - Introduction, Statement of the Problem, Background, Research Questions, Methodology, Key Findings/ Results, Conclusions

Refer: https://www.scribbr.com/dissertation/abstract/

Introduction

- Write a rough draft of your introduction as you begin your research, to help guide you
- Includes
  - Background/Rationale/Significance of study
  - Clear statement of the problem
  - What are Aims and Objectives
  - Scope

Introduction

- Provide a context for the report.
- States the purpose of the report/paper/proposal.
- Indicates what the report will cover.
- Introduce the domain of the focus of your study
  - Provide an **adequate** background for the reader as appropriate. Assess whether some text is needed or should be moved to the second chapter on Background.
- Indicate the scope of work
- Include a section to provide an overview of the chapter/section organizations
- The introduction should be concise.
- demonstrates mastery of the domain to be investigated by the currency & quality of the citations made.

Statement of the Problem

“What is the research gap needs to be filled?” and/or

“What is the problem to be solved?”

State the problem clearly and early in a paragraph

- Refer (During Tutorial) https://www.scribbr.com/research-process/problem-statement/

Aims and Objectives

- Aim = what you hope to achieve.
- Objective = the action(s) you will take in order to achieve the aim.
- Aims are statements of intent. They are usually written in broad terms. They set out what you hope to achieve at the end of the project.
- Objectives, on the other hand, should be specific statements that define measurable outcomes, e.g., what steps will be taken to achieve the desired outcome.
- When writing your objectives, try to use strong positive statements.
  - Strong verbs - collect, construct, classify, develop, devise, measure, produce, revise, select, synthesize
  - Weak verbs - appreciate, consider, enquire, learn, know, understand, be aware of, appreciate, listen, perceive

https://learn.solent.ac.uk/mod/book/view.php?id=116233&chapterid=15294

Research Objectives

- Research objectives refer to the specific goals or aims of a research study.
- They provide a clear and concise description of what the researcher plans to achieve by conducting the research.
- The objectives are typically based on the research questions and hypotheses (If any) formulated at the beginning of the study and are used to guide the research process.

https://researchmethod.net/research-objectives/

- Objectives can be split into **two** as General Objectives and Specific Objectives:
  - **General Objectives** state what is expected to be achieved in general terms
  - General Objectives are broken into smaller, logically related Specific Objectives
  - **Specific Objectives** should systematically address different aspects of the Research Problem stated in the thesis/dissertation
  - Specific Objectives should specify what is expected to be carried out and the rationale

Attributes of Objectives (SMART)

- Specific: Be specific about your desired outcomes. Your objectives should be clearly written and leave no room for confusion. This can help you keep them narrow and focused.
- Measurable: Making your objectives measurable is essential to achieving them. You can create metrics to measure your progress toward achieving your objectives.
- Achievable: Be sure to create objectives that you can realistically achieve to help you avoid getting overwhelmed by unrealistic expectations. Make sure you have the resources and budget to accomplish your objectives.
- Relevant: Make your objectives relevant to your research and your overall goals. This can help you stay motivated and on track throughout your research project.
- Time-based: You can establish deadlines to help you keep your research process on track. You can set a major deadline for your entire project as well as smaller deadlines for each objective.

https://www.indeed.com/career-advice/career-development/research-objectives

Tips for Writing Objectives

- Keep your number of objectives limited
- Use action verbs – e.g Assess, Determine, Calculate, Compare, Explain, Describe
- Be realistic
- Proofread and review your objectives thoroughly as it is an important element

Purpose of Research Objectives

- Some of the main purposes of research objectives include:
  1. To clarify the research question or problem: Research objectives help to define the specific aspects of the research question or problem that the study aims to address. This makes it easier to design a study that is focused and relevant.
  2. To guide the research design: Research objectives help to determine the research design, including the research methods, data collection techniques(if any), and sampling strategy (if any). This ensures that the study is structured and efficient.
  3. To measure progress: Research objectives provide a way to measure progress throughout the research process. They help the researcher to evaluate whether they are on track and meeting their goals.
  4. To communicate the research goals: Research objectives provide a clear and concise description of the research goals. This helps to communicate the purpose of the study to other researchers, stakeholders, and the general public.

https://researchmethod.net/research-objectives/

Research Objectives example

- Research Objectives for the topic of "*The Impact of Artificial Intelligence on Employment*":
  - To investigate the effects of the adoption of AI on employment trends across various industries and occupations.
  - To explore the potential for AI to create new job opportunities and transform existing roles in the workforce.
  - To examine the social and economic implications of the widespread use of AI for employment, including issues such as income inequality and access to education and training.
  - To identify the skills and competencies that will be required for individuals to thrive in an AI-driven workplace, and to explore the role of education and training in developing these skills.
  - To evaluate the ethical and legal considerations surrounding the use of AI for employment, including issues such as bias, privacy, and the responsibility of employers and policymakers to protect workers' rights.

Significance of the Study ctd..

- Need to demonstrate how the work
  - Contributes to the existing body of knowledge.
  - Addresses a significant research gap.
  - Offers a new or better solution to a problem.
  - Impacts policy or practice.
  - Leads to improvements in a particular field or sector.

Significance of the Study ctd..

