

You have to create a two-page research proposal. Two sample drafts, courtesy, Kristal Pollack and Maximiliano Mehech, are posted on the website

How to Write a Research Proposal

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Abstract

The objective of this research is to develop a methodology to educate graduate students how to write a research proposal.

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1 Introduction and Motivation

One of the most important objectives of graduate education in any field is to learn how to conduct novel research. Yet there is little information available to the educators how to prepare their graduate students for cutting-edge research. One of the key components in this endeavor is to learn the ability to create a well-written research proposal. The objective of this research is to develop a methodology to impart this much needed education.

We begin by identifying the key components of a good graduate education in Section 3. We discuss the background and previous work in this area in Section 2.

2 Background and Previous Work

It is amazing how little is known about how to teach how to conduct innovative research. Most of the information is available through verbal communication [J2003] and is held by individual faculty and researchers. Although one can get a glimpse of some of these views during social conversations at conferences, little is available in the written form that can be used by other educators.

The problem is significant because several universities such as UCSC has a large influx of graduate students who lack training in how to conduct any research and have no prior knowledge or information how and where to begin. To make matters worse, they often lack much-needed skills of effective literature search, technical writing, verbal communication skills, presentations skills. They also often have limited exposure to cutting-edge research articles. Most of them have never attended any conference and have formed opinions about what is valuable and what is not based on media stories rather than well-rooted research. This sometimes leads to both under-and-over-estimating the quality of some reported research which clouds clear thinking towards developing a promising research proposal.

3 Proposed Research and Methodology

The key components of a good research proposal are: (i) What is the problem? (ii) Why is the problem important? (iii) What is the state-of-art about the solutions of the problem? (iv) How is the proposed research going to improve the state-of-the-art? This part should clearly bring out the enhancements or advantages the proposed research is claiming over the existing solutions that can be readily understood by all your colleagues and not just by highly specialized domain experts. (v) Techniques that will be used to arrive at the solutions. (vi) Prior work by the PI to establish that they have necessary skills and resources to

conduct the research. In particular the PI should have done some prior work (with publications) to establish this claim.

A good proposal should be able to address all these issues succinctly in two pages and perhaps even less. Similarly, a good presentation should be able to convey these points and the key idea proposed in less than ten minutes. Although some researchers may believe that the space or time is not enough, I firmly believe that you should be able to capture the audience within the first five minutes or within the first few pages or else you have lost already.

In this research, we will begin to develop techniques for answering all of the above questions. Identification of a promising research problem is perhaps one of the most difficult part of successful research. Such identification assumes that you have a good knowledge of the problem and have the necessary, interest, skills, intuition, and experience to attack the problem. The question is how does the flow-chart of identification of a good problem look? Is this a sequential process or there are feedback loops, and if so, which are the most important ones, and how to obtain necessary information or training to fill the gaps that one encounters.

4 Schedule and Deliverables

This research will begin on January 1, 2009 for a period of one year. The research is divided into four phases. During the first phase (first three months), we will create a draft of techniques and methodology by researching the techniques employed by individual researchers and reported in the pedagogical literature. During the second phase (next three months), we will conduct interviews with researchers in the industry and academia soliciting and documenting their views regarding different methodologies proposed. In the third phase, we will identify and implement two most promising technique and educate about 20 graduate students over a period of ten weeks. In the fourth and final phase, we will create a final draft of our findings and present and disseminate our results through web and conferences.

5 Budget and Justification

We are requesting support for one month of summer salary for the PI (\$14,000), one year of graduate student support with non-resident tuition fees (\$55,000), one PC (\$2000), travel to one conference by the PI and the student researcher (\$4,500), and supplies (\$1,500) for a total of \$76,000. Above figures include an overhead of 49.7%.

6 Impact

Research and techniques developed in this research will have a major impact in preparing graduate students in several disciplines particularly in the field of science and engineering. This research will pave the way to develop curriculum that can impart much needed skills for writing quality time-critical research and funding proposals to graduate students in efficient ways. We expect that this research will also be helpful in developing techniques how to begin conducting cutting-edge research.

References

[J2003] J. Ferguson. Private Communication, 2008.