Research Method & Design

DCE 5900

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MODUL PEMBELAJARAN: DCE 5900 RESEARCH METHOD AND DESIGN disediakan dalam bentuk bahan pengajian dan pembelajaran kendiril di bawah program Pendidikan Jarak Jauh, Universiti Putra Malaysia. Sebarang pertanyaan dan cadangan untuk memperbaiki gaya penyampaian dan isi kandungan modul ini boleh diajukan kepada penulis dengan menggunakan alamat Pusat Pendidikan Luar.

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43400 UPM Serdang
INTRODUCTION

Contact Procedure

Enquiries concerning the teaching of this subject, the administration of your enrolment can be obtained by following the appropriate procedure explained below.

Academic Enquiries

Any questions concerning the teaching of this subject can be made by contacting your lecturers at:

UPM, ph. no: 03-9486101 (10 lines)

• ext. 2213 (AA), 2217 (MI)

Fax no: 03-945 0455

E-mail: Assoc. Prof. Dr. Aminah Ahmad:

Aminaha@acc.upm.edu.my

Assoc. Prof. Dr. Maimunah Ismail:

mismail@acc.upm.edu.my

Enrolment Enquiries

For enquiries about your enrolment, grades, or fees, please contact the Institute for Distance Education and Learning (IDEAL) at:

Ph. no: 03-9486101 (10 lines) ext. 2956 (Dr. Azizan Asmuni)
COURSE OUTLINE

CODE : PP 510

COURSE: RESEARCH METHOD AND DESIGN

Welcome

Welcome to the subject PP 510: Research Method and Design. The course is designed to provide you with an understanding of the research process so that you will be able to prepare a research proposal and conduct the research. At the end of the course you should also be able to understand and evaluate research conducted by others.

The Module Writers

This subject module has been written by Assoc. Prof. Dr. Aminah Ahmad, Assoc. Prof. Dr. Maimunah Ismail, and Dr. Shamsuddin Ahmad from the Department of Extension Education, Faculty of Educational Studies, UPM.

Introduction

Unlike unskilled workers who are told what to do and how to do their work, professionals must plan for themselves. It is assumed that they have the knowledge and skills necessary to make valid decisions about what to do and how to do it. But, how are educators to know what is the right answer in a particular situation?
Although there are other resources of knowledge, such as experience, authority, and tradition, it is scientific knowledge that makes the most valuable contribution to decision making in your profession.

**Course Aims**

After completing the course, the student will be able to:

1. Understand and evaluate research conducted by others
2. Prepare a research proposal and conduct research

**Course Objectives**

After completing this course you should be able to:

- Explain the meaning of research
- Identify the steps in a research process
- Explain the steps in a research process
- Identify a research problem
- Develop research objectives and hypothesis
- Develop measurements for research variables
- Describe the meaning, rationale and steps involved in sampling
- Choose appropriate data gathering method
- Identify appropriate data analysis procedure
- Interpret findings and write research report
Required Texts


Recommended Readings


Residential Requirements

You are required to meet the lecturers at least four times during the semester. The meeting dates are in the Study Schedule on page 7.

Assessment Procedures

Your performance in this course will be assessed by your ability to develop a research proposal and critique research articles. The assessment will be based on four sets of compulsory assignments.

For Assignments 1, 2, and 3 you are required to develop three chapters for the research proposal. For Assignment 4 you need to critique two research articles.
published in scientific journals. Each of the three chapters worth 30% and the critiques of two research articles are worth 10%.

For each assignment, a due date will be noted. Failure to submit one piece of assigned work will lead to the awarding a F (Fail) grade. Your grade will be based on the total marks of the four assignments using the following grading scheme:

\[\begin{align*}
80 - 100 & = A \\
75 - 79 & = B+ \\
65 - 74 & = B \\
55 - 64 & = C+ \\
45 - 54 & = C \\
40 - 49 & = D \\
39 and below & = F
\end{align*}\]

Submission of Assignments

All assignments should be accompanied by a complete assignment cover sheet and should be mailed or e-mailed to the lecturer at the following address:

IDEAL
(Assignment Section)
Universiti Putra Malaysia
43400 UPM, Serdang
Selangor
(Att: Assoc. Prof. Dr. Aminah Ahmad or Assoc. Prof. Dr. Maimunah Ismail)
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PP 510
RESEARCH METHOD AND DESIGN

SECTION 1
INTRODUCTION TO RESEARCH
# SECTION 1

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Learning Objectives

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LEARNING OBJECTIVES

After completing this module you will be able to:

1. List the four major sources of knowledge and comment on each source
2. Describe the characteristics of the scientific approach
3. Identify the types of research and explain their purposes
4. Identify and explain the steps in a research process
5. Define a research problem
6. Identify sources of research problem
7. State the criteria used for evaluating a research problem
8. Evaluate a given research problem
9. Identify the population and variables
TOPIC 1
RESEARCH AS A SCIENTIFIC APPROACH

Introduction

This topic introduces concept of research as a scientific approach and the relevance of this approach to the search for knowledge. It also includes characteristics of research and types of research as well as the purpose of each research type.

What Is Research?

1. It involves the gathering of new data or using existing data for solving a problem.
2. A systematic investigation to increase knowledge and understanding, always applying rigorous logical analysis.
3. A discipline guided by both the technique and philosophy of science.
4. Research places emphasis upon the development of sound theories or upon the discovery of general principles that will be helpful in predicting future occurrences.
Through these conceptualizations we can arrive at a common understanding about research -- Research is a systematic process by which data are gathered and analyzed through carefully designed procedures to generate new knowledge and solve an identified problem.

**Sources of Knowledge**

One could acquire knowledge through many ways. Some of the ways are through personal experiences, tradition, expert opinions, and the scientific approach. Experiences and traditions suggest possible ways to proceed in inquiring knowledge but the answers they provide are not always reliable. Experience is subject to personal interpretation which can vary depending on situation and perception. Likewise, tradition can be fallible since it is inherited based on personal opinions of other people through generations. Experts have shortcomings too. No expert, however, has studied or experienced all there is to know in a given field, and thus can never be totally sure.

Given the drawbacks in these three approaches the most reliable alternative in acquiring knowledge is through a more
systematic and empirical means using inductive-deductive method, or the scientific approach.

**Nature of Science**

Science refers to a systematic knowledge of natural or physical phenomena. There are two essential elements in science toward arriving at truth; rationality and observation. Truth can be ultimately derived from observation, experiment, and logical induction and deduction. A fundamental assumption of the scientific approach is that events investigated are lawful and predictable.

**Characteristics of Research**

The characteristics of research are summarized as follows (cited in Miller, undated)

1. Research involves gathering new data or using existing data for a new purpose from primary or first-hand sources. Teachers frequently assign a so-called ‘research project’ that involves writing a paper dealing with the life of a prominent person. The students are expected to read a number of encyclopedias, books, or periodical references and synthesize the information
in a written report. This is not research, for the data are not new. Merely reorganizing or restating what is already known and what has already been written is not research, valuable as it might be as a learning experience. It adds nothing to what is known.

2. Research is directed toward the solution of a problem. A problem states a relationship between two or more variables. One variable may be an effect. Research always involves an analysis of the relationships between causes and effects which imply the possibilities of empirical testing. Certain interesting problems do not lend themselves to research procedures because they are metaphysical; they cannot be tested empirically. Research rejects revelations and dogma as methods of gaining reliable knowledge and accepts only what can be verified by observation. Research is more than information retrieval -- the simple gathering, computation and organization of statistical information. Although many school research departments gather and tabulate factual information that may
be useful in decision making, these activities are not properly termed research.

3. Although research activity may, at times, be somewhat unsystematic, it is more often characterized by carefully designed procedures, always applying rigorous logical analysis. Although trial and error are often involved, research is rarely the result of blind shotgun investigation -- trying something to see what happens.

4. Research places emphasis upon the development of sound theories or upon the discovery of general principles that will be helpful in predicting future occurrences. Research goes beyond the specific objects, groups, or situations investigated, and infers qualities of a target population from those observed in a sample group.

5. Research requires expertise. The researcher knows what is already known about the problem under investigation. He or she has researched the related literature carefully. He or she is
thoroughly grounded in the terminology, the concepts, and the technology necessary to understand and analyze the problem.

6. **Research** involves accurate observation and description. The researcher uses quantitative, numerical measuring devices, the most precise means of description. He or she selects or devises valid data-gathering instruments, and employs appropriate mechanical, electronic, or psychometric devices to improve on the accuracy of human observation, recording, computation, and analysis of data.

7. Research is logical and objective, applying every possible test to validate the procedures employed, the data collected, and the conclusion reached. The researcher strives to eliminate personal feeling and bias. There is no attempt to persuade or to prove an emotionally-held conviction. The emphasis is on testing (probing) rather than on proving the hypothesis. Although absolute objectivity is probably as elusive as pure righteousness, the researcher tries to suppress bias and emotion in the analysis.
8. Research is characterized by patient and unhurried activity. Research is rarely a spectacular activity and the researcher must expect disappointment and discouragement in pursuing the answers to difficult questions. The researcher must suspend judgment to permit the logical analysis of data to lead to sound conclusions.

9. Research sometimes requires courage. The researcher must be willing to follow procedures to conclusions that may be unpopular and that may bring social disapproval. The Polish scientist Copernicus (1473 - 1543) was condemned by church authorities when he announced his conclusion concerning the nature of the solar system. His theory that the sun, not the earth, was the center of the solar system, in direct conflict with the older Ptolemaic theory, angered supporters of prevailing religious dogma, who viewed his theory as a denial of the story of creation as described in the book of Genesis.

10. Research is carefully recorded and reported. Every important term is carefully defined, limiting factors are recognized,
procedures are described in detail, references are carefully documented, results are faithfully recorded, and conclusions are presented cautiously and with scholarly restraint. The written report with accompanying data is made available for the scrutiny for associates or other scholars. Any competent reader of the report will have the information necessary to analyze and evaluate the process and the conclusions reached. The report will be presented in sufficient detail so the investigation could be replicated for the purpose of verification.

**Types of Research**

Generally there are five general types of research. Each has its own purpose. The types are:

1. Descriptive
2. Relational
3. Experimental
4. Quasi-experimental
5. Qualitative
The purpose of descriptive research is to become familiar with a phenomenon, to gain new insight, or to portray status and characteristics of a group or situation. The types of descriptive research includes survey, developmental study, follow-up study, documentary analysis, historical, and trend analysis.

Relational studies include correlational and causal-comparative research. Correlational studies are concerned with determining the relationship(s) existing among variables. Causal-comparative research determines the cause for or consequences of a phenomenon that already has taken place. This research is also called the ex-post-facto research.

An experimental research establishes different treatments and then studies their effects. In this research the researcher controls one or more independent variables and observes the effect of these manipulations on the dependent variable(s). When full control over the scheduling of experimental conditions and randomization cannot always be realized, then one has to resort to quasi-experimental research.
Qualitative research is an inquiry mode that emphasizes description, induction, grounded theory, and the story of people’s understanding. As the term implies, qualitative research does not primarily deal with numbers as data and in analysis of data. The main purpose of qualitative inquiry is to “seek for insight, discovery, and interpretation rather than hypothesis testing” (Merriam, 1988, p. 10). In another words, qualitative research seeks meaning of a phenomenon for those involved in depth rather than in breadth. The approach concerns with understanding the behavior and how people make sense out of their lives. Some characteristics of qualitative research are as follows (Merriam, 1988, p. 19-20):

1. Qualitative researchers are concerned primarily with **process**, rather than outcomes or products.

2. Qualitative researchers are interested in **meaning** -- how people make sense of their lives, experiences, and their structures of the world.

3. The qualitative researcher is the **primary instrument** for data collection and analysis. Data are mediated through this human instrument, rather than through inventories, questionnaires, or machines.
4. Qualitative research involves fieldwork. The researcher physically goes to the people, setting, site, or institution to observe or record behavior in its natural setting.

5. Qualitative research is descriptive in that the researcher is interested in process, meaning, and understanding gained through words or pictures.

6. The process of qualitative research is inductive in that the researcher builds abstractions, concepts, hypotheses, and theories from details.
TOPIC 2

THE RESEARCH PROCESS

Introduction

Topic 2 of Section 1 introduces the process of scientific research covering components such as research problem, methodology, and findings. One has to familiarize with these components before embarking on a research. This section gives an overview of the entire research process and the research proposal outline.

Overview of Research Process

1. Identifying research problem
2. Review of literature
3. Objectives and hypotheses
4. Measurement of variables
5. Validity and reliability
6. Research Instrument
7. Population and sampling
8. Data gathering
9. Data analysis
10. Interpreting results

11. Report writing

**Research Proposal**

It is a document or blueprint prepared prior to conducting a research. The purposes are to justify the rationale for the research and planning for the design, budgeting, and resource utilization.

**Research Proposal Outline**

- Cover Page
- Table of Contents
- Chapter 1- Introduction (Needs for the study, justification)
  - Problem Statement
  - Objectives/ Research Questions/ Hypotheses
  - Significance of the Study
  - Assumptions and Limitations
  - Definition of Terms
Chapter 2 - Review of Literature

(It gives an account of what is already known and relevant in the area of interest. It serves in defining the frontiers of the research area and placing the research questions in perspective).

Chapter 3 - Methodology

Research Design
Population and Sampling
Instrumentation
Data Gathering
Data Analysis
TOPIC 3
RESEARCH PROBLEM

Introduction

This topic discusses one of the most important aspects of research in any field. It covers the nature of the problem, sources of problem, evaluation of the problem, and statement of the problem.

Nature of Problem

A research problem is a gap in knowledge about a phenomenon that one wishes to describe or an event that one attempts to explain or find a solution. The research problem is often phrased as a question that needs to be answered. The process of problem identification involves refining and narrowing the topic of interest.

Sources of Problem

The first question most students ask is “How do I find a research problem?” Although there are no set rules for locating a problem, certain suggestions have been found to be helpful. Three
important sources of problems are experience, deductions from theory, and related literature.

Everyday experience is a useful source of a research problem. Most of the research ideas developed by researchers tend to come from their personal experiences. For instance a researcher with an interest in human resource development encounters a problem with regard to the effectiveness of a training program conducted in his or her organization. This serves as a source of problem for investigation.

The deduction that can be made from various theories with which the researcher is familiar. This provides an excellent source of problem. There are learning theories, personality theories, sociological theories, psychological theories, theories of social development and many others, whose validity, scope, and practicality might be justifiably tested in social situations. Similarly in the field of training, learning theories could be tested in training situations and this serves as a useful starting point for research.
Another valuable source of a research problem is the literature in one's own area of interest. In reading about previous research, we are exposed to gaps in knowledge or research problems that need further attention. These are often suggested by previous researchers.

Evaluating the problem

There are certain criteria which should be considered in the process of evaluating the significance of a problem. A research problem should be one whose solution will make a contribution to the body of knowledge in a particular field. It should be one that will lead to a new problem and to enhance further research. Another criteria is that the problem must be one that is researchable. Also, the problem must be suitable for the particular researcher, in terms of his/her interest (i.e. researcher's knowledge, feasibility of doing the research, and is achievable within the allotted time).