- In general, the significance of a study can be assessed based on several factors, including:
  - Originality: The extent to which the study advances existing knowledge or introduces new ideas and perspectives.
  - Practical relevance: The potential implications of the study for real-world situations, such as improving policy or practice.
  - Theoretical contribution: The extent to which the study provides new insights or perspectives on theoretical concepts or frameworks.
  - Methodological rigor: The extent to which the study employs appropriate and robust methods and techniques to generate reliable and valid data.
  - Social or cultural impact: The potential impact of the study on society, culture, or public perception of a particular issue.

https://researchmethod.net/significance-of-the-study/

Scope

- The scope of a research project depends on various factors, such as the research questions, objectives, methodology, and available resources.
- Writing the scope of the research involves identifying the specific boundaries and limitations of the study.
- It is essential to define the scope of the research project clearly to avoid confusion and ensure that the study addresses the intended research questions.
- To figure out what is meant to achieve.
- Not to jump into work without any clear idea of to accomplish,
- What is “effort budget” as “effort budget” is critical.

https://researchmethod.net/scope-of-the-research/

Purpose of Scope of the Research

- Purposes of Scope of the Research are as follows:
  - Defines the boundaries and extent of the study.
  - Determines the specific objectives and research questions to be addressed.
  - Provides direction and focus for the research.
  - Helps to identify the relevant theories, concepts, and variables to be studied.
  - Enables the researcher to select the appropriate research methodology and techniques.
  - Allows for the allocation of resources (time, money, personnel) to the research.
  - Establishes the criteria for the selection of the sample and data collection methods(if applicable)
  - Facilitates the interpretation and generalization of the results.
  - Ensures the ethical considerations and constraints are addressed.
  - Provides a framework for the presentation and dissemination of the research findings.

https://researchmethod.net/scope-of-the-research/

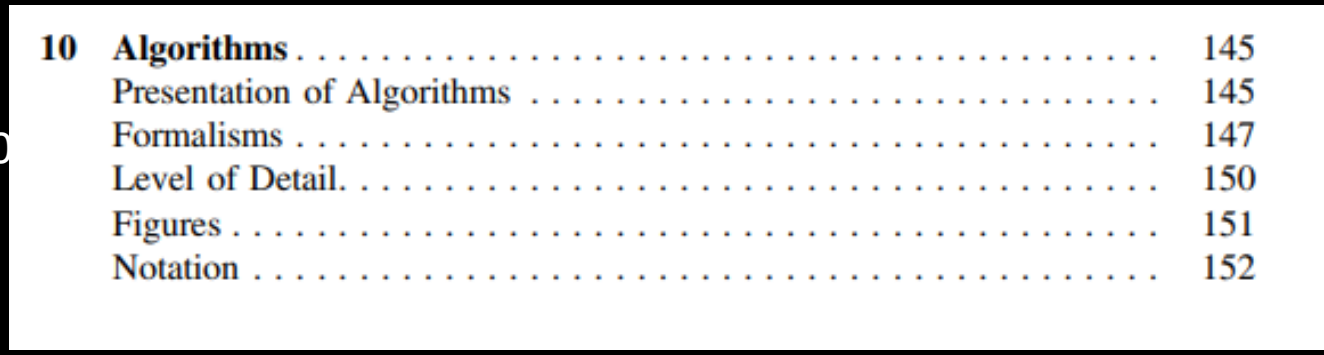
Examples

- Refer “Examples of the Scope of the Research “
  - https://researchmethod.net/scope-of-the-research/

End Matter

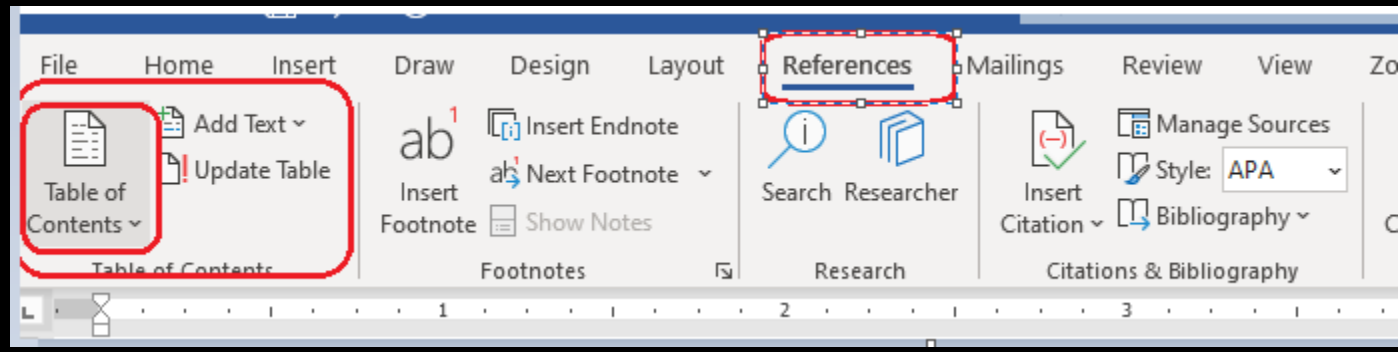
- End Matter consists of Appendices which are supplementary or detailed information that supports body of the report
- All the sources should be cited(Use a ref management tool from beginning)
- It is NOT recommended to include source code in the appendix. Only VERY important code segments can be presented in the Implementation Section/Chapter if applicable
- Refer to Writing for Computer Science, J Zobel (pp 145-153) – **References are useful for Quizzes!

https://faculty.kashanu.ac.ir/file/download/course/16770170 4-justin-zobel-auth.-writing-for-computer-science-springer-verlag-london-2014-.pdf



Numbering

- Numbering is important which help **signposting**
- What to Number? : *Chapters, Sections, Sub Sections, Figures, Tables, Equations, Appendices*
- e.g as shown in figure 2.1, Figure 3.1 (Chapter number followed by figure serial number is one convention)
- Dissertation or Longer Reports
- Chapter1
  - Section 1
    - Sub Section 1.1
      - Sub Section 1.1.1



