

Research Methods Assignment 3

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1 Abstract

Most people have a general idea of what research is in the broadest sense, but for a first year graduate student research is a bit of a mystery. This article attempts to highlight some areas on how to conduct research that a first year graduate student would benefit from.

2 Introduction

Graduate students must learn to become effective at research. Research is the main purpose of graduate school and as such, a graduate student would not have a good chance of succeeding without first understanding the basics of research. The basics of research include knowing the tools available, knowing the cyclical cycle of research which is also known as the scientific method.

3 Tools Available

Within whatever domain a researcher works in, there will almost always be domain specific tools that are available to researchers in that field. This article will attempt to avoid mentioning any such tools. However, once a graduate student finds a field which interests them the most; they should find out from their advisor or fellow students what standard tools they should familiarize themselves with.

3.1 The Library and Reading

There is a consensus among researchers on how to best start a research project. Research projects start with reading literature that is related to the project's field to gain background information. This way a researcher will know what research questions have already been answered, and what areas can be expanded on.

Almost all incoming graduate students will have little to no knowledge about the state of the field that they have interest in. If they have selected their advisor

wisely, then their advisor should already have an in-depth knowledge of that field and should be able to guide their student. However, for a researcher to be successful they must learn to be independent, therefore a student's dependency on their advisor should only be as long as necessary.

For a student to become independent they must learn how to read and analyze literature from published articles. This skill is not always taught to graduate students, but is necessary for a student to be able to do a literature survey in their new field.[1] In a literature survey a student can expect to analyze a minimum of 3 articles. [1] To find these articles a student can learn a three-pass reading method that will read the article in greater detail with every pass. [1] The first pass you skim the outline and read the introduction and conclusion to see if it is something you are interested in, the second you read the entire article skipping the proofs and formulas, and the third you follow the experiment step by step to try and verify the article in your head. [1]

3.2 Other Tools

Other tools to conduct research with is measurement, statistics, language, and our own mind. With measurement we can attempt to quantify a phenomenon that we are studying. With statistics we can analyze our measurements and data. With language we can communicate our statistical findings by writing papers. Lastly we obviously use our mind to utilize all the above tools, and for deductive and inductive reasoning.

4 Cyclical Cycle of Research

Current research is almost always building on existing research that has been done in the past. These previous works not only serve as a foundation for current research, but they also serve as a way for researchers to identify new problems that haven't been solved yet. Thus the cyclical cycle of research has begun.

Once the problem is identified, the next step is to design a research study. The study will use scientific methodology to solve the problem. Then you carry out the experiments and analyze the research results. Once you have analyzed the results you can then publish your findings and share what you have learned so that others may build on it.

5 Conclusion

The main thing a graduate student must do during their time in school, is learn how to conduct valid research that can be lead to publications. To do that they must learn to use the tools at their disposal; which include reading and writing, statistics, and their own mind. Once a student has mastered this skill set, they are ready to conduct meaningful research that hasn't been done yet.

References

- [1] S. Keshav. How to read a paper. *ACM SIGCOMM Computer Communication Review*, 2007.