Statement of problem

A good statement of problem must clarify exactly what is to be determined or sought and restrict the scope of the study to a specific question. Novice researchers often have a general idea of the problem
but have trouble formulating it as a workable research question. In stating the problem the researcher must strive for a balance between generality and specificity. The problem must not be so narrow that it becomes trivial and meaningless. One wants a problem that is broad enough to be significant yet specific enough to be feasible in one’s particular situation. A problem should be stated in such a way that research into the question is possible. Avoid philosophical issues, as well as value or judgemental questions that can not be answered by scientific investigation. The development of a workable problem is an evolutionary process involving many attempts to sharpen concepts, defines operation, and consider ways of collecting data.

**Identifying the population and variables**

A good strategy for shaping a felt problem into a researchable problem is to think it in terms of population and variables. Population refers to those people about whom one wishes to investigate the research problem. The specific nature of the population depends on the purpose of the investigation. For instance, if the investigation is on the effectiveness of extension training
program for agricultural development agencies in Malaysia, therefore, the population of the study will be extension agents attached to all agricultural development agencies.

In stating the problem one has to identify the variables (characteristics or attributes) of the population that one wishes to study. Examples of variables include the effectiveness of the training program, the training design, the training methodology, teaching and learning technologies, etc. Variables can be classified into dependent and independent variables. Depending on the nature of the study, for example in the causal relationship study, there are dependent and independent variables. On the other hand, an exploratory study, describing the approach used in extension delivery system, does not have dependent and independent variables.
REQUIRED READING


REVIEW QUESTIONS

1. Among the four approaches of acquiring knowledge which is the most reliable approach? Give reasons for your choice.
2. List 10 main characteristics of research.

3. Based on your research problem and objectives, which type of research would you engage in? Please justify your choice.

4. A research problem can come from one of the three sources, experience, theory and related literature. How have you located your research problem? Explain.

5. What are the criteria you would use in evaluating the significance of your research problem?

6. Based on your research problem, identify the population and variables for your research.

ASSIGNMENT

Assignment 1

Write Chapter 1 of your research proposal. Include the following: Background, Problem Statement, Objectives, Limitation of the Study, Assumptions, and Significance of the Study.

REFERENCES


Ary D. Jacobs L. C., & Razavieh, A (1990) *Introduction to*


Miller, L. E. (Undated). AGR. EDU 885: Research methods. The Ohio State University.
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SECTION 2
### SECTION 2

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LEARNING OBJECTIVES

When you have completed this module you will be able to:

1. Formulate a research question
2. Explain the meaning of research objective
3. Define a hypothesis
4. State the usefulness of conducting review of related literature
5. Identify types of measurement of variables
6. Define validity and reliability, and the significance of these concepts in research
TOPIC 1

RESEARCH QUESTIONS, OBJECTIVES, AND HYPOTHESES

Research Questions

Questions arising from the research problem can be used for the basis for formulating research objectives as well as postulating hypotheses. Both objectives and hypotheses give the direction to the research design in terms of what procedure to follow, the type of data to gather, and interpretation of the data. Research questions serve as the focus of the researcher's investigation. In correlational research a research question phrases the relationship between two or more variables in question form. Research questions must be realistic and researchable.

Research Objectives

Research objectives should be written in specific forms. A statement of objective should include the variables to be investigated. If relationships are to be investigated, specific objectives which indicate clearly the variables to be studied must be developed. Variables which are to be related need to be clearly indicated. The
objectives also indicate the nature of the relationship between variables.

**Research Hypotheses**

Hypothesis is a statement predicting the possible outcomes of a study. It could be in the form of stating the relationship between variables. A hypothesis is often stated following a research question. Although a hypothesis is a powerful tool in any scientific inquiry, depending on the research design, a research hypothesis is not absolutely essential. If investigators lack insight into the scope of the problem, the major variables that influence a phenomenon, or the setting in which the variables occurred, then it is very difficult to state a meaningful hypothesis.

**The Purposes of Hypothesis**

1. It provides a tentative explanation of a phenomenon
2. It facilitates the extension of knowledge in an area through testing and validation.
3. It provides the investigator with a relational statement that is directly testable in a research study.
4. It provides direction to the research
5. It provides a framework for reporting the conclusions of the study.

Hypotheses can be stated in the null or directional form. A null hypothesis is a hypothesis of no difference or no relationship between the variables. Whereas a directional hypothesis predicts the difference or direction of the relationship between the variables.
TOPIC 2
REVIEW OF RELATED LITERATURE

The review of related literature involves reading, locating, evaluating, and synthesizing the information obtained from the research report. The search for related literature should be carried out before the actual conduct of the study begins. It serves several important functions:

1. A knowledge of related research enables the investigators to define the frontiers of their field.

2. A thorough review of related theory and research enables researchers to place their questions in perspective.

3. Reviewing related literature helps researchers to limit their questions and to clarify and define the concepts of the study.

4. A critical review of related literature often leads to insight into the reasons for contradictory results in an area.

5. Through studying related research, investigators learn which methodologies have proved useful and which seems less promising.
5. A thorough search through related research avoids unintentional replication of previous studies.

7. The study of related literature places researchers in a better position to interpret the significance of their own results.

The Search Process Involves the following steps:

1. Listing of key words
2. Checking preliminary sources
3. Reading and noting selected references

Listing of Key Words

It is necessary that the researcher identifies key words related to his or her topic so that he or she may look up these key words in the index to locate sources of information related to the topic. Key words are useful in literature search using the computer. Key words provide a starting point, and as many possible key words as the student can think of should be listed in order to reduce the likelihood of important studies being overlooked.
Checking preliminary sources such as indexes and abstracts that are intended to help one identify and locate research articles and other primary sources of information. For example, Education Index, Psychological Abstracts, Educational Resources Information Center (ERIC); Agriculture Research Index (AGRIS), etc.

**Reading and Noting Selected References**

Certain guidelines in reading and noting selected references may be applied:

1. Begin with the most recent studies in your field and work backward through earlier volumes.
2. Read the abstract or summary section of a report first to determine whether it is relevant to your research question.
3. Define the limits of the review. Too broad a search will overwhelm you with materials; too narrow a topic might make you overlook related work or not find enough material.
4. Before taking notes, skim the report quickly to find those sections that are related to your research question. To develop a pool of a relevant source use bibliography of those sources.
5. Make notes directly on file cards as they are easier to sort and
organize, than on sheets of paper or others.

6. Write a complete bibliographic reference for each work.

7. To facilitate sorting and organizing, do not put more than one reference on each card.

8. Be sure to indicate which parts of the notes are direct quotations from the authors and which are your own paraphrases.

9. If online database searching has been conducted, keep your search strategies on file.

10. Continue the search until the sources are saturated and you feel you are in command of the topic.

**Writing Review of the Literature**

The chapter on literature review is meant to give the readers an understanding of previous relevant contribution to the problem so that they can better understand why the current research project is carried out. Before actual writing you should prepare a rough outline. The note cards should be sorted into major topics contained in the outlines. Not all sources should be reported in detail. Two or three pertinent and carefully carried out research can serve as a
foundation for each major topic of the outline. These sources can be described in some detail. Other studies related to the topics can be used to support these main sources. Literature under the major topics should be organized into a unified picture of the state of knowledge in the area reviewed. A well-organized review of literature should include the researcher's own insightful interpretation which is of value to the reader but also help the researcher to develop his or her understanding of the field. Avoid an 'article by article' presentation of the sources and excessive quotation in the review of the literature.
The design of research in social science can be divided into five categories depending on the purpose of the research.

1. Descriptive
2. Relational
3. Experimental
4. Quasi-experimental
5. Qualitative

Descriptive Research

The purpose of descriptive research is to become familiar with a phenomenon, to gain new insight, to formulate a more refined research problem or hypothesis, or to portray status and characteristics of a group or situation. There are several types of descriptive research. These include survey, developmental study, follow-up study, documentary analysis, historical, and trend analysis.
Among the most common types of descriptive research is the survey method. This method is frequently used for research in the field of sociology, psychology, political science, education, and management. Usually, survey research does not involve the testing of hypotheses about the relationship between variables. Consequently, variables are not identified as independent or dependent since they are used to describe status only.

Using survey research, it is possible to collect a wide scope of information from a large information through sampling. This type of research deals with a real situation and data are collected in the actual situation. It can serve as a first step in developing hypotheses or in identifying more specific problems for research that goes beyond description only. The survey method is usually more extensive than intensive especially if the data are collected by mailed questionnaire.

Developmental research comprises longitudinal and cross-sectional methods. In the longitudinal approach, the same sample of subject is studied over an extended period of time. This method allows for intensive studies of individuals because the investigator
accumulates data for the same subjects at various periods of time. However, this type of research has some practical difficulties. It demands high commitment for an individual or institution willing to spend time, money, and other resources for several years before completing the project. Keeping up the subject who moves may become difficult. In some cases too, it proves difficult to maintain the cooperation of subject for an extended period.

The cross-sectional research, unlike the longitudinal research, studies subject of some different characteristics at the same point in time. One major disadvantage of this type of research is that differences between samples due to chances may seriously bias the result. However, it is usually possible to obtain a larger sample for cross-sectional study than can be obtained for the longitudinal studies. The advantages of this large sample, may in many cases, outweigh disadvantages of the cross-sectional approach. Another disadvantage of a cross-sectional approach lies in the possibility of extraneous variables creating differences between the population sample.
The follow-up study to certain extent is similar to the longitudinal method. Studies of this type are concerned with investigating the subsequent development of a subject after a specified treatment or program. This type of research is frequently conducted to evaluate the success of a particular program.

Documentary or content analysis is a procedure for systematically analyzing information obtained from records, documents, visuals, and audio tapes. It involves the process of identifying, coding, categorizing the primary patterns of data. This type of research is time consuming and requires a great deal of patience and attention to detail.

Historical research is a study of the past either by reviewing documents of the period or by interviewing individuals who lived during the period. An attempt is then made to reconstruct as accurately as possible what happened during that time and to explain why it did. Historical research, too, is limited to contents of documents, written records, oral recording, artifacts (e.g., portraits, paintings, and films) that are available for the particular period of
time. Historical research can only establish facts and arrive at conclusions based on witnesses’ memory.

Trends studies involve specifying a population, drawing a representative sample, and obtaining measures on certain variables. At later times that same population is sampled again and the measures are repeated. This design permits changes in the variables to be identified. The researchers would then compare responses from year to year to determine what trends were present.

**Relational**

Relational studies include correlational and causal-comparative research. Correlational studies are concerned with determining the relationship(s) existing among variables. In this research one collects measures on at least two variables for the same groups of subjects and then calculate coefficient of correlation between the measures. It involves no intervention or manipulation on the part of the researchers other than that required to administer the instrument necessary to collect the data desired.
Causal-comparative research determines the causes for or the consequences of a phenomenon that already has taken place. This research is sometimes called ex-post facto research. It is often used instead of experimental method because many of the cause-and-effect relationships that we wish to study in social science do not permit experimental manipulation.

**Experimental**

A researcher in an experimental research establishes different treatments and then studies their effects. In this research the researcher controls one or more independent variables and observes the effect of these manipulations on the dependent variable or variables. The researcher develops and tests one or more hypotheses stating the nature of the expected relationship. In this research, subjects are randomly assigned to different treatments, either individuals or groups, so that each subject has an equal probability of being selected.

**Quasi-experimental**

This research is used where true experimental designs are not
possible. In this type of research, neither full control over the scheduling of experimental conditions nor the availability to randomize can always be realized. Because the quasi-experimental research does not provide full control, it is extremely important that the researcher be aware of the sources of both internal and external validity and consider these sources in the interpretation.

Qualitative Research

We have been conditioned to think of research as a process that uses an instrument, involves a large number of people, and is analyzed by reducing the data to numbers. This type of inquiry is termed quantitative research. However, there is another mode of inquiry termed qualitative research.

Qualitative research questions are framed to seek meaning and understanding with respect to how people make sense of their lives, what people experience, and how they structure their social worlds. It permits an in-depth and detailed study of selected issues, cases, or events. In addition, qualitative research seeks to understand the perceptions, feelings, and knowledge of people.
In general, the qualitative research uses a humanistic cast in understanding social reality. Social life is a shared creativity of individuals which produces multiple realities in the shifting, changing, and dynamic social world. People are actively producing and making sense of these realities. The variables are complex, interwoven, and difficult to measure. A holistic perspective must be used in order to understand the complex interconnectedness of the whole phenomena.

Qualitative data are collected in a variety of methods. To increase the trustworthiness of data, qualitative researchers normally use multiple sources of data collection strategies. The approach is called ‘triangulation.’ Some of the methods use in data gathering are participant observation, interviews, and document collection. The main purpose of data analysis in qualitative research is to communicate the findings to the readers as clear as possible. Data analysis begins when data are collected. There are a few known techniques used in qualitative data analysis, however, in general there are no absolute rules except to be most ethical in communicating what the data reveal given the purpose of the study.
Each qualitative research is unique therefore the analytical approach used will be unique. It depends on the skills, training, insights, and capabilities of the researcher. "The human factor is the great strength and the fundamental weakness of qualitative inquiry and analysis" (Patton, 1990, p. 372)

Qualitative data were collected and presented directly from the respondents in the forms of actual words, spoken or written. Direct quotations are used to ensure that the respondents' personal perspectives and experiences were captured and understood. These types of data are called 'soft' because they are rich in description of people, places, and conversations. The findings are presented through the concept of 'thick description.' This is a comprehensive description of close detail of phenomena in a holistic account of social life. In this way, the narrative results will make the phenomena accessible, tangible, and imaginable (Glesne & Peshkin, 1992).

Because quantitative approach is more popular, the two approaches are frequently compared and contrasted. Both methods do use similar elements. For examples both state a research objective, problem statement, define a research population, collect
and analyze data, and present the findings. Nonetheless, the differences between the two hinges on how researchers go about putting those elements together. Table 1 presents some fundamental differences between quantitative and qualitative approach.