- Use Word Processors Features to auto generate Table of Contents

Figures

- Figures play an essential role in research papers as they provide a visual representation of data, results, and concepts presented in the text.
- Figures can include graphs, charts, diagrams, photographs, and other visual aids that enhance the reader's understanding of the research

Types of Figures

- There are several types of figures commonly used in research, including:
  - **Line graphs**: These are used to show trends or changes in data over time.
  - **Bar graphs**: These are used to compare data across different categories or groups.
  - **Pie charts**: These are used to show proportions or percentages of data.
  - **Scatterplots**: These are used to show the relationship between two variables.
  - **Tables**: These are used to present large amounts of data in a structured format.
  - **Photographs or images**: These are used to provide visual context or examples of the research being presented.
  - **Diagrams or schematics**: These are used to illustrate complex processes or systems.

https://researchmethod.net/figures-in-research-paper/

Importance of Figures in Research Paper

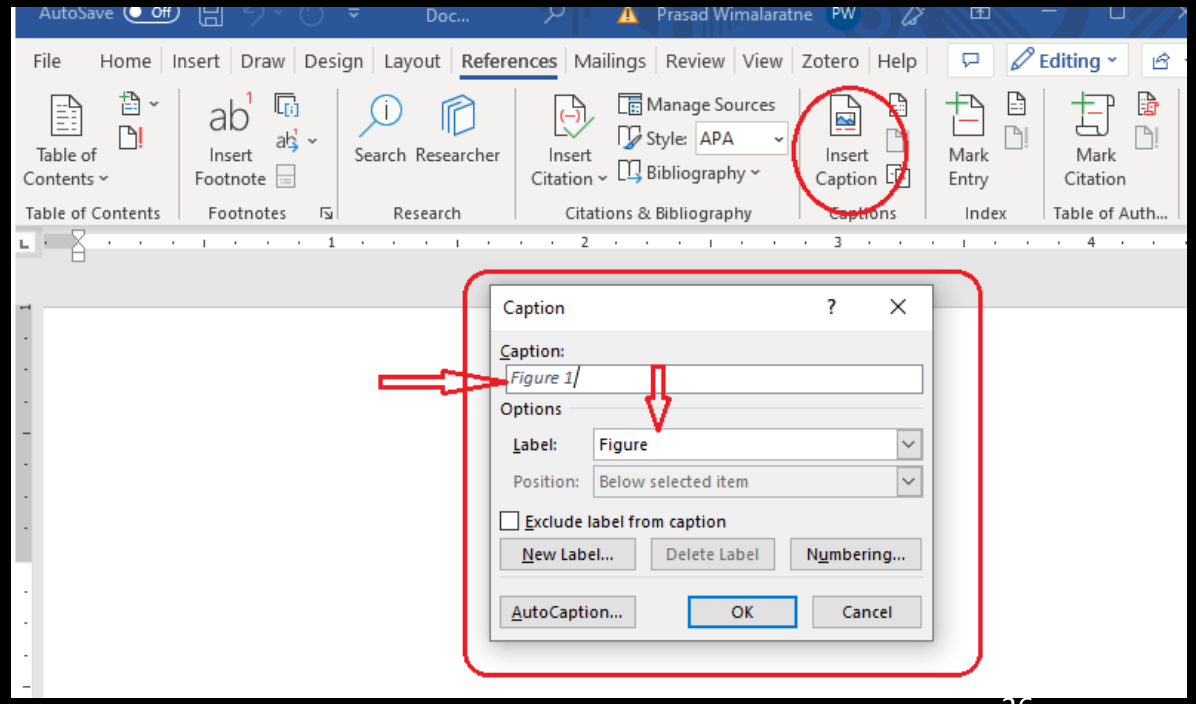
- Here are some specific ways in which figures can be important in a research paper:
  - Visual representation of data: Figures can be used to present data in a clear and concise way. This makes it easier for readers to understand the results of experiments and studies.
  - Simplify complex ideas: Some concepts can be difficult to explain using words alone. Figures can be used to simplify complex ideas and make them more accessible to a wider audience.
  - Increase reader engagement: Figures can make a research paper more engaging and interesting to read. They break up long blocks of text and can make the paper more visually appealing.
  - Support arguments: Figures can be used to support arguments made in the paper. For example, a graph or chart can be used to show a correlation between two variables, providing evidence for a particular hypothesis.
  - Convey important information: Figures can be used to convey important information quickly and efficiently. This is particularly useful when the paper is being read by someone who is short on time and needs to quickly understand the main points.

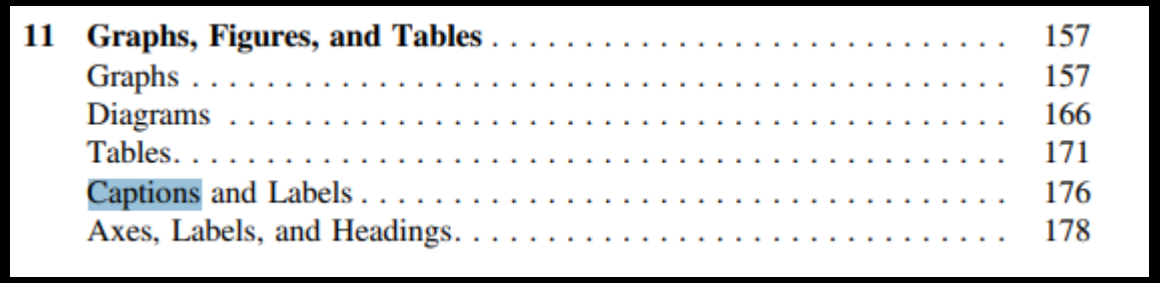
https://researchmethod.net/figures-in-research-paper/

Figures

- Provide Figures a numbers captions using the word processing software's tools (But NOT manually!)
  - Use auto captioning and cross-referencing tools
  - Refer to the figure in the text
  - Refer
- Writing for Computer Science,

  J Zobel (pp 157-178) –
  - **References are useful for Quizzes!





