

Chapter 3

Problem Identification and Hypothesis Formation

The purpose of Chapter Three is to help you to learn how to come up with a research topic, refine it, and develop a research proposal.

Sources of Research Ideas

Research ideas and research problems originate from many sources. We discuss four of these sources in the text: everyday life, practical issues, past research, and theory. Regardless of the source of your idea, a key point is that you must develop a questioning and inquisitive approach to life when you are trying to come up with research ideas.

- **Everyday life** is one common source of research ideas. Based on a questioning and inquisitive approach, you can draw from your experiences and come up with many research topics. For example, think about what educational techniques or practices you believe work well, or do not work well. Would you be interested in doing a research study on one or more of those techniques or practices?
- **Practical issues** can be a source of research ideas. What are some current problems facing education (e.g., facing administrators, teachers, students, parents). What research topics do you think can address some of these current problems?
- **Past research** can be an excellent source of research ideas. In my opinion (BJ), past research is probably the most important source of research ideas. That's because a great deal of educational research has already been conducted on a multitude of topics, and, importantly, research usually generates more questions than it answers. This is also the best way to come up with a specific idea that will fit into and extend the research literature. For students planning on writing a thesis or dissertation, the use of past research is extremely helpful, and remember to not just look at the variables and the results, but also carefully examine how they conducted the study (i.e., examine the methods).

When you read a research article, it will be helpful for you to think about the ideas shown in Table 3.1.

■ **TABLE 3.1** Ways in Which Prior Studies Can Provide Ideas for New Studies

Method	Rationale
Replication	You might decide that you want to repeat a study to see whether you can replicate the results because you think the author's results have significant educational importance and you want to verify them.
Test the external validity of a study	You might have read a laboratory-based study that has suggestions for important issues such as reading, control of aggression, or improving instruction. You want to find out whether the laboratory methods tested would work equally well in the classroom.
Improve a study's internal validity	In reading a study, you might realize that the study did not control one or more important variables and the lack of control of these variables led to an ambiguous interpretation of the results. For example, Gladue and Delaney (1990) thought that the Pennebaker et al. (1979) study that found that girls in bars got prettier at closing time did not answer the question of whether it was time or alcohol consumption that contributed to the perceptions of attractiveness.
Reconcile conflicting results	In reading the literature on a topic, you might find conflicting results. These conflicting results can lead to a study trying to resolve the conflict. This conflict might be due to different ways in which the studies were conducted, the use of different measurement instruments, or the use of different participant populations. When studies conflict, you need to look for any differences in the studies because these differences might represent the cause of the apparent conflict.
Suggestions for future research	One of the easiest ways to get ideas from past research is to look for the author's suggestions for future research. Often, particularly in review articles, the author(s) of the article will make suggestions for the future direction of the research. These suggestions are frequently quite valid and represent good sources of research ideas.
Theses and dissertations	Theses and dissertations often have a section devoted to future research that will identify subsequent studies that need to be completed.

- **Theory** (i.e., explanations of phenomena) can be a source of research ideas.
 - Can you summarize and integrate a set of past studies into a theory?
 - Are there any theoretical predictions needing empirical testing?
 - Do you have any "theories" that you believe have merit? Test them!
 - If there is little or no theory in the area of interest to you, then think about collecting data to help you generate a theory using the grounded theory technique.

Ideas that Can't Be Researched Empirically

The point in this section is that **empirical** research (i.e., research that is based on the collection of observable data) cannot provide answers to “ultimate,” “metaphysical,” or “ethical” questions. If a question is asking which value is true or correct, empirical research can’t offer the solution. For example, is school prayer good?, Should homosexuals be allowed to legally marry?, Should the teaching of Christianity (and no other religion) be provided in public schools? These are moral and legal issues which cannot be directly addressed or resolved by empirical research in the social or behavioral sciences. John Dewey made the point that empirical research can provide answers about how to get to valued endpoints, but he took the valued endpoints for granted (e.g., democracy, equality, education for all). So do not expect to conduct an empirical research study that will "show whether school prayer **should** be adopted."

