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Theses and Dissertations: A Guide to Writing in Social and Physical Sciences

Isadore Newman

Florida International University

Carolyn Ridenour

University of Dayton, cridenour1@udayton.edu

David M. Weis

The University of Akron

Keith McNeil

New Mexico State University

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Chapter 1

The Problem

This chapter discusses the components of what is usually found in chapter 1 of a dissertation or master's thesis. The material will be presented in the same order as identified in Exhibit 1.1

Exhibit 1.1. Table of contents for chapter 1.

Chapter

1. THE PROBLEM

Introduction

Statement of the Problem

Assumptions Underlying the Study

General Research Hypotheses

Significance of the Study

Delimitations

Definitions and Operational Terms

Summary

You need to have a lot of ideas, and then you have to throw away the bad ones. **Linus Pauling**

Introduction

TIP: Never start your paper with a quotation.

The Introduction section of chapter 1 contains a brief reference to literature pertinent to the research study. Include very few references in chapter 1--only those that are essential to represent the rationale for the study. The introduction introduces the subject under study to a reader who is unfamiliar with the topic area. Specifically, the introduction presents the major emphasis and significance of the study briefly and in broad terms. It is a good idea to state at the beginning of the chapter what the problem to be investigated is. Thus, the first sentence should begin, "This study was conducted to . . ." The introduction puts the study into the context for the reader, emphasizing why it is important. It is perhaps ideal to aim the material at a person who is knowledgeable of the field, but not necessarily deeply involved in the problem you are studying. Exhibit 1.2 contains an introduction from a dissertation.

Exhibit 1.2. Example introduction from a dissertation.

Introduction

Since 1920, there has been a geometric increase in the use of educational technology to enhance instructional procedures. The success of this educational technology has been mixed. The classroom technology of the 1980s and 1990s has been computer applications. The estimate for software related to education for 1988 has been given as 500 million dollars (Smith, 1987). Community expectations have no doubt affected the computerization of many schools. There is an estimate of 60 million microcomputers in homes across the US, many of which are used for instruction or skill advancement purposes.

Computer Assisted Instruction (CAI) has become a major educational tool for developing curriculum, and a vehicle for providing instruction. Many educators believe CAI to be one of the most effective ways to improve academic achievement of students. An analysis of over 400 studies (Schwalb, 1982) has shown positive results of CAI on student learning.

Nothing is interesting if you're not interested. **Helen MacInness**

Our minds possess by nature an insatiable desire to know the truth. **Marcus Tullius Cicero**

A mind that is stretched to a new idea never returns to its original dimension. **Oliver Wendell Holmes**

A problem well stated is a problem half solved. **Charles Kettering**

Statement of the Problem

The Statement of the Problem section presents a formal and succinct statement of the problem to be investigated. It answers the question of WHAT is being done in the study. The writer must establish that the problem is an important one, and that it is feasible to research it. That is, the answer to the problem will lie in the data obtained. Speculative questions require speculative answers and thus do not meet the criteria of a researchable problem.

TIP: Pick a problem that you have a genuine professional interest in--one that you do not have a personal interest in to the extent that you are out to prove something. Such emotional ties often blind the researcher from the resulting data.

In thinking, planning, and writing the problem section, one should ask, "What are the possible results of this research, and what impact will those results have on the knowledge base?" Answers to these questions not only provide insight for the discussion chapter, but also justify the import of the study to the reader. In addition, the general research hypotheses of the study should be clearly implied from the statement of the problem, as illustrated by Exhibit 1.3.

Never assume the obvious is true. **William Safire**

Assumptions Underlying the Study

Assumptions must be included in chapter 1. Underlying assumptions are present in every research study. Allowing them to only be implicit

Exhibit 1.3. A Statement of the Problem section from a dissertation.

Statement of the Problem

This study will investigate the relationship between the use of CAI and achievement gains in a representative sample of high school students in the US.

This study will be longitudinal in that participants will be studied at two points in time, 1980 and 1986. More specifically, this investigation will test the relationship between the students' frequency of use of CAI and their achievement gains on standardized tests and teacher assigned grades in 1980 and the amount of postsecondary education completed in 1986.

and not explicit prevents the reader from understanding what the researcher is assuming "to begin with." These assumptions answer several questions: What is the researcher starting with? What is the researcher's view of the phenomenon under study and the methods chosen to study it? What does the researcher believe? What does the researcher accept as knowledge or data?