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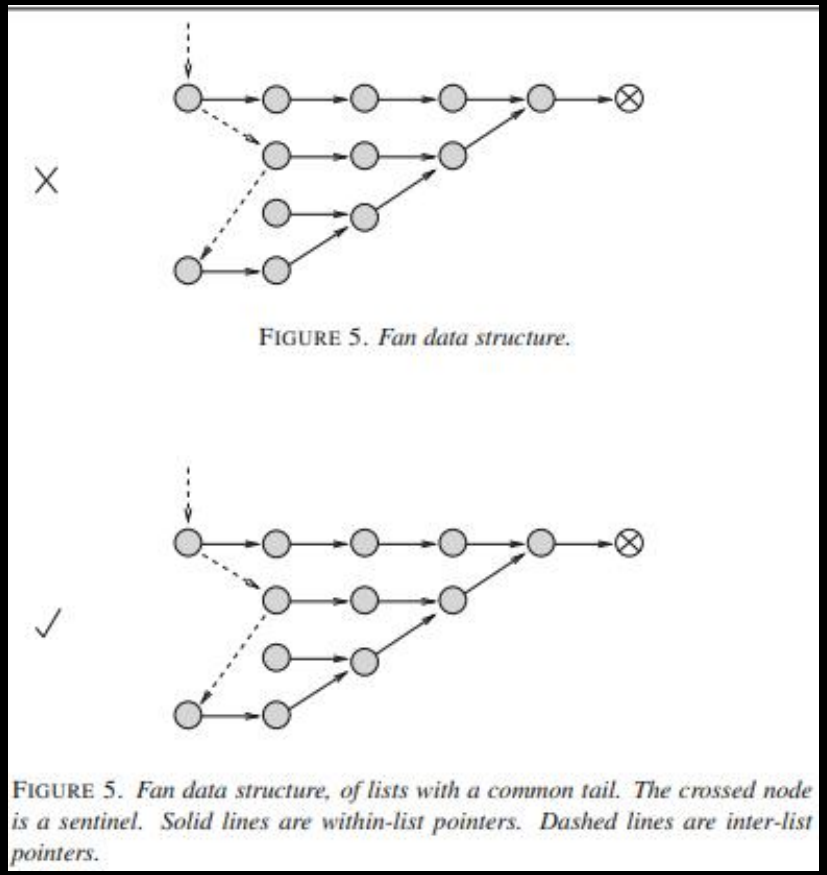
Captions and Labels

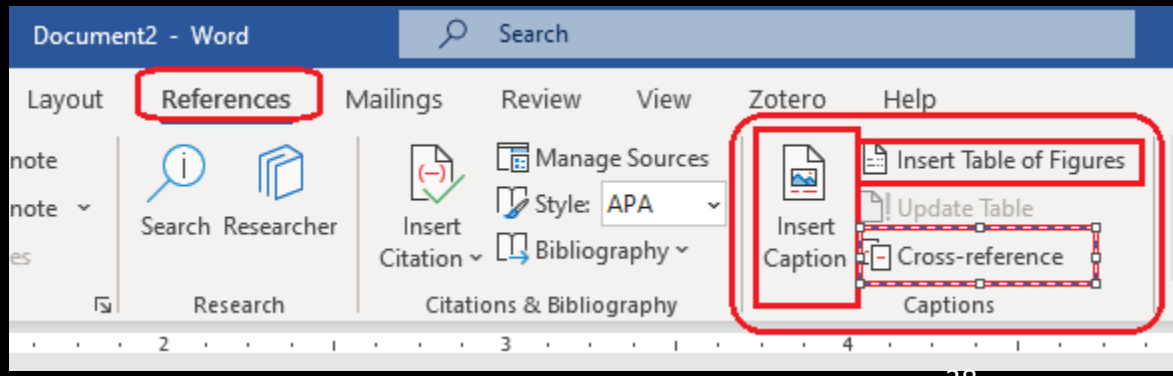
- Should be informative.
- The caption is usually placed below a figure, but above a table
- Though it is common for captions to be only a few words, it is preferable for captions to fully describe the figure's major elements.
- Full captions assist the reader who is skimming the paper or referring to earlier figures and tables.
- Use either minimum or maximum capitalization, but minimum is better, particularly if the caption is a description rather than a label.
- Use italics for the caption so that it is distinct from other text.

Writing for Computer Science, J Zobel (pp 157-178) –

Captions and Labels

- Since figures and tables should be fairly self-contained, the caption is an appropriate place to explain important details, especially since these would otherwise interrupt the flow of the main text.
  - For example, a graph might show running time for an algorithm over various data sets; the caption could include parameter values.
- The caption can also be used to expand abbreviations or notations used in headings