<table>
<thead>
<tr>
<th>Quantitative Mode</th>
<th>Qualitative Mode</th>
</tr>
</thead>
<tbody>
<tr>
<td><strong>Assumptions</strong></td>
<td></td>
</tr>
<tr>
<td>Social facts have an objective reality</td>
<td>Reality is socially constructed</td>
</tr>
<tr>
<td>Primacy of method</td>
<td>Primacy of subject matter</td>
</tr>
<tr>
<td>Variables can be identified and relationships measured</td>
<td>Variables are complex, interwoven, and difficult to measure</td>
</tr>
<tr>
<td>Etic (outsider’s point of view)</td>
<td>Emic (insider’s point of view)</td>
</tr>
<tr>
<td><strong>Purpose</strong></td>
<td></td>
</tr>
<tr>
<td>Generalizability</td>
<td>Contextualization</td>
</tr>
<tr>
<td>Prediction</td>
<td>Interpretation</td>
</tr>
<tr>
<td>Causal explanations</td>
<td>Understanding actors’ perspectives</td>
</tr>
<tr>
<td><strong>Approach</strong></td>
<td></td>
</tr>
<tr>
<td>Begins with hypotheses and theories</td>
<td>Ends with hypotheses and grounded theory</td>
</tr>
<tr>
<td>Manipulation and control</td>
<td>Emergence and portrayal</td>
</tr>
<tr>
<td>Uses formal instruments</td>
<td>Researcher as instrument</td>
</tr>
<tr>
<td>Experimentation</td>
<td>Naturalistic</td>
</tr>
<tr>
<td>Deductive</td>
<td>Inductive</td>
</tr>
<tr>
<td>Component analysis</td>
<td>Searches for patterns</td>
</tr>
<tr>
<td>Seeks data to numerical indices</td>
<td>Makes minor use of numerical indices</td>
</tr>
<tr>
<td>Abstract language in write-up</td>
<td>Descriptive write-up</td>
</tr>
</tbody>
</table>

Table 1. Predispositions of Quantitative and Qualitative Research*
<table>
<thead>
<tr>
<th>Quantitative Mode</th>
<th>Qualitative Mode</th>
</tr>
</thead>
<tbody>
<tr>
<td><strong>Researcher Role</strong></td>
<td><strong>Researcher Role</strong></td>
</tr>
<tr>
<td>Detachment and impartiality</td>
<td>Personal involvement and partiality</td>
</tr>
<tr>
<td>Objective portrayal</td>
<td>Empathic understanding</td>
</tr>
</tbody>
</table>

TOPIC 4

MEASUREMENT OF VARIABLES

A variable is a characteristic or an attribute by which a person or an object can be described. It reflects or expresses some concepts or constructs. A variable takes on different values. It can change from time to time for a given individual or object, or vary from person to person or from object to object.

Types of Variables

There are several ways of classifying variables. Variables can be categorical or they can be continuous. When subjects are classified by sorting them into groups, the attribute on which the classification is based is termed a categorical variable. Occupation, gender and marital status are examples of categorical variables.

When an attribute has an infinite number of values within a range, it is called a continuous variable. Height, weight, age, and performance test scores are examples of continuous variables. The most important classification of variables is on the basis of their use
within the research under consideration. This classification includes independent variables and dependent variables. Variables that are antecedent to the dependent variable are called independent variables. Variables that are a consequence of or dependents upon antecedent variables are called dependent variables.

The dependent variable is the phenomenon or object of study and investigation. For example, job satisfaction can be a dependent variable. The independent variable is the factor that is measurably separate and distance from the dependent variable, but it may relate to the dependent variable. Job characteristics such as job autonomy and task variety are examples of independent variables that may relate to the dependent variable, job satisfaction.

In experimental research, the independent variable is the variable that is manipulated or changed by the experimenter. The variable upon which the effects of the manipulation are observed is called the dependent variable.
It is possible for a variable to be an independent variable in one study and a dependent variable in another. Whether a variable is considered independent or dependent is determined by the research question and purpose of the study.

**Scales of Measurement**

Measurement is the assignment of numerals to objects or events according to rules. Measurement can be classified into four scales: nominal, ordinal, interval, and ratio.

Nominal scale is the most primitive scale of measurement. Nominal measurement involves the placing of objects or individuals into categories that are qualitatively different. This measurement requires that one be able to distinguish two or more relevant categories. Numbers are often used in order to identify the categories. The numbers arbitrary assigned to the categories serve merely as labels. For example, the numeral ‘0’ might be used to represent a male and the numeral 1 to represent a female. The numbers do not present absolute or relative amounts of any characteristic.
Ordinal scale is the next higher scale of measurement. For this scale, one determines the relative position of objects or individuals with respect to some attribute, but without indicating the distance between positions. This scale requires an empirical criterion for ordering objects or events with respect to the attribute in order to determine whether the individual or object has more, the same amount, or less of the attribute. For example, staff can be ranked according to their work motivation as high, moderate or low.

An interval scale is a scale of measurement that provides equal intervals from an arbitrary origin. This scale not only orders objects or events according to the amount of the attribute they represent but also establish equal intervals between the units of measure. The Farenhite and Centigrade thermometers are examples of interval scales. We may say that the difference between 30 and 31 degrees Centigrade is equal to the difference between 60 and 61 degrees Centigrade. However, we could not say that 60 degrees is twice as hot as 25 degrees. In an interval scale, both the order and distance relationships among the numbers have meaning. There is no true zero point on an interval scale. The zero point on a job performance
scale, for example, is arbitrary. A staff may receive a score of zero on the performance scale, but this does not mean what he or she has done on the job does not carry any worth.

Ratio scale is the highest level of measurement. This scale provides a true zero point as well as equal intervals. A yardstick used to measure length in units of inches or feet is a ration scale, for the origin on the scale is an absolute zero corresponding to no length at all. Thus, it is possible to state that stick 8 feet long is twice as long as a stick 4 feet long. With a ratio scale, it is possible to multiple or divide each of the values by a certain number without changing the properties of the scale. All types of statistical procedures are appropriate with a ratio scale.
TOPIC 5
VALIDITY AND RELIABILITY

Validity

Validity is the extent to which an instrument measures what one thinks it is measuring. Psychological testing instruments are designed for the purpose of appraising constructs such as performance, attitudes, conflict, motivation, and the like. Since there are no direct means of measuring these constructs, researchers must develop indirect means to measure complex attributes. These indirect means involve tests and scales consisting of a number of items that are selected to serve as indicators of the complex constructs. If the tests and scales measure the constructs, then meaningful and useful inferences will be made from the test or scale scores. Hence, the test or scale is valid.

Validity is always specific to the particular purpose for which the instrument is being used. A test that is valid in one situation and for one purpose may not be valid in a different situation or for a
different purpose. Validity can be classified into three types: content validity, criterion-related validity, and construct validity.

Content validity is the extent to which the samples of items or statement on a test are representative of some defined universe, or domain of content. The evidence for content validation is gathered by careful and critical examination by expert judges of the test’s content to determine if the contents are representative or those that constitute the content domain. For example, a job performance scale should contain items that represent specifications of the job.

Criterion-related validity is the extent to which the scores on a measuring instrument are related to an independent external variable (criterion) believed to measure directly the behavior or characteristic studied. The choice of the criterion is crucial to the success of this type of investigation. When one investigates the relationship between the scores on a scholastic aptitude test and university cumulative grade point average (CGPA), one is gathering criterion-related evidence for the validity of the test. The extent to which scores on the aptitude test are related to success in college as
measured by CGPA is the extent to which the aptitude test has validity for the purpose of predicting CGPA.

Construct validity is the extent to which the elements that measure are the elements that make up the construct. For a construct validation, there are also empirical data gathered as evidence. Internally, relationships within the test should be as predicted by the construct, and externally, relationships between scores on the test and other observations should be consistent with the construct. For example, the construct of social maturity is a combination of interrelated elements of self-help, self-direction, motivation, occupation, communication, and social relations. If the relationships of elements within the test are as predicted, then the test possesses construct validity. If the social maturity scale does correlate with chronological age, mental age, and with independent assessments of social maturity, then the scale has validity for measuring the construct.

Reliability

The reliability of a measuring instrument is the degree of
consistency with which it measures whatever it is measuring. Researchers are concerned about the consistency of their measuring devices when they attempt to measure such complex traits as performance, satisfaction, motivation, attitude, and the like. A test is reliable to the extent that the scores made by an individual remains nearly the same in repeated measurements.

Reliability can be estimated by correlating the scores obtained by the same individuals on different occasions or with different sets of equivalent items. These procedures require two administrations of a test, namely the test-retest reliability and the equivalent-forms reliability procedures.

There are other reliability procedures that are designed to determine whether all the items in a test are measuring the same thing. These are called the internal-consistency procedures that require only a single administration of one form of a test. The first of these procedures, known as the split-half, artificially splits the test into two halves and correlates the individual's scores on the two forms. Often internal-consistency measures of reliability do not
require splitting the test into halves and scoring each half separately. These procedures assess the inter-items consistency, or homogeneity, of the items. Two commonly used indexes of homogeneity are the Kuder-Richardson formula 20 and Cronbach's coefficient alpha. Reliability of a test is a function of (1) length of the test, (2) group heterogeneity, (3) procedure used for its estimation, and (4) nature of the variable being measured.

REQUIRED READING

1. Ary et al (1990). Chapter 4:


REVIEW QUESTIONS

1. Why might it be unwise for a researcher not to do a review of the literature before planning a study?

2. For a quantitative study, write two sets of questions: In the first set pose description questions about the independent and dependent variables in the study; in the second set pose questions that relate (or compare) the independent variables(s) with the dependent variable(s).

3. In what situation might a personal interview be superior to a mail or self-administered survey?

4. What are the characteristics of good research questions?

5. What is meant by the term 'validity' and 'reliability' as they apply to the use of instruments in social research?

ASSIGNMENT

Assignment 2: Write Chapter 2 (Review of Literature) of your research proposal.

REFERENCE


PP 510:
RESEARCH METHOD AND DESIGN

SECTION 3
SECTION 3

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LEARNING OBJECTIVES

At the end of this section student should be able to:

1. Understand the various methods of data collection
2. Construct the basic instrument of data collection i.e. the questionnaire
3. Understand how data is analyzed and interpreted
4. Write the outline of a research report
TOPIC 1

DATA GATHERING METHOD

Introduction

Data gathering involves procedures which depend upon types of research and objectives of investigation. If the study is planned to test hypotheses, for example, rational and empirical techniques such as question and observation may be used. Or if the inquiry is of a historical nature, internal and external criticism of documents through content analysis may be most appropriate.

For the purpose of discussion in this section, data gathering refers to the activities that describe the general way data are collected. The activities are as follows:

1. Uses of a questionnaire
2. Observation
3. Content analysis

The specific nature and uses of these data gathering procedures are now explained.
Use of a Questionnaire

A questionnaire is normally used in a survey research. Questionnaires vary in design according to the purpose suggested by the research problem. Two general types of questionnaires are the open questionnaire and closed questionnaire. An open questionnaire has items that allow greater freedom of response, whereas with a closed questionnaire, the respondent is forced to choose one of the alternatives provided. Responses from closed questionnaires are more easily analyzed because data essentially have been categorized prior to beginning of data gathering. Items on a closed questionnaire represent variables surrounding the research phenomenon which is the focus of the study.

Before the actual conduct of using a questionnaire is done, pretesting the instrument is necessary. This is to identify problems that may arise during the data collection or after the data have been collected. Pretesting will also ensure the appropriateness of items appear in the questionnaire.
Mode of data Collection Using Questionnaire

There are four basic modes to collect data. The modes are by administering the questionnaire through personal interviews, direct group interviews, by mail, by telephone, or by self-administered.

Personal interviews. In a personal interview, the researcher (or a trained research assistant) conducts a face-to-face interview with the respondent using the questionnaire. As such, the method has many advantages. Rapport can be established, questions can be clarified, unclear or incomplete answers can be cleared up, and so on. Face-to-face interviewing reduces burdens on respondents in terms of reading understanding and writing the responses of the questionnaires.

However, the biggest disadvantage of face-to-face interviews is that they are costly due to the time and resources used in training of enumerators and the actual act of the interviews. Another disadvantage is biases that may arise due to the presence of the interviewer, an outsider to the life setting of the respondent, and the interviewer's own biases.
Direct group interviews. This method is used whenever a researcher has access to members of a particular group in one place at the same time. The questionnaire is administered to every member of the group at the same time and usually in the same place. The chief advantage of this approach is the high rate of response, hence, it involves comparatively low cost. In addition, the researcher has an opportunity to explain ambiguities the respondents may encounter during the data collection to all the respondents. The disadvantage, however, is the biases due to influence of other individuals in a particular time.

Mail questionnaires. When the data in a survey are collected by mail, the questionnaire is sent to each individual respondent by mail, with a request that it be self-administered and then returned by a given date. The advantages of this technique are that it is relatively cheap and it can be accomplished by a researcher alone (or with a few assistants). It also allows the researcher to have access to samples that might be difficult to reach in person or by telephone. The disadvantage of this technique is, however, the less rapport
developed with the researcher compared to face-to-face interviews. As a result, mail surveys tend to yield low response rates.

**Telephone interviews.** In this technique of data collection, the researcher (or the assistant) asks questions to the respondents over the telephone. The advantages of this technique are relatively cheaper and quicker compared to a face-to-face interview. It also allows the researcher to assist the respondent responding to the questions asked, and provide better coverage in certain areas where personal interviews often are not possible.

The main disadvantage of telephone interviews is that not all respondents might have access to telephone. It also requires more time in preparing for the interview because first we have to make sure the phone numbers are correct and respondents are available to entertain our questions. Telephone interviews also prevent visual interaction between researcher and respondent that may otherwise increase the effectiveness in obtaining data.
**Observation**

Observation is an alternative method of data collection especially on behaviors or events related to phenomenon being studied. Like interviews, observations should be conducted in a systematic manner. Observation involves steps for identifying, categorizing, and recording the behaviors in either a natural or a contrived situation. Observation can serve several purposes. Since it can range from highly unstructured to highly structured, a great deal of flexibility is allowed. In an exploratory study or research which uses qualitative design, the technique of observation may be unstructured: the researcher observes while participating in a group activity related to the research problem. This is called participant observation. In contrast, when the research design addresses for a comparison of events, a systematic rating scale is normally used. The rating scale allows the research to make observations while at the same time make assessment or comparison on behaviors exhibited by the individuals in a group.

**Content Analysis**

Content analysis is the systematic analysis of communications,
whether it is in visual, aural, or printed form. It refers to any techniques for making inferences by systematically analyzing the meanings of messages. Broad application is one of the advantages of content analysis as a technique for research data gathering. The fundamental usage of this technique is that the data is derived from any type of communication materials such as autobiographical material, old and new documents, books, tapes, artifacts, films, and pictures.
TOPIC 2

DATA GATHERING INSTRUMENT

Introduction

Survey method is one of the most important data collection methods in the social science which uses a questionnaire as the main data gathering instruments. The foundation of all questionnaires is the question. Therefore it is important to understand how to formulate the questions in order to get the precise answers from the respondents. Questions have to be designed in a most effective way so that all respondents have the same understanding of the questions. Especially they must be designed according to the educational level of the respondents.

Content of Questions

Questions solicit answers. Some questions asking factual answers and some are asking opinion, feeling, and attitude. Depending on the research objective, a questionnaire may consist of two general categories of questions. (1) Factual questions and (2) Opinion, feeling, and attitude question. It is advisable to mix different
categories of questions to prevent monotony and to validate certain answers which can be answered in different forms.

**Types of Questions**

Questions can be put forward in many different ways structurally. There are basically four different question structures.

