

THE SELECTION OF REPORT, THESIS, OR DISSERTATION TOPICS

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As graduate students you will be involved at various times in the task of selecting a research topic. This material is being provided to you in order to assist you in this task.

The purpose of this paper is to get you in "correct frame of mind" to search for a topic, and to be sure that before you approach a faculty member or a research committee that you have done "the necessary homework" concerning the consideration and selection of a specific topic or topic area.

I. Looking for a problem

- A. There are unlimited problems to be solved. With the approval of your research advisor (committee), you select the topic on which you wish to work.
- B. To select a problem, you must first have a thorough understanding of your fields of interest.
 1. Be imaginative and think of ideals to achieve. Any part toward the ideal may merit a good research.
 2. Gaps exist in the knowledge in every field. To learn these gaps, you must do extensive reading in your fields.
 3. You should begin preparing (and reading in) your bibliographies.
 4. You may not be able to read every article in your bibliography but you will learn what is being done in your fields. Most importantly, you should know if what you are intending to accomplish has been already done by someone else.
 5. Some pitfalls - don't try to select a problem until you have done some reading. If you select a problem too soon, you may discover that it is much less interesting or important than something else. Don't always look for earth-shaking topics; generally, they are too big or difficult to tackle.
 6. Some ways to find problems:
 - a. When you come up with an intriguing innovative idea which has some connection to your field. Innovative ideas generally come to you by i) trying to find a solution to satisfy a need, ii) trying to find a new application for a new scientific discovery or technological breakthrough, or iii) when by sheer serendipity a new phenomenon or application is conceived.
 - b. When you are fascinated by a grander vision or activity and wish to contribute to it.
 - c. When systematic pursuit of your assigned research project (e.g., as a research assistant) merits a thesis.
 - d. When you disagree with someone else's work.
 - e. Pressing issues coming out of your everyday work.
 - f. Devising and constructing necessary research tools -aids to be used by other scholars.
 - g. Very often the author(s) of recently published research papers (and dissertations) will identify unresolved issues, thereby suggesting future research opportunities.
 - h. Consult with colleagues, students, professors, etc. It is appropriate to discuss research areas with the faculty. (Warning, do not expect a professor or a committee to give you a research

¹ This material has some contributions from Dr. George Bekey and major parts from various anonymous authors.

topic.)

II. Questions to ask about the Problem

A. Is the problem interesting?

1. Consider possible lack of interest in your problem.
2. Follow your interests and thus possibly avoid the pain of working on dull material.

B. Is the problem new or does your approach offer a better solution to an old problem?

1. Many topics are often inadequately studied--this offers you room for a new or fresh approach.
2. Studies are often redone in order to check accuracy of work done earlier.
3. You may unwittingly do something already done by others. Your ignorance is no excuse. Solution? read! read! read!

C. Is your problem feasible?

1. Many weighty problems are excellent material, yet no known means exist for solving them.
2. Trial and error often is the only way to determine if a problem is feasible.
3. Many facts and opinions exist concerning problems; still these cannot be organized into a suitable pattern which will yield acceptable conclusions.
4. When material is available, yet inaccessible, the problem must be set aside until evidence becomes available.

D. Will your work on your problem add something to storehouse of knowledge?

1. Examine carefully your problem for its significance and meaningfulness.
2. Examine carefully your purpose.
3. How valuable or how needed is the new knowledge you hope to contribute?
4. If your results promise to be too trivial, your problem is not significant and hence it should be discarded.

E. Has anyone else a prior claim to your problem?

1. Search your journals for reports of research in progress, research completed.
2. Any work taken from another scholar must always be acknowledged.

III. Stating the Problem

A. Be certain you know exactly what your problem is before you begin your work.

1. This is not always simple.
2. A common error: You may hit on a large and vague topic without consciously forming a specific problem out of it. Result: a formless mass of information quite vague, and hence no sharp or specific conclusion may result.
3. Ask: What am I hoping to discover? Precisely what is my problem? Is my topic

narrow enough? Is it too narrow?

4. Put your statement of problem into a question if possible. Better still; try to formulate a working hypothesis.
5. A question often aids you to prune your problem down to one of a reasonable size.
6. Limiting your problem (in scope) often saves you much useless work.
7. All limitations which you place on your problem must appear in your research documentation, so keep careful notes on how you do refine your problem down to manageable proportions.
8. Careful refinement of the problem avoids misunderstanding between you and your committee. Your "contract" with them is that much more specific and secure.
9. The clearer your objective is to you makes it that much simpler for you to work toward your solution. You have that much better chance of effectively solving your problem.

B. Some rules to follow

1. Be sure that your topic is neither too limited, nor too broad in scope.
2. Be sure your problem is sharply and specifically stated. To make it clearer and more understandable state it as a question which requires a definite answer. Carefully state the limits of the problem, eliminating all aspects and factors which will not be considered in the study.
3. Define all special terms which must be used in the statement of your problem.
 - i. Define only if words might be interpreted in more than one way and if there is a danger of ambiguity.
 - ii. Carefully distinguish between the purpose of your study and the statement of your problem. Purposes refer to reasons you are doing study. This concerns the probable value of your project and the possible uses to which your results might be put. Purposes are the "whys" of the study, and the problem is the "what" of the study.

ELEMENTS OF A RESEARCH PROPOSAL

As a graduate student you are now beginning the final phases of your program. The associated research effort required in the form of a thesis or dissertation will be one of the most creative endeavors you have undertaken as a graduate student.

A well written research proposal is a requirement and must be available prior to PhD qualifying examination.

Once a proposal is written and approved by your committee you are that much closer to your goal. In fact, one of the hard parts of your research effort may be over. The purpose of this section is to outline the items that should be included in a research proposal (unless your research advisor and committee approve modifications to this format).