Review of the Literature

After you have identified your research idea, and identified a general problem that sounds interesting to you, the next step is to become familiar with the published information on your topic. Conducting a literature review will help you to see if your topic has already been researched, help you to see how you might need to revise your research idea, and show methodological techniques and problems specific to your research problem that will help you in designing a study. Most importantly, after conducting a thorough literature review, your specific research questions and hypotheses will become clearer to you.

A literature review can take a different form in qualitative and quantitative research:

- In **qualitative research** (which often means exploratory research), little prior literature may be available. Furthermore, too much review may make a researcher "myopic." Literature is especially important during the later stages (e.g., interpreting results, discussion) of exploratory research. Still, for much qualitative research, we recommend that a literature review is conducted to see what has been done and to provide sensitizing concepts. Then when data are collected, the researcher can use strategies (discussed in chapter 8) to minimize the researcher’s biases.
- In **quantitative research**, the researcher directly "builds" on past research. Therefore, review of prior research must be done before conducting the study. In quantitative research, the literature review will help you to see if your research problem has already been done, show you data collection instruments that have been used, show designs that have been used, and show theoretical and methodological issues that have arisen.

Sources of Information

There are several major sources of information for you to use when conducting a literature review.

- **Books** is a good starting point. It gives you an overview and a summary of relevant research and theory.

- **Journals** is another excellent source. Journals provide more recent information than books and provide full length empirical research articles for you to carefully examine.
- **Computer databases** are excellent sources for locating information. The most important computer database in education is ERIC. Other important databases are PsycINFO or PsycLIT (for psychological research), SocioFILE and Sociological Abstracts (for sociological research), and Dissertation Abstracts (for summaries of doctoral dissertations in education and related fields). We strongly recommend that you do **not** limit your search to a single computer database. Also, we strongly recommend that you **do not search only for full-text articles** because this will eliminate most of the best published research.

Conducting the Literature Search

In this section, we have included some practical material on conducting the literature search.

- Because ERIC is the most important database in education, we have included a Table (3.4) that shows exactly how to search ERIC. You should access ERIC through your library to get the full version.
- In Table 3.6 we explain how to evaluate the **quality** of Internet resources. It is important for you to understand that the quality of material on the Internet varies widely and it must be evaluated before use.
- Using the Public Internet. The Internet has obviously become extremely important. Below, is a list of some useful subject directories, search engines, and meta-search engines that is from your chapter:

■ **TABLE 3.5** Internet Search Tools

Type of Search	Internet Address
Subject Directory	
Argus Clearinghouse	www.clearinghouse.net
Education Internet Guide	www.library.usyd.edu.au/Guides/
Britannica Internet Guide	www.britannica.com
Librarians' Index	www.lii.org
Open Directory	www.dmoz.org
WWW Virtual Library	www.vlib.org
Yahoo!	www.yahoo.com
Search Engines	
Alta Vista	www.altavista.com
Fast Search	www.alltheweb.com
Ask Jeeves	www.askjeeves.com
Google	www.google.com
HotBot	www.hotbot.com
Lycos	www.lycos.com
Northern Light	www.northernlight.com
Meta-Search Engines	
Dogpile	www.dogpile.com
Metacrawler	www.metacrawler.com
ProFusion	www.profusion.com
Search.com	www.search.com
SavvySearch	www.savvysearch.com
Vivisimo	www.ixquick.com