1. Open-ended Questions
2. Closed-ended Questions
3. Dichotomous Questions
4. Contingency Questions

Open-ended questions are normally used to solicit feeling, opinion, or attitude of the respondents. There are no specific answers to the questions and the questions are left open without writing any suggestions to be answered. On the other hand, closed-ended question requires respondents to choose specific answerers suggested in the questions. The respondents may choose one or more than one answers given. Dichotomous questions require respondents to answer either one of the answers. For example, respondents are asked whether they like to watch tv or not, true or false, or yes or no. Contingency questions are questions prepared for a special subgroup
of respondents because some questions are not relevant to all the respondents. Therefore, special contingency questions have to be formulated. For example the first question is “Do you have a child / children?” If the response is “Yes,” he or she will be instructed to go to question no 5 instead answering the following question which is no 2, 3, and 4. But for those who answer “No” have to answer the following questions.

**Question Format**

There are many different formats in designing closed-ended questions. In any of the format, the most important thing to do is to give clear instructions on how to answer the questions. It is also a good practice to give an example on how to answer certain questions. Some of the question formats are: rating, matrix questions, card sort, semantic differential, and ranking. You will find the examples of these format in the suggested reading materials.

**Sequence of Questions**

Different cultures may have sensitivity in answering certain questions in a questionnaire. Therefore, the sequence of the
questions must be politically correct. Some sensitive and difficult questions have to be placed toward the end of the questionnaire. Two general patterns of sequence suggested in the literature are funnel sequence and the inverted funnel sequence.
TOPIC 3

DATA ANALYSIS

The way data analysis is accomplished depending on the nature of the research problem, the purpose of the research or the design of the investigation. One simple guideline in doing data analysis is whether the purpose of the research is for describing variables or examining relationship between variables. The data obtained for the two research purposes are normally through survey research. The discussion that follows will explain the data analysis used in a survey research.

Table 2 summarizes the decisions made in the data analysis of survey research. Data analysis in survey research is characterized by a wide spectrum of statistical analysis used. It may simply consist of determining the frequencies and percentages for the most number of variables in the study. In an explanatory survey, however, this is desired in exploring the relationship between variables, whether two variables or more. Depending on the scale of measurement of data
used in the data collection, whether continuous, rank, or dichotomous relationship studies normally use correlation and regression statistics.

Research problems may also suggest that the purpose of an investigation is to find differences between or among sample means. This is generally called the "analysis of variance" or ANOVA. If only two groups are involved, the analysis is called t-test. ANOVA allows researcher to deal with two or more independent variables simultaneously, asking not only about the individual effects of each variable separately, but also about the interacting effects of two or more variables.

**Regression**

Regression is a statistical technique used to establish the relationship between a dependent variable (Y) with a set of independent variables (X's). The variables of Y and X's are related in a linear manner. Regression model is, therefore, used for the value prediction of Y or any X, known to have relationship in a linear manner.
Table 2: Decisions in Making Data Analysis of Survey Research

<table>
<thead>
<tr>
<th>Type of Data</th>
<th>Question</th>
<th>Number of groups/Variables</th>
<th>Scale</th>
<th>Independence</th>
<th>Statistic</th>
</tr>
</thead>
<tbody>
<tr>
<td>Categorical</td>
<td>Two categories</td>
<td>Binomial</td>
<td></td>
<td></td>
<td></td>
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<tr>
<td></td>
<td>Multiple categories</td>
<td>Chi-square</td>
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<td></td>
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<td>DATA</td>
<td>Differences</td>
<td>Independent</td>
<td>T-test</td>
<td></td>
<td></td>
</tr>
<tr>
<td></td>
<td>Two groups</td>
<td>Dependent</td>
<td>T-test</td>
<td></td>
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<tr>
<td></td>
<td>Multiple groups</td>
<td>Independent</td>
<td>ANOVA</td>
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<tr>
<td></td>
<td>or variable</td>
<td>Dependent</td>
<td>ANOVA</td>
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<td>Measurement</td>
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<td>Two variables</td>
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<td>Rank</td>
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<td>Dichotomous</td>
<td>Correlation</td>
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<td>Relationships</td>
<td>Multiple variables</td>
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extent to which change in one variable is associated with change in another variable. The strength and direction of relationships between variables are shown correlation coefficients.

Sometimes researcher needs to find the significance of differences among the proportions of subjects, objects, events, etc., that fall into different categories. A statistical technique used in such cases is called the chi-square test. If the chi-square test two sets of frequencies are compared: observed frequencies and expected frequencies. Observed frequencies, are the actual frequencies obtained by observations. Expected frequencies are theoretical frequencies, which are used for comparison.
TOPIC 4

INTERPRETING RESULTS

After the research data have been collected and statistical analysis has been made, the researcher can proceed with the interpretation of results. The purpose of interpretation is to show what has been learned in the project and how this knowledge fits into the general body of knowledge in the field.

Principles of Interpretation and Discussion

* The proper foundation for interpreting the results of a research should have been laid systematically through each stage of the development of the proposal.
* Once the proposal has been developed and the study carried out, the interpretation of results must be guided by the theoretical base laid out in the proposal.
* Interpretation of results should not go beyond the information obtained from the study. Conclusions drawn are only valid if they are based on the research data.
* Internal validity problems that could account for the data
should be reported.

* When the results contradict the theoretical rationale of the study, the discussion section of the report should include reconsideration of the original theory. Contradictory results indicate that the research question is not settled and may stimulate further research.

* It is incorrect to present a retained null hypothesis as evidenced of no relationship between variables or no significant difference between variables. A retained null hypothesis must be interpreted as lack of evidence for either the truth or falsity of the hypothesis.

* Unhypothesized relationships appearing in a study should be reported, but they should be considered as incidental to the main thrust of the investigation. They should be made the subject of a study specifically designed to investigate them before they can be employed as the basis for conclusions.

* When discussing the implications of the results, the contribution of the results to the knowledge in the field of study and the relevant theories, as well as to practice should be included.
TOPIC 5

RESEARCH REPORT

The results of a study are a little value unless they can be communicated effectively to others. Therefore, a knowledge of the procedures involved in writing a research report is important to all researchers. The following are guidelines for organizing and presenting a thesis or dissertation.

Thesis or Dissertation Components

1. Preliminary pages
   a. Title page
   b. Acceptance page
   c. Acknowledgments
   d. Table of contents
   e. List of tables
   f. List of figures
   g. Abstract
2. Introduction (Chapter 1)
   a. Background of the problem
   b. Statement of the problem
   c. Objectives
   d. Significance of the study
   e. Assumptions
   f. Limitations
   g. Definition of terms

3. Review of Literature (Chapter 2)
   Theories
   Relationship between variables
   Theoretical and Research Framework
   Hypotheses

4. Methodology (Chapter 3)
   a. Research Design
   b. Population and Sampling
   c. Measurement and Instrumentation
   d. Data Collection
5. Findings and Discussion (Chapter 4)
   a. Presentation of findings
   b. Interpretation of findings
   c. Implications

6. Conclusions and Recommendations (Chapter 5)
   a. Conclusions
   b. Recommendations for practice
   c. Recommendations for further research

7. Supplementary Pages
   a. Bibliography
   b. Appendices
   c. Vita
REQUIRED READING


REVIEW QUESTIONS

1. What are the different purposes of using questionnaire, observation, and content analysis in gathering research data?

2. What are the advantages and disadvantages of using a mail questionnaire?

3. How would you analyze the following type of data?
   a. Categorical - Two categories and multiple categories
b. Differences - Two groups and multiple groups

4. Describe the important topics that should be covered in writing a research report?

ASSIGNMENT

Assignment 3:

Write Chapter 3 (Methodology) of your research proposal. Include the following:

a. Research Design

a. Population and Sampling

b. Measurement and Instrumentation

c. Data Collection

d. Analysis of Data

Assignment 4:

Critique two research-based journal articles related to your research interest. Use the provided critiques guidelines.

REFERENCE


ELEME NTS OF RESEARCH PROPOSAL

Cover Page

Follow the style prescribed by the style manual suggested by the university, department or adviser.

Title - Should contain key words or phrases to give a clear and concise description of the scope and nature of the report, and key words should allow bibliographers to index the study in proper categories (Van Dale, 1979:406).

- Indicate major variables
- Indicate nature of research
  * descriptive
  * correlational
  * experimental
- Indicate target population
- Avoid words like:
  "A Study of ..."
  "An Investigation of ..."
  "A Survey of ..."
- Example dissertation title:

Journal article title for the above:
"What Does It Take To Sell Feed?"

Table of Contents

Follow appropriate style
Gives bird's-eye view of dissertation or thesis
Not "generally" provided in reports, papers or articles

Chapter 1 - Introduction

Background and Setting

- Provide reader with necessary background and setting to put the problem in proper context.
- Lets the reader see the basis for the study.
- Justifies and convinces the reader that the study is needed.
- Be factual—statements, opinions and points-of-view should be documented.
- Provide a logical lead-in to a clear and concise statement of the problem.
- Your "sales pitch"
- In a proposal for funding, address capabilities and capacity of individuals and agency/institution in this section.
Statement of the Problem

Characteristics of properly stated problems will be discussed; see notes. Clearly describe the problem to be researched.

Objectives of the Study
- See notes on "Objectives and Hypothesis" for details
- Best located after the statement of the problem in descriptive research
- Indicates the data to be collected
- Make clear the direct connection between specific objectives and hypotheses and related literature and theory
- Controversial as to whether or not null hypotheses go here or in Chapter 4. Rely upon wishes of adviser and committee, if a thesis or dissertation.
- If a study is descriptive, objectives or research questions can be used here.
- If the study is ex post facto or experimental, hypotheses must be used.

Definition of Terms
- Define terms in the context where they will be used - provide operational definitions as well as constitutive definitions.
- Include a list of definitions for terms and concepts that have significant meaning for the study.
- Constructed in listing form - like a dictionary, not prose form
- Do not define generally understood concepts, principles and concerns, e.g., vocational education, secondary education, adult education.
- Much of the specific information about the terms will be presented in other appropriate sections of the proposal.

Limitations of the Study
- Summarize limitations brought about by the procedures of the study
- Describe the procedural limitations in detail in the appropriate section; just summarize here

Basic Assumptions
- Do not make assumptions about procedures (or hypotheses)
- Accepted without thought of immediate proof
- Propositions for which no information can be made available within the scope of the study
- Are axiomatic in that they are propositions that virtually every reasonable person is ready to adopt but which cannot be proven.
- Type of assumption most commonly stated explicitly is one that is limited in its nature and serves to hold the size or scope of an investigation within its prescribed boundaries (puts parameters around the study), e.g., study will deal with secondary students not post-secondary
- Usually made when the argument rests on a priori reasoning, but can be made on basis of present knowledge on research which is as yet incomplete (Specific qualifications must be made in the conclusions of the research report in which assumptions are made.)
- Ought to be clearly stated
- Protects researcher, e.g., keeps someone from saying, "Oh, I
tought you were studying XYZ, too."
- Assumptions are not hypotheses
- Hypotheses are propositions to be investigated and are the very
subject of the problem; so, do not make assumptions about them.

Significance of the Problem
- These arguments can be presented in the "Background and Setting"
section. This does not need to be a special section.
- Knowledge relating to the theory that .
- New products, e.g., instrument, instructional material, etc.
- Who (what individuals or groups) can use this new knowledge or
information yielded by the research to change or improve the
present situation? How will the study contribute to the
improvement of the profession?
- Indicate how the results can be generalized beyond the bounds of
study
- Can use the arguments of others (expert opinion) who call for an
investigation of the problem (properly documented, of course).
- Can use conflict in findings of related research as justification
for the study. Be sure it is documented in Review of Literature.
- Use if, then (hypothetical-deductive) logic

Chapter 2 - Review of Literature

A. Provides tentative solutions to the problem or tentative answers to
the questions. (Could be publishable)
B. Indicates the theory on which the study is based; critique and
weigh studies as theory is built. (Teeter-totter example)
C. Provides the rationale for the hypotheses and variables therein
D. Organized and written in reference to the specific objectives of
the study
E. Some would say the review prepared for a proposal is not as
complete as the final report (thesis/dissertation) — make as
complete as possible!
F. Consists of two phases
   1. Problem exploration — definition stage
      * Conducted before proposal preparation to identify problem
      * Provides dimensions and limits of the problem area
      * Defines extent to which solution or answer is already known
      * Helps discern "What do we know the least about?"
      * Identifies possible procedures (design, instruments;
analyses) for conducting the study
   2. Proposal Writing - See A-E above
G. Reporting Related Literature will follow in the course
Chapter 3 - Procedures

(Some writers call this chapter "Methodology")

Replication is the key word to keep in mind when writing this chapter. Researchers must provide accurate, detailed descriptions of how the research was done so it could be replicated (redone) by others. You should provide explanations that will enable the reader to reproduce the exact conditions of the original study. A rather extensive explanation should be provided so that readers understand why and how you are going to do the research (in a final report). Your procedures should answer questions or test hypotheses as efficiently, economically and validly as possible.

Sections

The sections of research design, subject selection, outcome measures, conditions of testing, treatments and data analyses will encompass most methodological activities that need to be described. Each section will be described separately.

Research Design

Describe the type of research to be conducted, i.e., survey, ex post facto, quasi-experimental, etc. This section is utilized to describe how you will set up your study to observe the hypothesized relationship. Describe the steps you will take to address the hypotheses in operational terms.

Describe what intervening variables might affect the dependent variable(s) other than the independent variable, i.e.:
- Analyze the internal validity of the study (discussed later in the course)
- Also, discuss threats to external validity (discussed later in the course)
- Describe how your study will measure or control these threats given the "Limitations of the Study."

The description of the design for descriptive studies is generally easy to describe, while the validity is not. Describe non-respondent follow-up procedures and procedures to compare respondents with non-respondents.

A study may involve more than one purpose. Clearly indicate which design is to address each objective.

The description of the research design for correlational or ex post facto research is easy to describe, but particular attention must be directed to alternative or rival explanations (intervening variables).

The research design for experimental and quasi-experimental research is often quoted directly from Campbell and Stanley (or others) and analyzed by their threats to validity.
What experimental controls were utilized?

Schematic (graphic) diagrams often aid in understanding the design. Define the symbols you use.

Subject Selection

The population to be studied is first identified and how a sampling frame (list of elements in the population) will be developed. Is there frame error? Explain why this population is appropriate for this study. Note any discrepancies between the experimentally accessible population and the target population.

The sampling procedure is described. Relate how the sample was selected and your reasons for selecting any stratifying variables, if they were employed. Describe the sampling plan.

Describe the size of the sample, and how it was determined and the rationale for the size. Sampling units should be identified.

Data describing the characteristics of the subjects that are relevant to the study should be provided; and, if available, data from the population to enable the reader to judge the representativeness of the sample.

Describe what will be done with subjects that decline to participate, drop out, or do not participate in all parts of the study. What will be done about non-respondents? What will be done about incomplete questionnaires or ones with obvious response sets, lying, cheating or unanswered items? All affect the population to whom one can generalize the results, i.e., the external validity of the study.