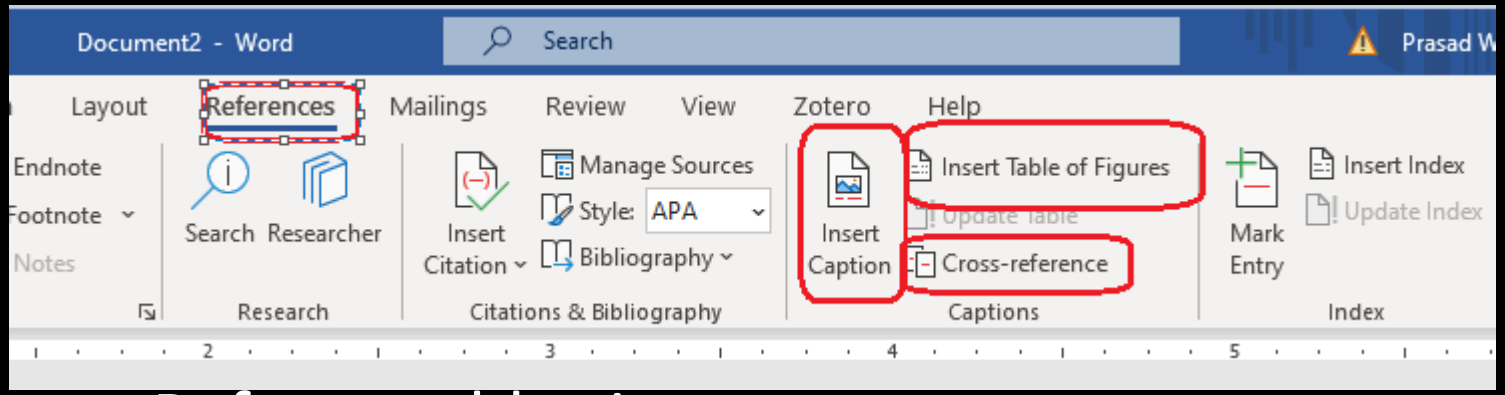




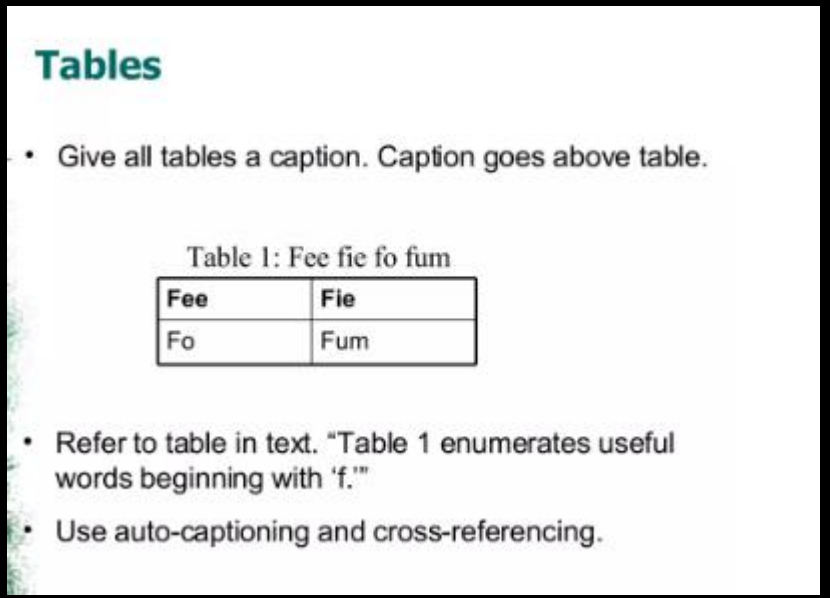
Writing for Computer Science, J Zobel (pp 157-178) –

Tables

- Provide a caption for all tables
- Include a list of tables in the front matter
- – auto generate
- Use auto captioning and cross-referencing

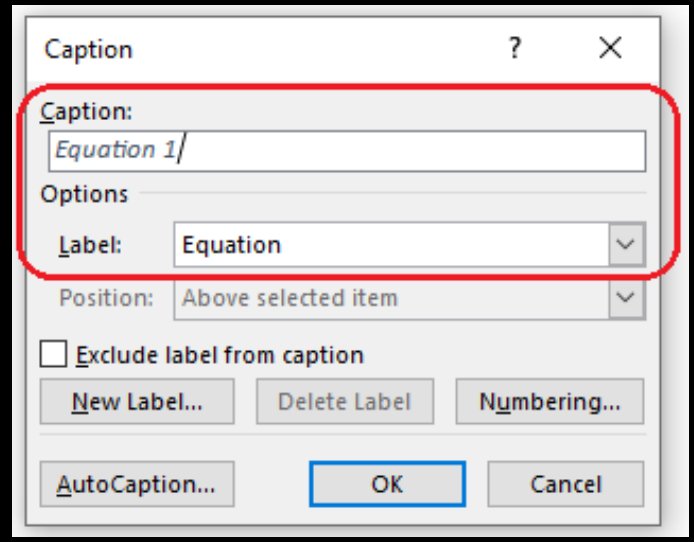


- Refer to tables in text



Equations

- Give all equations a label and refer to them in text (different convention exists)
  - E.g, Equations are centered on the page and labeled with Arabic numerals, right-aligned, in parentheses, and referred to only by those numbers in the text – e.g., “as seen in (3)” , “as seen in Equation (3)”.
  - E.g, Equations can be referenced within the text as "Eq. (x)." When the reference to an equation begins a sentence, it should be spelled out, e.g., "Equation (x).
- Use word processor’s equation editor for auto-captioning and cross-referencing
  - On the References tab, in the Captions group, click Insert Caption. In the Label list, select the label that best describes the object, such as a figure or equation.