Feasibility of the Study

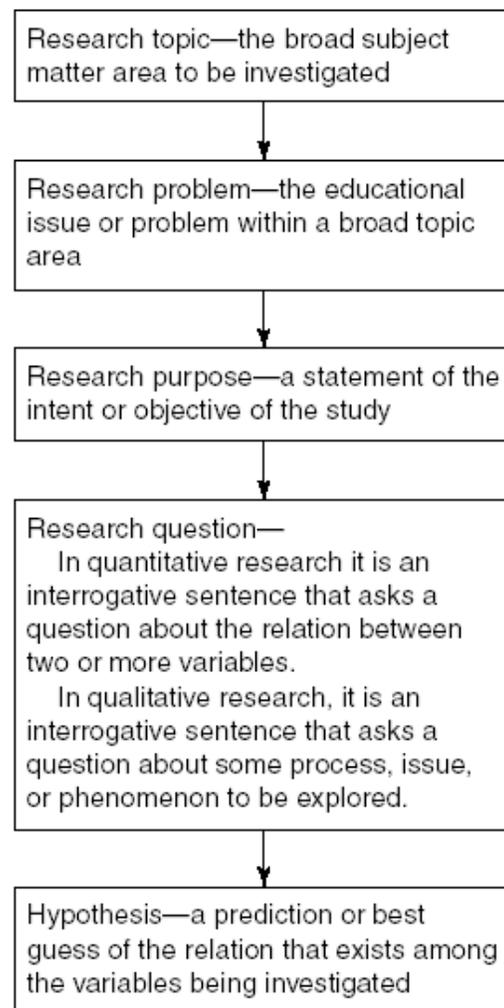
Before deciding whether to carry out your research project, you must decide whether it would be feasible to conduct. You should do this as early as possible so you don't waste your time. This means that you must design a research study that can be carried out given your available resources (e.g., time, money, people). Interviewing all children with ADHD in your state probably would not be feasible for a single research study. Interviewing a set of children with ADHD at your school would be more feasible. Furthermore, part of determining feasibility involves making sure that the study can be carried out ethically. The Institutional Review Board will help you with this decision.

So far we have discussed how to come up with your research topic and how to find the needed information.

As seen in the following figure (Figure 3.1 from your book), after you get your topic, you need to move to determining your research problem, your statement of the purpose of your study, your statement of the research questions, and if you are conducting a quantitative study you will also state need to your hypotheses. Note that movement from the top to the bottom of Figure 3.1 involves a movement from the general to the specific (e.g., a hypothesis is much more specific than a research topic). Also note that as you move from the top to the bottom, you will need to conduct your literature review so that you can determine what specific research questions and/or hypotheses need to be addressed. In fact, it is usually helpful (when conducting basic or applied research) to start your literature review right at the beginning of the process shown in Figure 3.1.

■ **FIGURE 3.1**

Flowchart of the development of a research idea



(Note: to see the full process that is explained in this chapter, we recommend that you also view the concept map for chapter 3 [click here for concept map or go to companion website](#))

Statement of the Research Problem

As seen in the above figure, the research problem is the educational issue or problem within your broad topic area. In other words, you start with your topic and then try to identify one or more research problems that you believe need to be solved in that topic area.

- In quantitative research, research problems tend to emphasize the need to explain, predict, or describe something.
- In qualitative research, research problems tend to focus on exploring a process, an event, or a phenomenon.

Statement of the Purpose of the Study

As seen in the figure, your research purpose follows from the problem you have selected, and it is your statement of your intent or objective for your research study. It is important to include this in your proposals and final reports because it helps orient your reader to your study.

- In quantitative research, the purpose identifies the specific type of relationship being investigated using a specific set of variables.
- In qualitative research, the purpose focuses on exploring or understanding a phenomenon.

Statement of Research Questions

After you have completed your literature review and have digested the literature, you will need to make an exact statement of the specific research questions you want to pursue. This will help ensure that you have a good grasp of what you want to do, it will enable you to communicate your idea to others, and it will help guide the research process (e.g., what variables will be examined, what methods will be needed). A good literature review will logically end with your specific research questions.

- In quantitative research, a research question typically asks about a relationship that may exist between or among two or more variables. It should identify the variables being investigated and specify the type of relationship (descriptive, predictive, or causal) to be investigated. For example: What effect does playing football have on students' overall grade point average during the football season?
 - We have included **scripts** for writing quantitative research questions in Table 3.7.
- In qualitative research, a research question asks about the specific process, issue, or phenomenon to be explored or described. For example: What are the social and cultural characteristics of a highly successful school where students and teachers get along well and students work hard and achieve highly? Here is another research question: How does the social context of a school influence preservice teachers' beliefs about teaching? Here is another: What is the experience of a teacher being a student like?