The stated assumptions place the research in context. They establish the conditions under which the study is assumed to be taking place. As such, these statements protect the researcher's intentions from being misconstrued by the reader. Assumptions describe in a normative fashion what is not necessary to reference to published sources. In other words, assumptions are "givens"; there is no requirement to cite sources, although some researchers might opt to do so.

Such phenomena as societal conditions, school structures, data types, and performance systems can be assumed rather than justified with evidence. Say a researcher is investigating whether there is a relationship between anxiety and academic ability. She may assume that an IQ test score reflects the level of academic ability. This assumption is better stated than left unstated and thus unacknowledged or unclear to the reader.

TIP: State the assumptions in a series of numbered sentences, as briefly as possible so that what is assumed is clear.

TIP: In the statement of an assumption, consider stating the reason(s)

why it was necessary to make the assumption. If there is a reason for believing an assumption is true, state the reason. If an assumption is questionable, consider casting it as a limitation.

The research question subsumes a particular set of "givens" based on the philosophical paradigm undergirding it. When a researcher is sampling participants from a population and testing hypotheses, there are various assumptions that the researcher should acknowledge. These include the ability to generalize from the sample to the population.

Assumptions differ from "delimitations" and "limitations" but are similar to both. Assumptions are statements of beliefs and knowledge claims within the researcher's mind. They can be thought of as internal. "Delimitations" (constraints imposed by the researcher) and "limitations" (constraints imposed by the results of the data collection process) are statements external to the researcher and more technical and idiosyncratic to the particular study being reported. Exhibit 1.4 contains an assumptions paragraph from a dissertation.

Exhibit 1.4. Assumptions example from a dissertation.

Assumptions

Several assumptions underlie this study. First, the researcher assumes that the participants investigated are a representative sample of high school students from across the country. Second, various applications of CAI technology are sufficiently generic in their relationship to learning to combine results and test CAI effects on academic achievement gains. Third, it is assumed that the self-reported demography (ethnicity, gender, and grade level) is sufficiently free of error. Fourth, the variance in reported grades is assumed to reflect random effects of bias among teachers. Fifth, it is assumed that the error in student accuracy in reporting grades is randomly dispersed.

Their real problem was that they assumed themselves able to formulate the questions, and ignored the fact that the questions were every bit as important as the answers. Robert Ornstein

The aim of science is to seek the simplest explanation of complex facts. We are apt to fall into the error of thinking that the facts are simple because simplicity is the goal of our quest. The guiding motto in the life of every natural philosopher should be, "Seek simplicity and distrust it." Alfred North Whitehead

Every great advance in science has issued from a new audacity of imagination. John Dewey

General Research Hypotheses

The word "Hypothesis" comes from the Greek meaning groundwork, foundation, or support. It is tentatively advanced to explain observed facts or phenomenon. A hypothesis is a shrewd guess, an assumption, an opinion, a hunch, or informal judgment. It helps guide the research methods of the study. Theory or a substantial knowledge base simplifies the development and defense for hypotheses. Hypotheses cannot emerge from nothing, there must be a rationale for each. Each hypothesis must be testable, and tested with the data collected.

The General Research Hypotheses section presents in general terms the research questions. Constructs are mentioned, not the operational measures of those constructs. The hypotheses should be derived logically from the Statement of the Problem section. A thesis or dissertation usually includes no more than five general research hypotheses. Exhibit 1.5 contains an example of three general research hypotheses from one dissertation.

Exhibit 1.5. Example of a General Research Hypothesis section.

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1. There is a relationship between the frequency of CAI use and achievement test scores when one controls for ability level.
 2. There is a significant relationship between the frequency of CAI use, instruction received, and assigned grades when controlling for ability level, SES, ethnicity, and gender.
 3. There is an interaction between the frequency of CAI use and ability level in predicting achievement when controlling for ability level.
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Significance of the Study

The Significance of the Study section justifies the need for the investigation. It answers the basic questions of WHY the investigation is important or valuable. One must make a compelling case for the study's contribution to the field. Grounds for the research might rest on such aspects as the emerging questions of prior studies, conflicting findings in other studies, evolution of methodologies, or political, social, or psychological trends. Most committees are looking for a one-page significance of the study, as in Exhibit 1.6.

Delimitations

The Delimitations section focuses on the context or the boundaries of the study. This section is sometimes called the "Scope" of the study.

Exhibit 1.6. Significance of the Study section from a dissertation.