In text Citations and References

- Credible Good sources(see Tutorial 1 & 2)
- Why cite? : A good ref list considered wider reading
- Critique with citations in the body of the report demonstrates understanding of the background/prior research and how your work builds upon prior work
- Cited sources provide a frame of reference for your claim for contribution (novelty of work)

Chapter Summary

- Chapter Summary is a brief description of the main points or findings covered in a particular chapter.
- It typically includes a concise description of the main ideas, arguments, or themes explored in the chapter, as well as any important supporting details or evidence.
- The summary is typically included at end of each chapter and serves as a guide for the reader to quickly understand the content of that chapter.

https://researchmethod.net/chapter-summary/

Results

- Research results refer to the findings and conclusions derived from a systematic investigation or study conducted to answer a specific question or hypothesis.
- These results are typically presented in a written report or paper and can include various forms of data such as numerical data, qualitative data, statistics, charts, graphs, and visual aids.
- Presents Findings Analysis, etc.
- Use tables, figures, charts, equations, etc.
- Textual explanations are necessary for key points
- May compare results with the expected outcome if applicable

https://researchmethod.net/research-results/

Research Contribution ctd..

- A novel and significant addition to a particular field of study that advances the existing knowledge, theories, or practices.
- It could involve new discoveries, original ideas, innovative methods, or insightful interpretations that contribute to the understanding, development, or improvement of a specific research area.
- Research Contribution in Thesis
  - In a thesis, the research contribution is the original and novel aspect of the research that adds new knowledge to the field.
  - It can be a new theory, a new methodology, a new empirical finding, or a new application of existing knowledge.

https://researchmethod.net/research-contribution/

Research Contribution ctd..

- Once you have identified your research contribution, you should clearly articulate it in your thesis abstract, introduction, and conclusion.
- Note: thesis abstract, introduction, and conclusion are very important elements of a thesis/dissertation
- You should also explain how your research contribution relates to the existing literature and how it advances the field.
- Finally, you should discuss the limitations of your research and suggest future directions for research that build on your contribution

https://researchmethod.net/research-contribution/

How to Write Research Contribution

- Here are some steps you can follow to write a strong research contribution:
  i. Define the research problem and research question: Clearly state the problem or gap in the literature that your research aims to address. Formulate a research question that your study will answer.
  ii. Conduct a thorough literature review: Review the existing literature related to your research question. Identify the gaps in knowledge that your research fills.
  iii. Describe the research design and methodology: Explain the research design, methods, and procedures you used to collect and analyze data. This includes any statistical analysis or data visualization techniques.

https://researchmethod.net/research-contribution/

How to Write Research Contribution ctd..

- Here are some steps you can follow to write a strong research contribution:
  iv. Present the findings: Clearly present your findings, including any statistical analyses or data visualizations that support your conclusions. This should be done in a clear and concise manner, and the conclusions should be based on the evidence you've presented.
  v. Discuss the implications of the findings: Describe the significance of your findings and the implications they have for the field of study. This may include recommendations for future research or practical applications of your findings.
  vi. Conclusion: Summarize the main points of your research contribution and restate its significance.

https://researchmethod.net/research-contribution/

When to Write Research Contribution in Thesis

- A research contribution should be included in the thesis when the research work adds a novel and significant value to the existing body of knowledge.
- The research contribution section of a thesis is the opportunity for the researcher to articulate the unique contributions their work has made to the field.
- Typically, the research contribution section appears towards the end of the thesis, after the literature review, methodology, results, and analysis sections.
- In this section, the researcher should summarize the key findings and their implications for the field, highlighting the novel aspects of the work.

https://researchmethod.net/research-contribution/

Example Research Contributions

i. Identification of gaps in the existing literature and proposing solutions
ii. Development of a new theoretical framework or model
iii. Development of a new algorithm/model
iv. Creation of a novel methodology or approach
v. Discovery of new empirical evidence or data
vi. Application of existing theories or methods in a new context

Research Contribution

- To identify the research contribution of your thesis, you need to consider the following:
  - What problem are you addressing in your research?
  - What is the research gap that you are filling?
  - What is your research question or hypothesis, and how does it relate to the problem you are addressing?
  - What methodology have you used to investigate your research question or hypothesis, and why is it appropriate?
  - What are the main findings of your research, and how do they contribute to the field?
  - What are the implications of your research findings for theory, practice, or policy?

https://researchmethod.net/research-contribution/

Conclusions

- Recall reader what was original goal
- Outline theoretical background, methodology, results and analysis
- Highlight contribution(s)
  - Provide a summary of achievements
- Any limitations
- Discuss future work
  - How the work can be extended for father research

Limitations

- When writing about the limitations of a research study, it is important to be honest and clear about the potential weaknesses of your work. Here are some tips for writing about limitations in research:
  - Identify the limitations: Start by identifying the potential limitations of your research. These may include for example sample size, selection bias, measurement error, or other issues that could affect the validity and reliability of your findings. (i.e, potential effect on key findings)
  - Be honest and objective: When describing the limitations of your research, be honest and objective. Do not try to minimize or downplay the limitations, but also do not exaggerate them. Be clear and concise in your description of the limitations.

https://researchmethod.net/limitations-in-research/

Limitations ctd..