Formulating Hypotheses

- If you are conducting a quantitative research study, you will typically state your specific hypotheses that you have developed from your literature review. A *hypothesis* is the researcher's prediction of the relationship that exists among the variables being investigated.
- If you wrote a research question, the hypothesis will be your tentative answer to your question. For the quantitative research question stated above (i.e., What effect does playing football have on students' overall grade point average during the football season?) the related hypothesis might go like this: Students who play football during the football season will experience a decrease in their GPAs as compared to students not playing football.
- Unlike in quantitative research (where hypotheses are stated before collecting the data), hypotheses in qualitative research are often generated as the data are collected and as the researcher gains insight into what is being studied.

The Research Proposal

After you have identified your research idea, reviewed the research literature, determined the feasibility of your study, made a formal statement of the research questions (and hypotheses for a quantitative study), you are ready to develop a research proposal to guide your research study.

It is essential that you develop your research proposal before conducting a research study. This will force you to carefully spell out the rationale for your research study, and it will make you think about and specify each step of your study.

Here are the major sections for a typical research proposal:

Title Page

Abstract

Introduction

- Include a statement of the research topic.
- Include a statement of the research problem(s)
- Include a summary of the prior literature.
- Include the purpose of the study.
- Include the research question(s)
- Include the hypotheses for quantitative studies

Method

- Research Participants
- Apparatus and/or Instruments
- Procedure

Data Analysis

References

The following briefly explains what goes in the major sections just shown:

I. Introduction

This section is "V shaped," moving from general to specific. It includes a statement of the topic, problem, and purpose. It includes a discussion of the prior relevant research. Finally, it ends with the research questions and hypotheses of the study.

II. Method

This section typically includes a discussion of the following:

- The research participants (e.g., Who are they?, What are their characteristics?, How many will there be?, Where are they located?, How will they be selected? What kind of response rate are you planning for?).
- The apparatus (e.g., is any special equipment needed for your study?).
- The instruments to be used in the study (i.e., What are your specific variables and how will you measure those variables?, What specific data collection instruments will you use?, What kinds of reliability and validity evidence is available for the instruments?, Why are the instruments appropriate for your study and your particular participants?).
- The procedure (this is a narrative outline of the specific steps you intend to follow to carry out your data collection; it should be clear enough for someone to replicate your study). A section on design is sometimes included (often in the procedure section), describing the research design used (e.g., a nonequivalent comparison group design or a longitudinal design).

III. Data Analysis

This section includes a discussion of how you intend on organizing and analyzing the data that you collect.

- Quantitative studies use statistical data analysis procedures (e.g., ANOVA and regression).
- Qualitative research studies are based on inductive data analysis (e.g., searching for categories, patterns, and themes present in the transcribed data).

Note that some research proposals include a separate section or "Chapter" for the literature review (especially dissertations). Also, some prefer to include the data analysis section in the Method section. For example, the research proposal for a dissertation might include the following three chapters:

1. Introduction
2. Literature Review
3. Method

Consumer Use of the Literature

Frequently there will be no need to conduct an empirical research study because the necessary research will have already been done. In other words, many times, only a literature review will be needed to answer your questions.

- We have provided checklist for evaluating research studies in Tables 3.8 and 3.9. These will help you to evaluate each study you review.

Don't forget this point that we want to continue to emphasize: never place too much confidence in a single research study. That is, you should place much more confidence in a research finding that has been replicated (i.e., shown in many different research studies).

- Because of the importance of viewing the full set of studies on an issue and the built in benefit of replication when this is done, you can see why we recommend that you pay special attention to meta-analyses when you find them in your literature searches.
- A *meta-analysis* is a quantitative technique for summarizing the results of multiple studies on a specific topic. It will tell you if a variable consistently has been shown to have an effect as well as the average size of effect.