Significance of the Study

Computer assisted instruction effectiveness has been investigated extensively over the past 10 years (Kulik & Kulik, 1985; Moursund, 1986; Pannwitt, 1984; Rota, 1981). However, results of reported effectiveness are conflicting. Some of these conflicting findings have been attributed to the size of the sample, the design of the study, the design of the instruction, and data analytic procedures.

Public opinion has been greatly affected by the reported successes of computers in education (NSBA Leadership Report, 1985). The recommendations of the report are influencing decision makers about how resources should be allocated.

The question that one must ask is how much of the increase of CAI use is based upon it being considered a fad, and how much is based upon outcome research showing the relationship between CAI and achievement. What is needed is an examination of the effectiveness of CAI as it relates to achievement gains in a large enough sample of students at different ability levels and for different content areas. The High School and Beyond database allows for such an investigation.

Exhibit 1.7. Delimitations from a dissertation.

Delimitations

High School and Beyond (HSB) database was chosen for this investigation. Along with many advantages, there are many delimitations. Items measure only the degree (quantity) of CAI are used in different courses. No estimate of quality is available. The data are self-reported grades and scores on the Standard Achievement Test.

Since there are six years between pretest and posttest, the sample is delimited to those students who were available both times. The sample does not contain participants who were mobile or not inclined to answer achievement questions.

The Delimitations section establishes the limits or parameters that the investigator chooses to include and to leave out. Examples are the population to be sampled, selection criteria, and demographic data included in data analysis. Exhibit 1.7 contains an example of a Delimitations section from a dissertation. The Delimitations section should not be confused with the Limitations section, those factors over which the investigator has no control. Some examples of limitations would be the time of day a class meets, the response rate to a mailed questionnaire, and attrition rate. Limitations are discussed in more detail in chapter 3, as they become apparent after the data has been collected.

Those who write clearly have readers, those who write obscurely have commentators. Camus

In science, each new point of view calls forth a revolution in nomenclature. Friedrich Engels

Definitions and Operational Terms

The Definitions and Operational Terms section defines the most frequently used terms within the study. These words and phrases selected for definition should be chosen to be included because they will lead to a better understanding of the study. Definitions included in a research study

are based on a scientific foundation: that is, distinctions are made between a constitutive definition and an operational definition. The former defines a term's meaning by using other words; the latter assigns meaning according to specific operations necessary to measure it (Kerlinger, 1986). It is especially important to operationally define terms that take on a different definition from more commonly accepted definitions that might be assumed by the reader.

It may seem difficult to decide just what should be included in the list of operational definitions. First, one could begin with the terms used in the general research hypotheses. For example, from a study guided by a general research hypothesis about gender and job satisfaction the researcher should define the term "job satisfaction" in an operational way, i.e., how it will be measured in the study.

Secondly, the researcher should note terms that have more than one definition in the literature, or are written about differently by different theorists. "Job satisfaction" in the above example has been written about by various authors. The researcher must provide the one definition applicable to the present study.

The definitions can be obtained from a dictionary or a professional reference source. It will often be the case that scholars you reference will have developed their own definition. Or, you can review the various definitions that have surfaced in the literature review, and synthesize your own definition, showing why it is more appropriate than the other definitions.

Because the manuscript is targeted to an academic audience, it is unnecessary to exhaustively define every term that a lay audience would not understand. One should keep the academic audience in mind and review the list with one's advisor to decide appropriate terms to include in this section. Exhibit 1.8 contains the definitions of our CAI dissertation example.

TIP: All of the variables in each research hypothesis, purpose, or question should be defined. Also, define any attribute of your population. Theories and models should also be defined.

TIP: If an unpublished instrument was used, the whole instrument should be reproduced in an appendix to operationally define the variable.

TIP: Operational definitions should be sufficiently specific so that another investigator can replicate the study.

Exhibit 1.8. Definitions from a dissertation.

Definitions and Operational Terms

Ability score: ability was operationally defined by the Standardized Vocabulary Test from the HSB study.

Ethnicity: the self-identification of being Black, Hispanic, White (not Hispanic), or Other.

Grades: letter grades that are self-reported by students.

Socioeconomic status: a composite score based upon factors of family income, and operationally defined as the SES score on the HSB database.

Summary

The Summary section should briefly summarize all the major areas of focus covered by the first chapter. It synthesizes the chapter without repeating verbatim what is in the chapter. The summary helps a reader, who is unfamiliar with the content area, to superficially examine the material in the chapter. The Summary section is considered optional by some committees; However, to be consistent, if a summary is used in the first chapter, then a summary should appear at the end of each chapter.