- Provide context: It is important to provide context for the limitations of your research. For example, if your sample size was small, explain why this was the case and how it may have affected your results. Providing context can help readers understand the limitations in a broader context.
- Discuss implications: Discuss the implications of the limitations for your research findings. For example, if there was a selection bias in your sample, explain how this may have affected the generalizability of your findings. This can help readers understand the limitations in terms of their impact on the overall validity of your research.
- Provide suggestions for future research: Finally, provide suggestions for future research that can address the limitations of your study. This can help readers understand how your research fits into the broader field and can provide a roadmap for future studies.

https://researchmethod.net/limitations-in-research/

Purpose of Limitations in Research

- There are several purposes of limitations in research. Here are some of the most important ones:
  i. To acknowledge the boundaries of the study: Limitations help to define the scope of the research project and set realistic expectations for the findings. They can help to clarify what the study is not intended to address.
  ii. To identify potential sources of bias: Limitations can help researchers identify potential sources of bias in their research design, data collection, or analysis. This can help to improve the validity and reliability of the findings.
  iii. To provide opportunities for future research: Limitations can highlight areas for future research and suggest avenues for further exploration. This can help to advance knowledge in a particular field.
  iv. To demonstrate transparency and accountability: By acknowledging the limitations of their research, researchers can demonstrate transparency and accountability to their readers, peers, and funders. This can help to build trust and credibility in the research community.
  v. To encourage critical thinking: Limitations can encourage readers to critically evaluate the study's findings and consider alternative explanations or interpretations. This can help to promote a more nuanced and sophisticated understanding of the topic under investigation.

https://researchmethod.net/limitations-in-research/

Importance of Limitations in Research

- Here are some reasons why limitations are important in research:
  i. Enhances the credibility of research: Limitations highlight the potential weaknesses and threats to validity, which helps readers to understand the scope and boundaries of the study. This improves the credibility of research by acknowledging its limitations and providing a clear picture of what can and cannot be concluded from the study.
  ii. Facilitates replication: By highlighting the limitations, researchers can provide detailed information about the study's methodology, data collection, and analysis. This information helps other researchers to replicate the study and test the validity of the findings, which enhances the reliability of research.
  iii. Guides future research: Limitations provide insights into areas for future research by identifying gaps or areas that require further investigation. This can help researchers to design more comprehensive and effective studies that build on existing knowledge.
  iv. Provides a balanced view: Limitations help to provide a balanced view of the research by highlighting both strengths and weaknesses. This ensures that readers have a clear understanding of the study's limitations and can make informed decisions about the generalizability and applicability of the findings.

https://researchmethod.net/limitations-in-research/

Research Questions

- Research Questions
  - are usually stated as Research Questions
  - It is s the statement of the problem stated in inquisitive form
  - RQ is the Research problem posed as questions
  - Helps to narrow the scope and focus the investigation
  - Guides the research process
- Research Problem should be
  - Suit the Academic discipline
  - level of skills
  - Availability of resources
  - Feasible in the given time frame

https://paperguide.ai/blog/research-question-examples/

Good Research Questions?

- Feasible- withing given resource budget(Time, effort, funds)
- Clear- -key words used in formulating Research Questions
- Significant - has a scope for sufficient potential contribution
- Ethical- will not cause harm to human, natural environment

Lit Review

- See handout 2
- Writing a good lit Review helps to understand
  1. How other scholars have presented/written their work. Vocabulary, presentation style etc
  2. Range of theories/concepts/frameworks models/datasets/algorithms etc
  3. How other scholars relate the work to potential use cases,
  4. How similar work have been evaluated
  5. What experimental approaches have been used in similar work
  6. What are strengths and weakness of possible solution paths to the problem under investigation
  7. Be able to demonstrate knowledge in the domain/area under investigation
  8. Be able to justify choices made in the design, implication and evaluation
     - Example Viva Question : What choices did you have and why did you made a particular design decision

Lit Review

- Provide theoretical background
- Critically assess research trends in the narrow domain selected
- Identify research gaps
- Provide foundation for Research Questions

Methodology

- Methodology needs supporting literature
- Anticipate and prevent the reader's methodological concerns
  - Acknowledge limitations, if any
  - Justify the approach used, explaining how benefits outweigh potential limitations
  - Provide rationale for choices used

Research Gap

- Research gap refers to an area or topic within a field of study that has not yet been extensively researched or is yet to be explored. It is a question, problem or issue that has not been addressed or resolved by previous research.
- How to Identify Research Gap
  - Identifying a research gap is an essential step in conducting research that adds value and contributes to the existing body of knowledge.
  - Research gap requires critical thinking, creativity, and a thorough understanding of the existing literature.
  - It is an iterative process that may require revisiting and refining your research questions and ideas multiple times.

How to Identify Research Gap

i. Review existing literature: Conduct a thorough review of the existing literature in your research area. This will help you identify what has already been studied and what gaps still exist.

ii. Identify a research problem: Identify a specific research problem or question that you want to address.

iii. Analyze existing research: Analyze the existing research related to your research problem. This will help you identify areas that have not been studied, inconsistencies in the findings, or limitations of the previous research.

iv. Brainstorm potential research ideas: Based on your analysis, brainstorm potential research ideas that address the identified gaps.

v. Consult with experts: Consult with experts in your research area to get their opinions on potential research ideas and to identify any additional gaps that you may have missed.

vi. Refine research questions: Refine your research questions and hypotheses based on the identified gaps and potential research ideas.

vii. Develop a research proposal: Develop a research proposal that outlines your research questions, objectives, and methods to address the identified research gap.

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Types of Research Gap

- There are different types of research gaps that can be identified, and each type is associated with a specific situation or problem. Here are the main types of research gaps and their explanations:

1. Theoretical Gap

- This type of research gap refers to a lack of theoretical understanding or knowledge in a particular area. It can occur when there is a discrepancy between existing theories and empirical evidence or when there is no theory that can explain a particular phenomenon. Identifying theoretical gaps can lead to the development of new theories or the refinement of existing ones.

2. Empirical Gap

- An empirical gap occurs when there is a lack of empirical evidence or data in a particular area. It can happen when there is a lack of research on a specific topic or when existing research is inadequate or inconclusive. Identifying empirical gaps can lead to the development of new research studies to collect data or the refinement of existing research methods to improve the quality of data collected.

https://researchmethod.net/research-gap/

Types of Research Gap ctd..

