Research Primer for Graduate Students

As a graduate student, you may experience some anxiety about conducting your own independent research. It is not uncommon to think that you can not complete the work required for a thesis. The work involved in completing a thesis is significant. You will most likely spend many long nights and weekends conducting and documenting your research. With the proper approach and guidance, however, completing your thesis research is not something you should fear. This short paper is intended to help you approach your research in a systematic manner. It is not intended to be a guide on how to conduct research, though you will likely find useful information and tips (especially on the thesis process). If you are interested in further readings or help, there are many excellent resources available on conducting research, writing proposals, and writing (thesis) that contain more detail than this short paper.

What is research?

In his book, *Practical Research: Planning and Design*, Paul Leedy[1] describes research as "the systematic process of collecting and analyzing information (data) in order to increase our understanding of the phenomenon with which we are concerned or interested." Leedy suggests that the word *research* has so many meanings attached to it in that "few people have any idea of the real meaning." The most important characteristics of formal research, as Leedy defines it, is that it involves the interpretation of data to draw conclusions. Research is not, then, the mere restating of previously known facts (as previously done for undergraduate term papers) or the process of obtaining new knowledge by searching for information (information gathering for buying a car). The process of formal research which we are interested in has eight distinct characteristics as identified by Leedy:

- Research originates with a question or problem.
- Research requires a clear articulation of a goal.
- Research follows a specific plan of procedure.

- Research usually divides the principal problem into more manageable subproblems.
- Research is guided by the specific research problem, question, or hypothesis.
- Research accepts certain critical assumptions.
- Research requires the collection and interpretation of data in attempting to resolve the problem that initiated the research.
- Research builds on previous research.

Leedy's eight characteristics can also be viewed as the research methodology.

How do I get started?

Consider a general area in which you want to conduct your research (traffic operations, transportation planning, remote sensing, freight transportation, etc.)

Cppoint committee members. For a masters degree you will need three members and at least one must be from outside your home department. One of your committee members will be your thesis adviisor. This is a critical decision, as your thesis advisor will guide, review and approve all of your work.Your advisor may or may not have expertise in your topic area.

Start reading in your interest area. Read trade publications, online articles, research reports, and most importantly, related journals.
It is also useful to read theses of former or current students. Start formulating ideas as you read. Keep a notebook and write down research topics as you think of them for future discussions with your committee members.

Schedule a meeting with the Director of the MS Tel Program, before or soon after, completing your first semester of graduate school. DO NOT WAIT to schedule this meeting! Speak to the Director of the MS Telecom program about classes that will help you in your research area. You will need to make sure that the classes that you propose to take meet the requirements of the department for graduation. At the Prpgram of Study review (POS), your advisor will determine what

classes you will take for the remainder of your graduate work. Also, at the POS be prepared to discuss potential research topics with your committee. They will provide guidance and offer advice. After the POS meeting, you should be better prepared to identify your research topic for your thesis.

Preparing for the proposal meeting

As soon as possible after deciding a more specific research topic with your committee, gather relevant literature on your research topic. Start by asking your committee to suggest the critical references you should read. Your aim is to become completely familiar with the work that others have done in your subject area. It is a good idea to keep notes or a database on the literature you have read. Research your topic thoroughly; overlooking key resources shows that you do not have a grasp of the material. Marshal online resources and search the SUNY library, and other University library catalogs.

After reviewing the relevant literature, you should begin thinking about your proposal meeting. The proposal meeting should happen at least six months prior to your first submission of the thesis (depending on your committee). In their book, *Proposals that Work: A Guide for Planning Dissertation and Grant Proposals*, Locke et. al[2] state that a proposal

> "sets forth the exact nature of the matter to be investigated and a detailed account of the methods to be employed. In addition, the proposal usually contains material supporting the importance of the topic selected and the appropriateness of the research methods employed."

Your proposal should be a complete document and address the issues identified by Locke *et al*. It should indicate that you have identified a problem, read enough literature to discuss the subject intelligently, and developed a strategy for completing the research. Overall, Locke *et al* state that your proposal will communicate your intentions to your committee, serve as a plan for yourself and the committee, and finally serve as contract between yourself and the committee (if you complete the work as described, you should graduate).

Find out the prescribed format for your project proposal from your committee. Most committees will require a written and oral presentation of your proposal (check with your major professor). In the absence of any advice, make the written proposal 6 pages in length. The following outline, adapted from Kennedy[3], serves as a model outline for a proposal (it may be more detailed then you require):

- The title page including the envisaged title for the thesis
- Introduce the study: *Give the background*.
- The problem and its setting: *Give your viewpoint*.
  - A statement of the problem
  - A statement of the subproblems
  - The hypotheses
  - The delimitations (boundaries of your research)
  - The definition of terms
  - The assumptions
  - The importance of the study. *State your envisaged contribution*.
- The review of the related literature. *Quote quotable quotes*.
- A proposed solution to the problem. *Describe your method*.
- The data, their proposed treatment, and their interpretation
  - The data
    - The primary data
    - The secondary data
  - The criteria governing admissibility of the data
  - The research method to be adopted
  - Specific, projected treatment of each subproblem
    - Data needed
    - Where the data are located
    - How the data will be secured
    - How the data will be treated and interpreted
- The qualifications of the researcher
- The outline of the proposed thesis
- References list
- Schedule of work for the duration of the project

Writing your thesis

- Complete the actual research you have proposed. Meet with your thesis advisor on a regular basis to discuss progress and problems. (There is a lot of work bundled in this bullet)

- Review the *MS Telecom On-line Thesis Manual* which will serve as your guide for the thesis. It also contains checklist for the required timelines you must meet in order to graduate.

- Read the attached writing tip guidelines from the TEL 598: Research Methods course refer to the reference guidelines

- If you wrote a good proposal for TEL 598, it should serve as the basis for the beginning chapters for your thesis. When documenting your research, keep in mind that your committee will expect your thesis to demonstrate that you have met the requirements they have set forth. Sharp[4] states that a master's thesis should meet the first six criteria (Ph.D. dissertations should meet all criteria.)

    - Evidence of an original investigation or the testing of ideas.
    - Competence in independent work or experimentation.
    - An understanding of appropriate techniques.
    - Ability to make critical use of published work and source material.
    - Appreciation of the relationship of the special theme to the wider field of knowledge.
    - That it is worthy, in part, of publication.
    - Originality as shown by the topic researched or the methodology employed. A new technique may involve new or improved instrumentation, or it may simply be the result of novel uses or combinations of older methods.
    - Distinct contribution to knowledge. The thesis must form a distinct contribution to the knowledge of the subject and show evidence of discovery of new facts or the exercise of independent judgement.

Good Luck!