Outcome Measures

Measurement of the dependent variable(s) is one key to your study. Instruments are operational definitive for variables. Techniques or instruments used to measure the dependent variable(s), outcome, must be carefully described in terms of:

1. Validity - Does the instrument or technique measure what it purports to measure with this group?
2. Reliability - Whatever the instrument or technique measures does it do so consistently with this group?
3. Suitability - Utility must be high for subjects to whom administered.

If well-known instruments are used, one can generally briefly describe them, and their reliability and validity, and refer the reader through citation to references where more thorough detailed discussions can be found.
If the researcher is developing the instrumentation, then validity and reliability must be established. The instrument should be pilot and/or field tested. The researcher should describe how this was done. A field test can locate potential suitability problem areas. Appendix copies of the instruments to the proposal.

The Review of Literature can be utilized to verify the concepts/theory under study and the scope of the measurement methods to assess the concepts. This section should establish the operational link between these concepts/theory and the measurement.

If you use interviewers or observers, how were they trained? What were their inter-rater and intra-rater reliabilities?

Conditions of Testing

Describe when, where and under what conditions the data were gathered, the number of times and order in which instruments were used, and the time allotted for the data collection.

Describe the verbal and written directions provided to the subjects. Were incentives used to encourage responses?

Be specific! When you describe when, taking a test after lunch, after another test, etc., may explain variance more than the quarter or date.

During the actual data gathering, testing, monitor events so they can be explained to the reader.

If instruments are potentially reactive, what precautions will be taken to minimize this threat.

Treatments

How were the independent variables administered? What was done to the subjects? Describe all levels so that they are replicable. Were any methods employed and abandoned because they were valueless?

Kerlinger describes maximizing the differences between the levels of the independent variable. A typical shortcoming is comparing a "new" methods with a "traditional" or "conventional" method of doing something, and the researcher describes at length the "new" method but not the "traditional" method. How, really, are they different?

If attribute variables are used in the design, identify them and the number of levels of each and briefly describe the rationale for the selection of the attribute variables (more thorough explanation should be in the "Review").
Data Analysis

Statistical techniques are tools selected because of your design, not vice versa.

Descriptive and inferential analyses are provided to address each facet of the hypothesis, null hypothesis, objective or problem. Have foresight! What is the easiest way to collect, code and analyze your data?

Why were these methods of analysis employed? Why was the level of significance selected?

For each statistical method used, present evidence indicating that the basic assumption underlying its use have been met. For example, a Pearson Product Moment Correlation (r) assumes both linearity and homoscedasticity, so you would always need to construct a scatterplot whenever you use r to show these assumptions are met. Statistics courses provide you with these skills and understandings.

Remember, select statistics that answer the question(s) involved with the study. They serve research, not dominate it. Nothing is gained in using complicated statistics that happen to be in "vogue" if simple ones will do just as well. Specify what analysis will be used for each objective.

The proposer may find it beneficial to provide, as an appendix, sample skeletons of the tables and figures that will appear in Chapter 4 as a result of the analysis. Proposal readers, committee members, etc., often find this beneficial in conceptualizing what will be produced by these analysis techniques.

Proposals submitted for Agr Educ 885 do not have to have the Data Analysis section complete. Agr Educ 887 will approach this topic in more detail.
Selecting a problem for a doctoral dissertation... has the tow needs contributing something original to the knowledge and performing research that will lead to improvements in... It seems to me that doctoral research must always meet the test of contributing to the knowledge, and if it can also point to, or take a step towards, improvements in the technology practices, that adds to the value of the university's educational and research mission. I believe that advanced graduates student research represents very high value in relation to the cost of the work, especially when compared with research done by a consulting firm or a large research agency.
The thesis title does reveal adequately the subject matter of the study and clearly identifies the problem for investigation. The objectives are clear and the depth and breadth of the work is certainly sufficient for a doctoral degree.

The thesis suffers from a lack of problem definition. There is too much material on general issues of (the subject), but it is not clearly tied to any problem or issue being addressed.

Although the problem is eventually identified, the section entitled The Research Problem is extremely long and there is NO question or problem in succinct form. ... retile the section to indicate that it really provides background support for the problem and then STATE THE PROBLEM BRIEFLY in statement or question form. ... A reader expects to find the problem in one or two statements or in a brief paragraph. This short form is also needed for publication in professional journals.

While a narrow focus enables a researcher to dig deeply into all aspects of the research problem, this study has yielded data which could be perceived as being of marginal utility from the practical point of view.

The Statement of the Problem has very clearly argued the need for this study citing past and current interests on the subject of... and its effects on... What has made the research more interesting and relevant is not only the actual phenomena under study but also that it was done with to test some models developed and studied in Western countries to a non-Western country, Malaysia.
PROBLEM STATEMENT – A PROBLEMATIC AREA INDEED!

A thesis, be it in the natural or social sciences, is written in order to solve a certain problem identified by the graduate student. The student probably knows thoroughly the nature of the problem, but often fails to demonstrate its existence convincingly to the independent examiners (external). For example, one examiner wrote: “The (problem statement) is too long and wordy . . . Normally (it) is one or two short paragraphs . . .” Another examiner says: “Kenyataan masalah perlu diperbaiki supaya lebih tepat kepada maksud sebenar. Penyelidik diminta mendapatkannya maklumat dari pemeriksa. (The problem statement needs to be improved to capture the real problem. Candidate is requested to obtain guide from examiner.)

Existence of a problem may be demonstrated by the candidate stating some desired goals, situations or conditions and giving relevant facts that would show the ‘gap’ between those goals and the present state. The ‘gap’ may be the lack of some information vital to decision-making, or it may be the failure to achieve some set target or expectation.

A problem may exist as paradoxes or ironies that need to be resolved. It may exist because past solutions have failed to work. The solutions may have failed because the “wrong” ones were used. Thus, despite repeated efforts and high expenditure, the problem continues to persist.

A problem is therefore the gap between the desired state (goal or expectation) and the prevailing state of affairs. Ignorance itself can be the problem. The desired goal, in this case, is “complete information.” But what is the information for? Who will use it? For what purpose? What is the consequence of not having the information? How can the candidate’s study contribute towards narrowing the gap? This last question is actually addressing the candidate’s research objectives which should follow the problem statement.

A problem, therefore, manifest itself in some kind of dissatisfaction or frustration on the part of the researcher. He cannot sleep until he finds some answers! It is the strongest motivating factor in seeing the research through and earning the degree.
Part II

PLANNING EDUCATIONAL RESEARCH

Planning is the most important step in any research project. The most polished procedures and sophisticated statistical analyses cannot salvage a study that is poorly planned. The first step in planning is to identify a significant problem to attack. In this section you learn how to locate a research problem and how to develop a research plan that will permit you to collect rigorous evidence related to your problem.

In planning your study you must pay careful attention to the ethics and legal rules of research. Most educational research involves the use of human subjects. Failure to follow ethical guidelines not only can cause the researcher legal problems but may do serious harm to the subjects who participate in educational research.

Research evidence is cumulative. Many researchers contribute small pieces to a puzzle until, finally, a comprehensible “picture” emerges. In order for you to plan a research project that will contribute a new piece to the “picture,” you must carefully study and interpret the pieces other researchers have contributed. This process is called “reviewing the literature” and is an essential part of planning your research. Researchers who attempt to sidestep a thorough review of previous research often end up following a path that others have found to be a dead end or repeating a study that someone else has done better.

Perhaps your most difficult task in reviewing the research of others is evaluating their work and deciding, in view of its limitations, how the findings fit into the overall picture of research related to the problem you are trying to investigate. How well you can carry out this critical review is determined to a large extent by how much you know about educational research methods. Thus, although you will be able to identify a research problem, start your literature search, and develop a tentative research plan after you have read the four chapters in this part, your critical evaluation of the key studies related to your problem and your final research plan should be delayed until you have finished studying this book.
OVERVIEW

Chapter 2 introduces you to several important skills that are needed to write an educational research plan and to conduct the project itself. First, we suggest several approaches to help you identify possible research problems and select an appropriate problem for your own research project. Next, you are given an outline to use in developing your research proposal systematically. This section deals briefly with each major part of the research plan: the problem, hypotheses, measures, subjects, research design, and data analysis.

The advantages of developing a chronological list of procedures for your research project are also discussed. Many students prepare their research plan section by section and do not give enough attention to the problem of fitting the sections together. We discuss this problem and illustrate a method for developing a related plan. If your research plan is fairly complex, the use of a procedure such as PERT (Program Evaluation and Review Technique) helps you better understand your research and avoid many of the errors and miscalculations often made by inexperienced researchers. We introduce you to the PERT technique and ask you to consider the advantages of conducting a pilot study prior to the main investigation in order to test and revise the research plan.

OBJECTIVES

After studying this chapter you should be able to:

1. Describe your areas of interest in education and current research problems that are under investigation in these areas.
2. Explain the advantages and disadvantages of working on a team project.
3. Discuss the reasons for replicating significant studies.
4. Use a variety of procedures to locate unsolved research problems in a given area of education.
5. List and describe the topics that need to be included in a sound research plan.
6. Describe the advantages of a research plan.
7. Write directional hypotheses, null hypotheses, and questions that relate to a given research problem.
8. Apply four criteria to the development and evaluation of hypotheses.
9. Demonstrate the relationship among the hypotheses, measures, and analysis procedures in a research plan.
10. Describe PERT and how it can be used in research planning.
11. State at least three reasons for including a pilot study in a research project.
INTRODUCTION

In this chapter we will give you an overall introduction to the task of locating a suitable research problem and building a proposal designed to address your problem. Although you are not yet ready to prepare a proposal, we believe that this overview will help you see how each step in the research process is related, thus helping you learn and understand the process.

The list below provides a very brief outline of the steps you will follow in developing a research proposal. The remainder of this chapter helps you carry out the initial step, and the remainder of the text takes you through the entire research process.

Selecting and Defining the Research Problem

1. **Identify problem area.** What area relates best to your current interests and future professional goals? (chapter 2)
2. **Build preliminary knowledge base.** Read secondary sources to get an overview of what is known and what questions in your problem area need further exploration. (chapter 4)
3. **Identify specific problem and write your problem statement.** What question will you address? What variables will you measure? Why is this problem important? (chapter 2)
4. **Review previous research.** Locate, evaluate, and synthesize previous research and theory and relate your findings to your problem. (chapters 4, 5)

Outlining the Research Plan

5. **Formulate hypotheses or objectives.** What specific questions will you address in order to shed light on your problem? (chapter 2)
6. **Select possible measures.** Locate and evaluate measures of the variables to be studied and select the most appropriate. (chapters 8, 9)
7. **Select research subjects.** Identify the population to which your research will apply; decide on the size of your sample and how subjects will be selected. (chapter 6)
8. **Specify the research design.** Study the types of research and decide which is most appropriate for your problem. (chapters 11–19)
9. **Select analysis procedures.** Review statistical tools and decide which will best test your hypotheses, given your subjects, measures, and research design. (chapters 10, 13, 14, 15, or 16 depending on research design)
10. **Specify research activities.** Describe in chronological order and in as much detail as you can the specific steps you must take to carry out the proposed research. Check the entire proposal for ethical and legal compliance. (chapter 3)
As you progress through this text you will master the concepts and skills needed to develop the research proposal that you will submit to your thesis or dissertation committee and that will subsequently guide your research.

The text is organized in about the same order that one follows in developing a research plan and subsequently conducting your study. Thus, many students develop each section of their proposal as they complete the relevant section of the text, ending the course with a well-thought-out plan.

**SELECTING AND DEFINING A RESEARCH PROBLEM**

The graduate students' research problem for their thesis or dissertation usually focuses on an educational phenomenon that they wish to describe, an event that they have observed and will attempt to explain, or a problem for which they will try to develop a solution. The research problem often is phrased as a question such as:

1. What changes can I make in reading instruction to increase the interest of Chicano children in my class?
2. What mistakes do students make most often in solving long-division problems?
3. Some children never volunteer answers during recitation even when I am sure they know the correct answer. Why is this?

The ultimate value of your research project is probably determined more by the imagination and insight that goes into the research problem than by any other factor. Therefore, the selection of a research problem for the master's thesis or doctoral dissertation is a very important step. Often, eager to get started on research work, the student seizes upon the first research idea that comes along. A student who begins a research problem before giving the choice much careful study and thought is likely to lose many important advantages.

The very process of seeking a research problem is an important step in your professional maturation. At the outset, you may see no problems, or from first explorations into the research literature conclude that research has already solved all the problems in education. Your first ideas for research may be naive; a closer check will reveal that they have already been thoroughly explored. As you continue to search, however, insight into the literature becomes sufficiently broad so that you can see research problems in everything you read. This point is not reached without a considerable amount of scholarly work in the research literature, but once achieved, you have taken a significant step.

One reason that students seize upon the first idea they encounter is that very often they go too far in their graduate program before starting to search for
a suitable research problem. You have had years of experience in taking courses and thus the coursework involved in your graduate program is a familiar experience and one that you are reasonably confident you can complete successfully. In contrast, the research aspect of the graduate program is new and different and something that you may be strongly tempted to put off. Every university has a lengthy list of “all-buts” among its graduate students—those who have completed all work for an advanced degree but the thesis or dissertation. A great many such students never obtain their advanced degrees. It is usually desirable for graduate students to gain some insight into research and to commence the search for a suitable problem as soon as possible after entering graduate work, even if they do not plan to carry out a project until they near the end of their work.

In looking for a research problem, bear in mind some of the possible outcomes of your research effort in preparing you for your profession. The review of the literature provides you with an understanding of the work that has already taken place relating to your problem area and prepares you to carry out a project that will add to the facts and information that have been accumulated by previous research workers. Because of the extensive reading you must do in your problem area, you will usually build up a sizable fund of knowledge. Thus, in order that this knowledge may be of significant future value, you should attempt to develop a research problem in an area that is closely related to your professional goals. For example, a student who plans to teach elementary school will profit much more from a research project in some area such as child development or the learning of elementary school subjects than in an area involving secondary education, adolescent development, or school administration.

Another reason for the selection of a topic closely allied to your interest is that the research project provides an opportunity to do significant independent work in a problem area that will better prepare you for professional work and will incidentally make you a more desirable prospect for employment. Although most of them do not produce research findings of major significance, many master’s theses do produce worthwhile information that makes a small but definite contribution to the field of knowledge. Because there are many significant problems in education for which we require further knowledge, you should resist the temptation to do research that is essentially trivial or that can contribute nothing to educational knowledge. Students often rationalize carrying out a trivial study by saying that the real purpose of the master’s thesis is to provide practice in independent work, and the results cannot be expected to be of any scientific value. Generally, once a significant project has been identified, it requires no more time a ‘d effort to carry out than a trivial project or one that repeats work that has already been adequately done. The difference between the trivial project and the significant project is not the amount of work required to carry it out, but the amount of thought that the student applies in selection and definition of the problem.
Another factor that you should consider in selecting a problem is that you will not only gain valuable knowledge and experience in the problem area you select, but if you carry out a worthwhile piece of research, it may be possible to publish the results in a professional journal. Publishing an article based on your thesis adds significantly to your professional status.