3. Methodological Gap

- This type of research gap refers to a lack of appropriate research methods or techniques to answer a research question. It can occur when existing methods are inadequate, outdated, or inappropriate for the research question. Identifying methodological gaps can lead to the development of new research methods or the modification of existing ones to better address the research question.

4. Practical Gap

- A practical gap occurs when there is a lack of practical applications or implementation of research findings. It can occur when research findings are not implemented due to financial, political, or social constraints. Identifying practical gaps can lead to the development of strategies for the effective implementation of research findings in practice.

5. Knowledge Gap

- This type of research gap occurs when there is a lack of knowledge or information on a particular topic. It can happen when a new area of research is emerging, or when research is conducted in a different context or population. Identifying knowledge gaps can lead to the development of new research studies or the extension of existing research to fill the gap.

https://researchmethod.net/research-gap/

Research Gaps and Challenges

- Difficulty in identifying gaps: Identifying gaps in existing research can be challenging, particularly in fields where there is a large volume of research or where research findings are scattered across different disciplines.
- Risk of oversimplification: Addressing research gaps may require researchers to simplify complex problems, which can lead to oversimplification and a failure to capture the complexity of the issues.
- Bias: Identifying research gaps can be influenced by researchers' personal biases or perspectives, which can lead to a skewed understanding of the field.
- Potential for disagreement: Identifying research gaps can be subjective, and different researchers may have different views on what constitutes a gap in the field, leading to disagreements and debate.

https://researchmethod.net/research-gap/

Significance of the Study

- What is the significance to the domain and research community
- Significance of the study in research refers to the potential importance, relevance, or impact of the research findings.
- It outlines how the research contributes to the existing body of knowledge, what gaps it fills, or what new understanding it brings to a particular field of study.

https://researchmethod.net/significance-of-the-study/

Conclusions

- The conclusion is the very last part of your thesis or dissertation. It should be concise and engaging, leaving your reader with a clear understanding of your main findings, as well as the answer to your research question.
- In it, you should:
  - Clearly state the answer to your main research question
  - Summarize and reflect on your research process
  - Make recommendations for future work on your thesis or dissertation topic
  - Show what new knowledge you have contributed to your field
  - Wrap up your thesis or dissertation conclusion
  - Writing and referencing are important skills that are critical to academic writing.

https://www.scribbr.com/dissertation/write-conclusion/

Discussion vs. conclusion

- While your conclusion contains similar elements to your discussion section, they are not the same thing.
- Your conclusion should be shorter and more general than your discussion.
- Instead of repeating literature from your literature review, discussing specific research results, or interpreting your data in detail, concentrate on making broad statements that sum up the most important insights of your research.
- As a rule of thumb, your conclusion should not introduce new data, interpretations, or arguments.

https://www.scribbr.com/dissertation/write-conclusion/

Step 1: Answer your research question

- Your conclusion should begin with the main question that your thesis or dissertation aimed to address.
- This is your final chance to show that you have done what you set out to do, so make sure to formulate a clear, concise answer.
- Don not repeat a list of all the results that you already discussed
- Do synthesize them into a final takeaway that the reader will remember.

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Step 2: Summarize and reflect on your research

- Your conclusion is an opportunity to remind your reader why you took the approach you did, what you expected to find, and how well the results matched your expectations.
- To avoid repetition, consider writing more reflectively here, rather than just writing a summary of each preceding section.
- Consider mentioning the effectiveness of your methodology, or perhaps any new questions or unexpected insights that arose in the process.
- You can also mention any limitations of your research, but only if you have not already included these in the discussion. Do not dwell on them at length, though—focus on the positives of your work.

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Step 3: Make future recommendations

- You may already have made a few recommendations for future research in your discussion section, but the conclusion is a good place to elaborate and look ahead, considering the implications of your findings in both theoretical and practical terms.

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Step 4: Emphasize your contributions to your field

- Make sure your reader is left with a strong impression of what your research has contributed to the state of your field.
- Some strategies to achieve this include:
  1. Returning to your problem statement to explain how your research helps solve the problem
  2. Referring back to the literature review and showing how you have addressed a gap in knowledge
  3. Discussing how your findings confirm or challenge an existing theory or assumption
  4. Again, avoid simply repeating what you have already covered in the discussion in your conclusion. Instead, pick out the most important points and sum them up succinctly, situating your project in a broader context.

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Checklist: Conclusion

- ❑I have clearly and concisely answered the main research question.
- ❑I have summarized my overall argument or key takeaways.
- ❑I have mentioned any important limitations of the research.
- ❑I have given relevant recommendations.
- ❑I have clearly explained what my research has contributed to my field.
- ❑I have not introduced any new data or arguments.

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Tutorials

- Tutorial Activity 3- Academic Writing
  - Make a share copy of the tutorial 2 submission
  - Peer review of lit review written by each member. Include comments in the shared document on issues identified and make suggestions for improvements
  - Group review of peer review by each member of the team
  - Make Improvements to writing by each author based on peer feedback

- Tutorial 4 – Development of sections of Research Proposal
- Activity 1: Identification of Research Gap (Group Activity)
  - Identify a research gap from the lit review carried out by the team(Out come of Tutorial 4)
  - Hint: may require revisiting the papers read as a team /reading more papers and identify a suitable research gap
- Activity 2: Formulating Research Questions
  - Write down Research Questions
- Activity 4: Formulating Aims and Objectives
  - Write down the Aims and Objectives for the identified Research Questions

Questions?