Outline of a Research Proposal

- I. Title Page
- II. Table of Contents
- III. Introduction
- IV. Statement of the Problem
- V. Background of the Study
- VI. Critique of Past Approaches
- VII. Hypothesis
- VIII. Preliminary Results
- IX. Research Plan and Procedures
- X. Evaluation of Research Results
- XI. Schedule of Research Tasks and Milestones
- XII. Bibliography
- XIII. Appendices

The entire proposal can be viewed as a gradually expanding explanation. The introduction is a broad and brief. The statement of the problem and purposes extends the introductory statement. The background section expands upon the purpose. The hypothesis is a formal statement of the problem. The research plan and procedures all detail the general statement of approach included in the statement of the problem, and the evaluation section details how the hypotheses are to be measured and tested.

Discussion of Outline

I. Title Page

- A. The title should express the central focus of the proposed research as succinctly as possible. It should be neither too short nor too long.
- B. In addition to the title, this page should carry the
 1. Author's name
 2. Members of advisory committee Research Advisor listed first followed by other committee members
 3. Department name and date
 4. A short abstract describing the problem and the expected contribution of your research

II. Table of Contents

- A. You should list the major headings and their page number in order of their appearance in the proposal.
- B. Particular headings to be used are those suggested after this Section II (III through X) unless the nature of your research and/or desires of your research advisor and committee dictate a modification to the proposal format.

III. Introduction

- A. In this section you should convey information to your readers in broad terms
 1. The major of your proposal explaining the problem and its importance
 2. The way the problem is currently being solved
 3. Brief description of your new approach and its advantages
 4. The major goals of your research
 5. The probable date of completion
- B. Up to three pages should be sufficient to state the basic points you should make
 1. This is not the place for detailed explanations
 2. Keep your introduction brief, broad, and straightforward
 3. Details should come later

IV. Statement of the Problem

- A. The purpose of this section is to define and delimit the research effort. In this section you emphasize the important distinction between the problem and the purpose of the research.
 - a. The Problem is the central theme of the questions to be answered by the research.
 - b. The purposes of the research are the reasons why the problem is worthy of study--the rationale for the expenditure of your time and effort.
- B. This part of your proposal should serve as a more formalized statement of the content of the introduction with added detail and organization.

V. Background of the Study

- A. This will probably be the longest part of your proposal. Most of this material will be used in your final thesis or dissertation, assuming, of course, that your committee accepts your proposal without major changes.
- B. The material that you put in this section should be carefully selected to include appropriate general references and the most pertinent specific studies from the research literature.
- C. You should organize this section in a way that will lead your reader from the more general background material to the more specific previous research in a rather idealized analogue of the way you should have approached the problem.
- D. In this section you must convince the committee members that you have developed a clear understanding of the problem in terms of what other researchers have had to say about the problem.
- E. This section should contain all of the necessary supportive material concerning the formal hypothesis to be presented in the next section.

VI. Critique of Past Approaches

A critical evaluation of the literature, indicating the major drawbacks and difficulties with previous approaches, which then justifies the new project should be included in this section.

VII. Hypothesis

- This part of the proposal will probably give you more trouble than any other part due to the precision required in phrasing the statements to imply directly the way in which they will be tested.
- The hypotheses are the refined core of your study. They are the precise statements that reflect the questions to be answered by the evidence. They must not only be appropriate to the purposes of the research, but they must be stated in a form that will be testable by the methods and procedures to be presented later in the proposal. This is the section in which you are precisely stating your objectives in a measurable way that can be tested at the conclusion of your research. There may be a hypothesis for each need identified previously in the statement of the problem.

VIII. Preliminary Results

You should not attempt writing a research proposal without having some preliminary results, whether these be experimental, theoretical, or obtained from simulation studies. Ideally your preliminary result should be based on a small prototype of your entire research. Such a prototype is extremely useful in providing you with a clear insight about your future research activities and in giving you confidence that the work is feasible and doable by you. The prototype will also give you a good idea about the magnitude of the effort ahead and thus will help you to plan well and have a more reliable time table for your research tasks and milestones.

IX. Research Plan and Procedures

- A. In this section of your proposal, you will describe how the research objectives and hypotheses are to be met.
- B. Here you will delineate the methodology of your research plan and "walk and talk" your committee members through the forecasted research activity.
- C. It is proper at point to indicate a detailed project time frame in the form of a Gantt chart or CPM network.

X. Evaluation of Research Results

- A. In this section, you will describe how the research objectives and hypotheses will be evaluated.
- B. Here you must outline the way in which you will test each of your hypotheses using the data collected by the plan and procedures described in the previous section.

XI. Schedule of Research Tasks and Milestones

In this section you should present a chart that illustrates the time phased plan of accomplishing the major research tasks and the major milestones. Besides giving yourself and your committee an idea about the magnitude of the effort of the needed time to accomplish the entire research objectives, the chart can become your basis for disciplining yourself throughout your research process. Using today's graphics tools a variety of formats for useful charts and graphs may be used. One sample representation of a research project chart is shown in the end of this document. Note that this chart is not for a PhD research otherwise it would have included activities such as dissertation writing.

XII. Bibliography

- A. There are many different standards in use for listing references. For your proposal the references can be in any consistent form as long as they are complete. Since the final listing will be typed for the final research manuscript, it is suggested that your format be one of those approved by the Graduate College in their "Thesis Writing Manual."
- B. Since you have access to the computer you may find it useful to enter bibliographic references in a spreadsheet. Your list can be easily sorted, in the appropriate way, with little difficulty, and new entries can be added.

XIII. Appendices

- A. A series of appendices may be needed to provide copies of supportive calculations, data from preliminary studies, or other supplementary materials. When multiple appendices are used, they are usually differentiated by letters.