In defining a research problem, do not hesitate to entertain ideas and approaches that represent a departure from conventional educational practice. Researchers often overlook or reject promising ideas because they are strange or conflict with some of the individual’s biases. B. F. Skinner provides us with an excellent example of the degree to which narrow thinking can stifle unusual ideas. During World War II, Skinner worked with a group of psychologists on a project aimed at conditioning pigeons to operate a guidance system for missiles. The pigeons were conditioned to peck at a particular type of target that they viewed on a screen, such as a ship or length of coastline. If the target was not at the center of the screen, the pigeons’ pecking provided a guiding signal to change the course of the missile. The device was developed to a high level of efficiency and became nearly foolproof even under unfavorable conditions. It required no materials in short supply, and once the pigeons had been conditioned the behavior persisted for long periods without reinforcement. In several demonstrations before scientific committees the conditioned pigeons performed perfectly, yet the project was abandoned because it was impossible to convince the dozen or so distinguished physical scientists on the evaluation committee that the behavior of a pigeon could be adequately controlled. To these men, who were accustomed to thinking in terms of servomotors, rheostats, and electrical circuits, the idea of using a live organism to carry out the task of missile guidance was too fantastic to be taken seriously, even when they were confronted with evidence that the pigeons could do the assigned task. Although none of us can be completely freed from the shackles of our environment, preconceptions, and prejudices, the researcher seeking a research problem should remain aware of the existence of these impediments and should make a conscious effort to avoid their influence. As Skinner points out, “One virtue in crackpot ideas is that they breed rapidly and their progeny show extraordinary mutations.” Thus, even the wildest idea may, if pursued, lead eventually to a unique and often practical approach to a scientific problem.

The First Step

The first step in locating a specific problem for the dissertation or thesis is to identify the broad problem areas that are most closely related to your interests and professional goals. You will find it a profitable experience to write down in as much detail as possible the type of work you wish to do upon completion of
graduate training and the specific aspects of this work that most interest you. The process of writing down this information will help you clarify your goals and interests. Very often you will find that these goals are somewhat less clear in your mind than you may have supposed. Typical broad areas of interest that might be listed are high school counseling, teaching art to children in the primary grades, social problems of adolescents, remedial reading in the elementary school, relationships between teachers and principals, and intramural programs in physical education.

After one or more such areas of professional interest have been identified, you are ready to seek out specific problems in these areas that could form the basis for your thesis.

Working on a Team Project

Thirty years ago almost no money was available for the support of educational research. Most research projects were small-scale studies carried out by university faculty members, and in many instances the faculty member did all the research including such tasks as administering and scoring tests used in the project. Since that time, however, money available for educational research has increased tremendously. Now most universities are receiving financial support for educational research in the form of contracts and grants from federal agencies and private foundations, and the projects being carried out are much wider in scope and often involve a team of research workers rather than a single scientist. The graduate student often has an opportunity to participate in one of these extensive research projects as a member of a team. As a rule, such projects are developed by faculty members, and portions of the project are given to graduate students to complete. Completion of the allotted portion of the project then constitutes the research for the master’s thesis or doctoral dissertation.

Working on team projects has both advantages and disadvantages. Perhaps the most important advantage is that financial support is usually available for working on such a project. This support may cover as little as paying for test administration or providing needed materials or clerical assistance, but in many cases it also involves a scholarship or research assistantship that is sufficient to meet expenses while you are completing your graduate work. The team project also offers you an opportunity to participate in a bigger and more sophisticated study than would be the case if you were working independently. These studies usually involve more complex research designs and more advanced statistical procedures, and thus you learn more about these than you would otherwise. You also have a chance to learn something about the workings of team research, and because most major projects are now carried out by teams, this insight may prove valuable in future work. You can also learn much from other members of the research team. Each team member brings a different background of training
and experience to the project, and therefore the team can often produce a more polished research effort than is the case with a single investigator.

Participation in a team research project also has disadvantages, however. Perhaps the most important of these is the loss of the opportunity to find and develop an individual problem. In team research, the project is usually created and designed by the faculty member who is directing it. At worst, graduate students involved in team projects are little more than clerks who carry out various tasks without fully understanding what they are doing or why it is being done. Even in team projects where you are asked to do significant independent work—and this is usually the case—you may not get firsthand experience in all aspects of developing and carrying out a research plan. Second, the problem being studied by a research team may not be closely allied with your interests, nor may it contribute directly to your future professional work, as would be the case if you designed and carried out an independent project.

Whether you carry out a small independent project or participate in a larger team project, the experience you gain through independent scholarship and research is perhaps the most important aspect of your graduate program. A significant piece of work done at this level can add materially to your professional maturity, may improve your employment opportunities, and start you on the path to recognition and high professional status in your chosen field.

A Reading Program

Perhaps the most satisfactory method of locating specific problems within the scope of your broad interests is through a systematic program of reading. Let us say, for example, that you plan to teach in the elementary schools and are particularly interested in problems related to working with bright children at that level. First, you would check the library card catalogue to locate current textbooks in this field. If you have selected a field in which no complete textbooks have been written, you will usually find chapters dealing with your interest area in some of the introductory texts used in general education and psychology courses. Select two or three textbooks and review pertinent chapters in each. This will give you some background information about your area of interest and also some insight into various subtopics in the field, a knowledge of current practices, and a brief summary of recent research. This preliminary reading will help you narrow your focus to one or more specific subtopics. If your broad interest is in working with bright, elementary-level children, you may decide to develop a research problem dealing with the creative abilities of bright children, or you may decide to study the development of bright children in the primary grades. These topics are of course still much too broad for a specific research problem, but this initial narrowing permits you to explore the areas you have selected in somewhat greater depth by reading additional
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materials that deal specifically with the narrower subject. You may also obtain valuable information by checking these topics in such sources as the *Review of Research in Education*, the *Review of Educational Research*, and the *Handbook of Research on Teaching*.2

This additional reading will usually result in the identification of a number of tentative research problems that are sufficiently limited and specific to form a possible basis for your work. In the example used here, you might develop specific research topics in the area of social development of bright students in the elementary schools such as the following: (1) relationships between intelligence and sociometric choice among sixth-grade children, (2) development of interest in the opposite sex in elementary children between grades four and six, (3) social activities of bright children as compared with those of average children in 10 fifth-grade classrooms, and (4) social adjustment problems in extremely bright children in the intermediate grades.

Research Based on Theory

Perhaps the approach most likely to produce an outstanding thesis or dissertation is to formulate a research problem that will test a theory related to your area of interest.

In simple terms a theory is an explanation of behavioral or physical events. The more "powerful" a theory is, the more events can be explained by it. Psychoanalytic theory is considered by some researchers to be powerful because it provides an explanation for a vast range of behavior from infancy to old age, from the behavior of normal persons through the continuum of mental illnesses. Theories consist of generalizations (in the physical sciences, usually called laws) and constructs. A law or generalization is a statement of a relationship between two or more events; generalizations can be used to predict events. For example, the statement that individual tutoring results in increased school achievement is a generalization. Assuming it is true, we can predict that a particular student, given tutoring, will show a gain in achievement. A construct is a type of concept used in scientific research to describe events that share similar elements. Motivation, achievement, learning ability, intelligence, and value are all examples of constructs. Constructs are usually defined in operational terms, that is, in terms of the "operations" needed to measure them. For example, the construct "intelligence" is usually defined in terms of scores derived from administration of an intelligence test. Motivation may be defined in terms of changes in subjects' performance after they receive "motivating" instructions. These operational measures of constructs are usually called variables because the level or

2. Bibliographic information for these references can be found in the Annotated References at the end of chapter 4.
degree to which different subjects display the construct varies and because values or numerals can be assigned to different levels. Theoretical research usually consists of testing a hypothesis (a speculation about the relationship between two or more variables) that is derived from a theory.

Many areas of education have virtually no theoretical foundation. In areas, however, where the problems of education cut across other behavioral sciences, such as psychology or sociology, an increasing amount of pertinent theoretical work can be found. Some of these areas of overlapping concern are learning, motivation, language development, behavioral management, attitude development, and social class. A good example of an educational research problem derived from theory in another behavioral science, psychology, is provided by a recent study of changes in school-related attitudes. In this study, Robert Steiner tested a hypothesis related to attitude change derived from the theory of cognitive dissonance developed by Leon Festinger. Simply stated, cognitive dissonance is a state of tension that occurs when an individual simultaneously holds two cognitions (i.e., attitudes, ideas, or beliefs) that are logically inconsistent or in conflict. According to Festinger’s theory, this dissonance is unpleasant, and the individual experiencing it is motivated to reduce it. With regard to attitude change, Festinger’s theory would indicate that if an individual has an attitude we want to change, such as racial prejudice, we can create cognitive dissonance by exposing the person to ideas that are incompatible with his or her attitude or inducing the person to behave in a manner contrary to his or her original attitude. This in turn will create dissonance, and in order to reduce this dissonance, the individual will shift his or her original attitude so that it will be more consistent with the behavior we have induced. The theory also suggests that the level of cognitive dissonance experienced by the individual is related to the degree of attitude change that is likely to occur. That is, a greater degree of dissonance will lead to greater attitude change in order to reduce the dissonance.

In Steiner’s study, a measure of attitude toward science was administered to a sample of ninth-grade science students. Steiner then divided his group into students having high (HS) versus low (LS) attitudes toward science. Students in these groups in turn were randomly assigned to experimental and control treatments. Each student in the experimental treatment prepared a short videotape extolling science and advocating that students enroll in science. According to Festinger’s theory, this behavior would cause substantial cognitive dissonance for the LS students, whose initial attitude toward science was low. The behavior could also cause some dissonance (presumably less) among

students in the HS group if their videotape behavior was more favorable to science than their initial attitude was. The control group was not exposed to any treatment, and so it would be expected that their attitudes would not change. After the treatment phase, an attitude scale was again administered to all subjects, and changes in attitudes between the pre- and post-measures were analyzed. It was found that the attitudes of the control group remained virtually the same on the two measures, as expected. The attitudes toward science of subjects in the experimental groups improved significantly between the pre- and post-measures. Contrary to expectation, however, gains made by the LS and HS groups were not significantly different. Therefore, the theory of cognitive dissonance was partially supported in that the cognitive dissonance generated by the treatment did result in higher scores. The theory was not fully supported because the LS group did not change their attitudes more than the HS group did.

This study is typical of research designed to test behavioral science theory in that it produced some relevant evidence but did not provide a definitive test of the theory. As research of this kind slowly accumulates, the scientist gains an increasingly better understanding of the theory, which in turn leads to changes in the theory and eventually to its general acceptance or rejection.

However, we should note that even though a number of studies might produce evidence confirming a theory while no disconfirming evidence is found, the theory is never fully accepted because the possibility of disconfirming evidence in the future always exists. On the other hand, one study that produces disconfirming evidence calls for revision or rejection of the theory.

Several advantages accrue to conducting theory-based research in education. First, the theory tends to focus the direction of the research. Without some viable theory to serve as a guide, many studies address trivial questions or contribute nothing to the slow accumulation of knowledge needed for advancement of a science of education. Second, a theory can provide a rational basis for explaining or interpreting the results of research. Studies without a theoretical foundation often produce results that the investigator is at a loss to explain. Eventually such studies can help in the development of a theory, but their impact on our understanding of the phenomena being studied is much less clear and immediate than for theory-based research. Still another advantage of good theories is that they enable the researcher to make predictions about a wide range of situations. For example, cognitive dissonance could be employed to attempt to change a wide range of attitudes.

In summary, a valuable technique for defining a research problem is to derive a hypothesis from a theory in one of the behavioral sciences and then to test the hypothesis in a relevant educational context.

9. See David R. Krathwohl, Social and Behavioral Science Research (San Francisco: Jossey-Bass, 1985), for a discussion of how scientific theory is developed and confirmed.
Replication

Another strategy that can be used to locate a research problem is to select a previous study for replication. In the behavioral sciences, where we are usually unable to maintain the level of experimental control that is possible in the physical sciences, important studies should always be replicated before their findings are accepted by the scientific community. Therefore, you can often make a valuable contribution by repeating an important research project that someone else has carried out. In order to make a significant contribution, however, you must carefully search the literature to find a study that is appropriate for replication. There is no point in replicating a trivial study or one that is so poorly designed that the results cannot be accepted with any confidence. There are, however, several valid reasons for carrying out replications, and you should locate a study for which one of these reasons is relevant. Among the reasons for carrying out a replication are the following:

1. To check the findings of a major or milestone study. Occasionally a study is reported that either produces new and surprising evidence, reports findings that conflict strongly with previous research, or challenges a generally accepted theory. The replication of studies of this kind is very useful because these studies help confirm or disconfirm the validity of the new evidence. If supported by replication, such studies often open up a new area of investigation or have a major impact upon educational practice. Studies of this sort are often discussed in graduate seminars, as well as in literature reviews such as those that appear in editions of the Handbook of Research on Teaching or in issues of the Review of Educational Research. An example of a study that has had a major impact in the educational community is the work of David Wiley and Annegez Harnischfeger. Based on their reanalysis of data obtained from Coleman's sixth-grade sample in Detroit, these researchers concluded that lengthening the school year by 10 days, increasing the school day to six hours, and raising the average daily attendance to 95 percent would bring about major achievement gains, including a 65 percent gain in reading comprehension and a 34 percent gain in mathematics achievement. This study dramatically illustrated the importance of time as a factor in school learning and stimulated many studies that further explored the influence of time in the schools. Considerable controversy also developed over the validity of Wiley and Harnischfeger's findings. This creates an ideal situation for replication, since their findings were both important and controversial.

2. To check the validity of research findings across different populations. The typical research study in education is carried out with a small sample of

individuals representing a single population. Without replication we are unable to determine the degree to which findings that emerge from such research apply to other populations. For example, Charles Fisher and his colleagues studied the relationship between specific teacher behaviors and the achievement of second- and fifth-grade pupils in mathematics and reading. The researchers found that teachers' use of academic monitoring was negatively related to reading achievement but positively related to mathematics achievement. They also found several teaching behaviors that were positively related to the achievement of fifth-grade students but negatively related to second-grade achievement. Clearly, it is unsafe to generalize research findings on effective teaching techniques across grade levels or subject areas without first doing replication studies. Similarly, findings for male populations may or may not apply to females, and findings valid for one racial or ethnic group may or may not be valid for other groups. Thus, replications provide us with a very valuable tool for determining the degree to which research findings can be generalized across populations.

3. To check trends over time. Many research results in the behavioral sciences depend in part on the environment in which the individual functions. Thus, research findings on racial attitudes that were valid 20 years ago may be invalid today. Replication is a useful tool for checking earlier findings and identifying trends. For example, a study of curricular trends in high schools surveyed 234 principals in 1979, replicating a 1974 survey. Comparisons of the 1974 and 1979 data revealed trends in 20 areas such as departmentalization, use of independent study, and moral education. These trend data give us interesting insights into where the secondary curriculum appears to be going.

If you can locate a survey conducted several years ago that covers topics of current interest, it is fairly easy to conduct a replication that will reveal interesting trends and that will increase our understanding of the questions addressed.

4. To check important findings using different methodology. In any research project there is a possibility that the observed relationships are an artifact of the methodology used by the researcher and are not due to a true relationship between the phenomena being studied. A true relationship should emerge regardless of the measures and methods used as long as they are reasonably

valid and appropriate. Thus, a very useful form of replication is to repeat important studies using different methodology. For example, a study by Wayne Piersel, Gene Brody, and Thomas Kratochwill found that disadvantaged minority-group children shown a videotape designed to give them a favorable experience with the test situation before being given an intelligence test earned significantly better scores than did similar children not shown the videotape.\textsuperscript{11} This is an important finding because its application would reduce the likelihood of disadvantaged minority children being given spuriously low test scores, which psychologists suspect often happens. Leslie Raskind and Richard Nagel replicated this study but improved the research methodology by using examiners who did not know which children were in the experimental and control groups and by showing an unrelated videotape to the control group.\textsuperscript{12} These features of experimental design, which were not present in the earlier study, reduced the likelihood of obtaining spurious results. Using the same intelligence measure (WISC-R), Raskind and Nagel found no significant IQ differences between the experimental and control groups. This suggests the results of the earlier study could have been due to deficiencies in research methodology. Because the children in the two studies were drawn from different populations, however, additional replications would be desirable before drawing any firm conclusions.

In conclusion, we have seen that replication gives us a much sounder basis for judging the validity of a research finding than is possible when only a single study is available. Moreover, replications that study individuals drawn from different populations, during different times, and using different methods contribute greatly to the confidence we may have in generalizing the research findings. Clearly, the more broadly we can apply a research finding to educational practice, the more valuable that finding will be.\textsuperscript{13}

There has been a trend in recent years to conduct more replications of educational research. You should give this option careful thought because it offers significant advantages for thesis and dissertation studies.

Other Methods of Identifying Research Problems

If you still have not located a problem after using the approaches just presented, a number of other approaches may be tried. One of these is to observe carefully the existing practices in your area of interest. For example, a student interested


\textsuperscript{13} The degree to which research findings can be generalized across people, settings, and times is called \textit{external validity}. This construct will be discussed at length in later chapters.
in human relations problems in the public schools may observe faculty me-
tings, committee activities, and other situations where such problems may arise. 
These observations will often provide ideas and insights that can lead to a 
worthwhile research project. The student may observe that in faculty meetings 
some principals are much more effective than others in enlisting cooperation 
and developing enthusiasm among teachers. This observation might lead to a 
comparison of the methods of principals who are successful with those who are 
unsuccessful in obtaining teacher cooperation.

Another valuable source of research ideas is found in the advanced courses 
that you take in your graduate program. In graduate seminars, important 
research articles are often critically reviewed in class and important research 
questions are raised. In many textbooks, questions are also brought up for which 
we have no answers. Some textbooks even go so far as to list problems that 
require additional research. The brief reviews of research published in the 
Review of Educational Research almost always list specific areas in which further 
study is needed.

When searching for a problem, keep a notebook of research ideas. 
Whenever an interesting idea comes up in reading or class discussions, make a 
brief note of the idea and its source. The source will be useful if you decide to 
probe more deeply into the idea. This approach not only produces many 
potential thesis and dissertation problems but also makes you increasingly 
perceptive to possible problems, so that you see many you would previously 
have overlooked.

Do not hesitate to consult with professors at your college or researchers at 
other institutions who are working in areas related to your interests. Because 
they may have carried out research on a particular problem over a period of 
years, these people are likely to have developed a sensitivity to important 
unsolved problems in their field. For example, the authors have worked over the 
last several years on the development of training programs to improve the 
classroom skills of in-service teachers. As a result of this experience, we have 
identified a number of research problems concerning the teacher’s role in the 
classroom. Little is known, for example, about the effect of many teacher 
behaviors on student performance. Does the teacher’s use of higher cognitive 
questions in classroom discussions relate to student behavior and achievement? 
What is the effect of individual or small-group tutoring on student achievement? 
Also, little is known concerning the frequency with which certain teacher 
behaviors occur in the classroom, for example, how frequently teachers use 
tutoring, role-playing, or discussion of controversial issues, and at what grade 
levels these techniques are most used. Another type of research problem 
concerns identification of variables affecting development of teaching skills. We 
know, for example, that the use of models facilitates skill development. 
However, certain variables, such as sex and status of the model, may enhance or 
lessen the effectiveness of modeling. By consulting with researchers in your own
area of interest, you may be able to identify problems of similar importance to
the advancement of a particular field of study.

Graduate students in education have the advantage of working in an area
where they have gained much experience during their years as students. Very
often graduate students can recall problems encountered in their own educa-
tional experiences and from one of these problems develop a worthwhile
research plan. Newspapers and popular magazines are sometimes valuable
sources of research ideas. These periodicals often report at length on educational
problems that are currently considered of major importance and usually report
the opinions of educators and others in public life concerning these problems.
These reports usually contain assertions, suggestions, and criticisms, the merits
of which can be checked by research. For example, public debate in recent years
concerning the need for changes in the methods of teaching reading has
stimulated many research projects aimed at trying and evaluating some of the
ideas and proposals that have been put forth.

OUTLINING A RESEARCH PROPOSAL

Purpose of the Research Plan

After having identified a specific research problem that appears to be satisfac-
tory, you should outline a research plan in as much detail as possible. The
project is still tentative at this point because your review of the literature has yet
to be completed, and this review almost always leads to some changes in the
research plan. The tentative outline, however, can do much to clarify your
thinking and will also give direction to your review of the literature and your
study of educational research. In order to plan a research project, you must have
tentatively identified a problem, read a substantial amount of the research and
theoretical literature relevant to your problem, and have a good basic knowledge
of the educational research process. As this is only the second chapter of this
text, you may wonder how you can be expected to be ready to prepare a research
plan at this point. The fact is that you are probably not ready to develop a
finished plan, but you should still start a preliminary plan, following the outline
presented earlier in this chapter and based on the information described in the
next few pages. Your preliminary plan will surely contain many blank spaces
and many ideas that you will later change. The deficiencies of your plan will
become apparent to you as you progress through this book. As you learn more
about such topics as reviewing the literature, sampling, educational measure-
ment and research design you can immediately apply this knowledge to the
gradual refinement of your preliminary plan.

Most graduate students have two major goals in their study of the process
of educational research. First, they want to develop the skills and knowledge they will need to plan and carry out their own research. Second, they must be able to apply their knowledge of the research process to the critical evaluation and interpretation of the research of others. Only by understanding the work of previous researchers can you build upon this work and move ahead, if only by a small amount, the frontiers of educational knowledge. If you keep these two broad goals in mind as you progress through this book, ideas and information presented will have much more meaning.

The tentative research plan should contain the following sections: introduction and problem description, statement of the objectives or hypotheses, listing of possible tests or measures to be used in the study, description of the proposed sample, research design, a chronological description of the procedures to be used in carrying out the project, and plans for carrying out analysis of data to be collected.

An important advantage of a research plan is that it compels students to state all their ideas in written form so that they can be evaluated and improved upon by the researcher and others. Even a simple research project contains many elements, and it is easy to overlook some of them unless they are all written down in a systematic manner. The authors recall an instance in which a written plan helped to stop a student from making a serious error in his research project. In discussing the proposed project with the student, we found the research design satisfactory. When the research plan was read later, however, we discovered that the student planned to have teachers try a new teaching technique with unfamiliar pupils rather than with pupils from their own classes. This procedure would confound the effect of the new teaching technique with the effect of working with unfamiliar pupils. Subsequently the student was advised to change the research design to avoid this error.

Another advantage of a detailed research proposal in written form is that it can easily be submitted to several professors and consultants for their comments and suggestions. Furthermore, the final plan can be used as a guide for conducting the research project. Otherwise you will need to rely on memory and may forget important details of the project when carrying it out.

**Introduction and Problem Statement**

Research proposals usually start with an introductory section that states the research problem, briefly reviews the most relevant research and theoretical literature, and states why you believe the problem to be important and what contribution you expect to make to educational knowledge and practice. This section typically covers the first four activities listed in the outline in the Introduction of this chapter.
By the time you start writing your research plan, you should be well along in your efforts to convert your initial research idea into a clear, specific, and manageable research problem. You will recall that the development and clarification of the research problem usually progresses as you build a stronger foundation of knowledge through a reading program. This program should start with books that pull together much information in a few pages, but by the time you have selected a specific problem, it should also include a review of the most relevant research articles that have appeared in recent journal issues.

Knowledge and understanding should be demonstrated through a brief review of the most important research and theoretical work relating to your problem. Usually a discussion of 10 to 20 key references is sufficient to help the members of the thesis committee fit your problem into the context of other work in this area. These few references, however, should be selected carefully from an extensive review of previous research and the findings fitted together to provide an integrated picture of the field of knowledge. If this brief review appears to be a disjointed recitation of the studies cited, as is often the case, the reader may well question your understanding of the problem you propose to study.

You are also expected to describe how your proposed study will contribute to educational knowledge. You should try in this section of your introduction to build a bridge between your expected outcomes and major educational problems and needs. If you have found any survey data that establish or document the importance of your problem, it should be presented.

For example, if your problem is concerned with remedial reading, surveys that report a large number of poor readers could be cited to demonstrate the need for additional research. Quotations from experts in the field that emphasize the importance of your problem area or the need for further research can also be used to help build a justification for your proposed research topic.

Briefly, the introduction and problem statement should have the following characteristics:

1. It should be written in clear, nontechnical language, avoiding jargon. Try to stimulate the reader's interest.
2. The problem should be sufficiently limited in scope to be a manageable thesis or dissertation problem.
3. The problem should be carefully fitted into the broader context of current theory and relevant research. Avoid making assumptions or unsupported claims or statements.
4. The significance of the problem should be addressed; that is, does it explore an important question, meet a recognized need, or make a useful contribution to knowledge?
5. The problem should be clearly and logically related to the hypotheses that follow.
In preparing the introductory section of the research proposal, you should bear in mind that the impression this section makes upon the members of the thesis committee will do much toward shaping their attitudes about you and the remainder of your plan.

Formulating Hypotheses or Objectives
In our day-to-day activities we are often faced with problems for which we must gather information and seek answers. In order to focus our information gathering we try to identify possible solutions or explanations to our problem and then gather the information needed to see if a given explanation is correct. These “educated guesses” about possible differences, relationships, or causes are called hypotheses.

For example, suppose that your car will not start. You know that there is a cause-and-effect relationship between availability of gasoline and running of the engine. Therefore, your first hypothesis may be that you are out of gas. When you note that the gauge indicates half full, you tentatively reject this hypothesis. Next, you hypothesize that you have gasoline but it is not reaching the carburetor. To test this hypothesis, you disconnect the gasoline line from the carburetor and operate the starter to see if gasoline is pumped out of the line. If so, you reject this hypothesis. Your next hypothesis may be that no electricity is reaching the spark plugs. This can be tested by removing a spark plug wire, operating the starter, and checking to see if a spark jumps from the wire to the engine. You can continue to formulate and test new hypotheses until the problem is solved.

This simple process that we use to attack our day-to-day problems is similar to the approach an investigator may use to attack a problem in educational research. First, the investigator hypothesizes a relationship between two or more variables, or a difference between two or more treatments. The investigator then collects evidence related to the hypothesis and examines the evidence to decide whether or not to reject the hypothesis. For example, a first-grade teacher may have noted that one of the pupils in class appears to be making no progress in reading. Careful observation of this child plus a review of previous research in this area may suggest several possible causes for this problem. These possible causes may be stated as hypotheses. The teacher may then design and carry out a program aimed at testing each hypothesis by manipulating the possible cause and then checking the child’s progress in reading.

Educational research problems tend to be more complex than “troubleshooting” your car. The first-grade pupil is infinitely more complex than an automobile engine, and consequently most educational problems are likely to have multiple causes that may interact in unexpected ways and are likely to
differ from child to child. Nevertheless, formulation of an hypothesis, and
gathering of relevant evidence to test the hypothesis, is usually the most
productive approach to throwing light on educational problems.

Before we leave our car and take the bus, let us look a bit more closely at
the process we went through in attacking the "won't start" problem. First, it is
important to state our problem as precisely as possible. For example, "the car
won't go" is not as good a problem statement as "the starter will turn over the
engine but the engine will not start." Once we have stated our problem clearly
we can formulate hypotheses, that is, possible explanations or solutions to the
problem. Note, however, that you must know something about the process
you are studying in order to formulate good hypotheses. For example, if you did not
know that gasoline must reach the carburetor in order for the engine to run, you
would not be likely to formulate the hypothesis that gasoline is not reaching the
carburetor. Similarly, in educational research you will be unable to formulate
good hypotheses unless you know something about the phenomenon you
propose to study. Furthermore, the more you know about your topic before you
conduct your research, the better will be your hypotheses and the greater will be
your chances of producing useful new knowledge related to your problem. This
is one reason why a careful review of relevant literature is essential to the
development of a sound research plan.

Although knowledge is a crucial ingredient to the formulation of good
hypotheses, imagination is equally important. Investigators who make a real
effort to look at their problem in new ways or organize relevant previous
knowledge into new configurations are likely to gain perspectives and insights
that other investigators have missed. When generating hypotheses, researchers
must allow time to think through all the alternatives they can identify. Graduate
students, who are typically in a great hurry to finish their research, often settle
for the first promising approach or hypothesis they think of. It is always a
serious mistake to hurry the planning phase of research. This is a time for careful
thought, reading, and discussions with professors and fellow students. Re-
search planning, even when done with care, requires only a small percentage of
the total effort required to carry out a research project. In many cases a hastily
planned project that produces nothing of value takes longer to carry out than a
carefully planned project because of the mistakes, false starts, and need to
repeat or replan that are an inevitable consequence of poor planning.

Because our society is highly evaluative, students often reject unique ideas
that with further development would form the basis for promising hypotheses.
In the initial stages of generating hypotheses, you should be noncritical. That is,
you should first generate as many ideas as possible and only then should you
start examining the ideas critically.

Educational researchers can often generate more imaginative hypotheses
and procedures if they look at the knowledge, ways of attacking problems and
methods for gathering data that have been developed in other disciplines such
as sociology, psychology, economics, history, and anthropology. For example, a number of recent studies of classrooms and school systems have generated interesting new knowledge by using procedures borrowed from anthropology.14

The graduate student who has formulated a well-thought-out set of hypotheses has taken a major step on the road to an effective study. Such hypotheses place clear and specific goals before the researcher and provide a basis for selecting relevant samples, dependent variables, and research procedures to meet these goals. Many studies in education fail to produce useful knowledge because the researcher plunges ahead before developing a clear and specific set of hypotheses.

Directional and Null Hypotheses

Hypotheses may be stated in two forms, directional and null. The directional hypothesis states a relationship between the variables being studied or a difference between experimental treatments that the researcher expects to emerge. For example, the following are directional hypotheses:

1. Pupils of low ability in ability-grouped classrooms will receive significantly higher scores on a measure of inferiority feelings than pupils of low ability in random-grouped classrooms.
2. There is a positive relationship between the number of older siblings and the social maturity scores of six-year-old children.
3. Children who attend preschool will make greater gains in first-grade reading achievement than comparable children who do not attend preschool.

In contrast to the directional hypothesis, the null hypothesis states that no relationship exists between the variables studied or no difference will be found between the experimental treatments. For example, in null form, the aforementioned hypothesis could be stated thus: “There will be no significant difference between the scores on a measure of inferiority feelings of low ability pupils in ability-grouped classrooms and low-ability pupils in random-grouped classrooms.” The null hypothesis does not necessarily reflect the scientist’s expectations, but is used principally because it is better fitted to our statistical techniques, many of which are aimed at measuring the likelihood that a difference found is truly greater than zero.

Note that regardless of whether directional or null hypotheses are stated, the differences or relationships hypothesized refer to population differences, not...
sample differences. Stated another way, the null hypothesis, in the form usually used in education, states that no difference exists, and the statistical tools test this hypothesis by determining the probability that whatever difference is found in the research subjects is a true difference that also is present in the population from which the research samples have been drawn. You may be confused by the null hypothesis because it appears senseless to hypothesize the exact opposite of one's expectations. This is a disadvantage of the null form, because the researcher's expectations, based as they are upon considerable insight into other research and theory, often make the study clearer to the person reading the research report. Some researchers overcome this problem by using both a working hypothesis that reflects their expectations based on theory or previous research and a statistical hypothesis that is usually in the null form and is set up to make testing of the working hypothesis statistically more precise.

Directional hypotheses can also be tested as statistical hypotheses. However, your statistical hypothesis should be stated in the directional form only when there is little or no possibility that the findings will yield a difference or relationship in the opposite direction. This is because the null hypothesis and the directional hypothesis call for different statistical treatment, the first requiring what is called the two-tailed test of significance and the second requiring a one-tailed test. The two-tailed test assumes that the difference could occur in either direction—that is, either the ability-grouped or random-grouped children could have significantly greater inferiority feelings. The one-tailed test on the other hand assumes that, if a difference occurs, it can occur in only one direction. See chapter 13 for a discussion of one-tailed and two-tailed tests.

Some investigators state their problem in the form of a question instead of stating a working hypothesis. The aforementioned hypothesis stated as a question might read: "Is there a significant difference between the scores on a measure of inferiority feelings of a group of low-ability pupils in ability-grouped classrooms as compared with low-ability pupils in random-group classrooms?" The question form is often the easiest for the inexperienced research worker to use because it states specifically the question that the research will attempt to answer. In writing the research results, you may organize your report so as to answer the questions that you have posed.

In some research carried out in education, especially descriptive studies, it is appropriate to list objectives rather than hypotheses. A survey, for example, aimed at determining the extent of differences in the salaries of university professors in different fields of learning could test a hypothesis such as "There will be no significant differences between the mean salaries of faculty members of comparable ranks in different areas of learning." In a study of this sort, however, it is probably more desirable merely to state the objectives of the study as follows: "The objectives of this research are (1) to study the salaries paid professors of comparable academic ranks in different fields of learning and (2) if differences are found to exist, to attempt to identify the factors that appear to contribute to the observed differences."
Criteria for Good Hypotheses

If hypotheses are to be of maximum value to the researcher, they should satisfy the following four criteria:

1. The hypothesis should state an expected relationship between two or more variables. In correlational studies, that is, those in which data on two or more variables are collected on the same individuals and correlations are computed, a direct relationship is usually stated in the hypothesis. For example, a directional hypothesis for a correlational study might state: "There is a significant positive relationship between peer-group acceptance and attitude toward school of sixth-grade boys."

In experimental studies, where an experimental treatment such as a new reading program is administered to one group of subjects but not to another group, differences between the treatments are usually hypothesized. For example, a null hypothesis for an experimental study might state: "There will be no significant difference in the reading achievement of first grade pupils trained with Experimental Program A and comparable pupils trained with Conventional Program B." Although this hypothesis deals with an expected difference, it also indirectly suggests a relationship. Namely, it implies a relationship between characteristics of the two reading programs and reading achievement. Thus, either directly or indirectly, a good hypothesis is concerned with an expected relationship between two or more variables.

In addition to stating a relationship, the hypothesis may also briefly identify the variables and the population from which the researcher plans to select his sample. Some researchers provide a good deal of specific information about subjects and variables in their hypotheses as in this example: "Success in engineering as measured by a composite score based on income, patents held, and scholarly publications is positively related to freshmen scores on the Garnett College Test in Engineering Science for a random sample of 100 engineers who graduated from the University of Minnesota during 1976." As a rule, however, do not include such information because it lengthens the hypothesis statement and tends to make it less clear.

2. The researcher should have definite reasons based on either theory or evidence for considering the hypothesis worthy of testing. After completing the review of the literature, you will have detailed knowledge of previous work relating to your research project. In many cases you will find conflicting research results so that your hypothesis cannot agree with all available information. In general, however, your hypothesis should not conflict with the preponderance of previously reported information.

In addition to being in agreement with knowledge already established within the field, hypotheses should be formulated in accordance with theories in education or psychology. When this is possible, the results of the research will contribute to the testing of the theory in question. In many areas of education so little research has been done that reasonably conclusive information is not
available. In this case educational theory may form the only basis for developing the hypothesis. You must always have some basis in theory or fact for your hypotheses. Occasionally, we find a "study in education that has used the "shotgun approach." In this approach the research worker tries all the measures one can in the hope that something will yield useful results. This approach should be avoided because it uses measures for which no hypotheses have been developed. Many dangers are involved in applying such research results to educational practice. When we do not have some understanding of why a particular relationship exists, there is always a danger that factors are operating that may be detrimental to the educational program.15

3. A hypothesis should be testable. Hypotheses are generally stated so as to indicate an expected difference or an expected relationship between the variables studied in the research. The relationship or differences that are stated in the hypotheses should be such that measurement of the variables involved can be made and necessary statistical comparisons carried out in order to determine whether the hypothesis as stated is or is not supported by the research. Do not state any hypothesis that you do not have reason to believe can be tested or evaluated by some objective means. For example, the authors recall a "hypothesis" prepared by a teacher who wished to evaluate a high school course in civics. It was "to determine whether this course will make the student a better adult citizen." Such an objective would be very difficult to test because it would require (1) waiting until pupils taking the course had become adult citizens, (2) setting up criteria to determine how good a citizen each pupil had become, (3) evaluating each adult in terms of the criteria established, and then, perhaps most difficult of all, (4) determining what aspects of the adult citizenship of the former pupils could be directly attributed to the civics course. We can see from this example that such hypotheses are much easier to state than they are to evaluate by objective means. The hypotheses of inexperienced research workers in education often fail to meet the criterion of testability because relationships are stated that cannot be measured using today's tests. A similar mistake made frequently by graduate students is to state hypotheses in terms that would require many years to test.

4. The hypothesis should be as brief as possible consistent with clarity. In stating hypotheses the simplest and most concise statement of the relationship expected is generally the best. Brief, clear hypotheses are easier for the reader to understand and also easier to test. The question "Is a student counseling program desirable and economically feasible at the elementary school level?" reflects the sort of fuzzy thinking that handicaps many studies in education. A program can be "desirable" or "undesirable" from a very large number of different viewpoints. No specific guides are given about what aspect of the guidance program is to be studied. The second part of the question dealing with

15. A discussion of the "shotgun approach" can be found in chapter 14.
the economic feasibility is determined largely by the individual school district’s financial resources. In order to develop a meaningful hypothesis from this question we would need to determine first the specific aspects of the elementary school counseling program that the research worker plans to study. Let us say he wished to provide counseling for three classes of sixth-grade pupils and not provide counseling for three other classes in a large elementary school and then compare his two groups on such variables as the number of behavior problems reported by the classroom teachers, the incidence of truancy, and the pupils’ stated attitudes toward school. In this case perhaps three specific hypotheses would be the best approach. Stated in the null form these might be:

1. Sixth-grade pupils receiving counseling will not be significantly different in the number of behavior problems reported by the teacher from sixth-grade pupils not receiving counseling.
2. Sixth-grade pupils receiving counseling will not be significantly different in incidence of truancy from sixth-grade pupils not receiving counseling.
3. Sixth-grade pupils receiving counseling will not be significantly different in their stated attitudes toward school from sixth-grade pupils not receiving counseling.

In the aforementioned example the broad general question has been changed to three specific null hypotheses, each stating a specific relationship between two variables. It is usually desirable to state your hypotheses in this more precise form. The advantage of stating a hypothesis for each relationship to be studied is that this procedure is simple and clear. The testing of multiple hypotheses involving several relationships leads to some confusion because portions of the hypothesis may be supported by the research evidence and other portions may not be supported. In writing the results of the experiment, you will find it possible to present a more easily understood picture of your findings if each hypothesis has stated only a single relationship.

Considering Alternate Hypotheses

Once you have formulated your hypotheses, carefully consider the following question: “If my research results support the relationship that I have stated in my working hypothesis, what factors, other than the variables manipulated in my research, could have brought about this result?” For example, suppose you plan a study designed to compare the effectiveness of two reading programs in improving the reading comprehension of first-graders. Your working hypothesis is that children who study Program A will obtain higher reading comprehension test scores at the end of first grade than will children who study Program B. You select 10 first-grade teachers in School 1 to teach Program A, a new program. Program B, which is already in use in your district, will be used by 10
teachers in School 2. What are some of the reasons, other than the superiority of Program A, that could result in children in Program A classrooms obtaining higher scores on the reading comprehension test? Let us consider a few possibilities:

1. School 1 has a more extensive prereading program in kindergarten than does School 2. Thus, the children in School 1 are better prepared for first-grade reading and do better for that reason.
2. Teachers who try Program A in School 1 are more enthusiastic and highly motivated than those who continue to use Program B in School 2. Often a new program tends to generate teacher enthusiasm.
3. School 1 serves a neighborhood of higher socioeconomic status than that served by School 2.
4. The items on the Reading Comprehension Test fit the content of Program A better than the content of Program B and therefore are biased in favor of Program A.

We could list many more alternate hypotheses, but these few should be enough to illustrate that many factors other than the effectiveness of Program A could account for the research results. In effect, each alternate hypothesis constitutes a flaw in your research design that will cast doubt on your research findings.

The reason for stating alternate hypotheses when planning your research is that once you have identified these alternatives, the research design can often be changed in ways that eliminate each alternate hypothesis. For example, consider alternate hypothesis 4 as stated above. The Reading Comprehension Test bias could be eliminated by selecting another test that fit the content of Programs A and B equally well, or by analyzing the content of the two programs and omitting test items that were covered in one program but not the other.

As you learn more about research design you will become increasingly capable of identifying alternate hypotheses and adjusting your research proposal to eliminate them.

Selecting Possible Measures

The next step in preparing the tentative research plan is to make a listing of possible measures. You probably have had courses in educational measurement that have provided some background in the types of measures available and sources of information about educational measures. This topic is covered briefly in chapters 8 and 9. Very often the process of identifying possible measures will require you to clarify your objectives and eliminate hypotheses for which no measures are available or can be developed. After measures have been identified, evaluate them and select the most appropriate.
Selecting Research Subjects

You should then describe the subjects you will require for your study. At this point, consider carefully the chance of obtaining the type and number of subjects you need. If your study is concerned with individuals who occur only rarely in the general population, be particularly careful to determine whether or not subjects are actually available to do the work you have planned. For example, studies of highly gifted children, say those with IQs above 160, are extremely difficult to carry out unless you have a very large population to draw from because children at this IQ level occur very rarely in the general population. Your method of selecting your sample should also be considered and tentatively decided upon. Careless selection of subjects is an error often found in educational studies. Considerations involved in selecting a sample of subjects are discussed in chapter 6.

Specifying the Research Design

Next, describe your tentative research design. Become familiar with the various types of research designs in chapters 10 to 19, and be sure that the design you plan to use will permit testing the hypotheses. Students often give little thought to the design of their projects until too late.

Selecting Analysis Procedures

A tentative plan for analysis of the research results is very important because this plan may have a considerable bearing upon the number of subjects needed, the measures and scoring procedures used, and the methods of recording the data. Yet many students give no thought to analysis until the data are collected. Then they find that no analysis procedures fit their data very well, and often they discover that the only procedures that can be used to salvage the study are complex ones that they must then learn to use.

In no area is lack of foresight so costly and disastrous as in doing research. Careful planning saves time in the long run and results in much better research. Students should complete their course in research methods prior to starting the work on their research problem, because much of the knowledge needed to carry out even the first steps in a research problem requires an understanding of the overall field of educational research.

Specifying Research Activities

After you have spelled out your measures, subjects, design, and analysis, add to your research plan a chronological list of procedures that you will follow in carrying out your study. This list should be as detailed as possible. In addition to
describing each activity, give the approximate date when the activity will be completed, and also estimate how many working hours will be required to carry out the activity. Compiling this chronological list forces you to think through the entire research process and may alert you to problems that you might otherwise overlook. The following types of problems are often identified as a result of compiling a chronological list of procedures:

1. In order to start the research in October, school officials must be contacted during the summer.
2. The collection of pretest data must be speeded up or the experimental treatments will extend into the Christmas holiday.
3. Standardized tests to be administered must be ordered as soon as possible to assure their arrival by the time needed.
4. The posttests cannot be given by one person in the number of days available.
5. The research cannot be completed during the time remaining in the current school year.
6. At least three observers will be needed to collect the classroom observation data in the time allotted.
7. Some of the activities to be done by the researcher during the first month of the project must be rescheduled because they will require 200 hours and only 80 hours are available.

Fitting the Proposal Together

In their initial attempts to develop a research plan, students often focus on each section of the plan in turn, and give too little attention to relationships among the various sections. As a result, it is not uncommon to find research plans in which errors such as the following occur:

1. An hypothesis is listed that cannot be tested by the measures described later in the plan.
2. The "Measures" section of the plan includes measures that are not related to any of the hypotheses or objectives. This happens frequently in correlational studies in which the careless researcher adds a few extra measures in the hopes that something interesting will emerge, or because the schools from which he has sampled already use the measures, or for some other reason.
3. Inappropriate analysis procedures are stated. Students who do not think through their analysis often list several analysis techniques and hope that one or the other will be accepted by the thesis committee.

One way to avoid errors such as those mentioned above is to construct a table in which the hypotheses are listed in the left-hand column, the measures to be used to test each given hypothesis are described in the center column, and
TABLE 2.1  
Procedure for Checking Relationships among Hypotheses, Measures, and Analysis

<table>
<thead>
<tr>
<th>Hypothesis</th>
<th>Measures</th>
<th>Analysis</th>
</tr>
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<tbody>
<tr>
<td>1. There is no relationship between overall achievement and popularity for sixth-grade boys.</td>
<td>1a. Achievement: total battery score on the California Achievement Test.</td>
<td>1. Product moment correlation between 1a and 1b.</td>
</tr>
<tr>
<td></td>
<td>1b. Popularity: a sociometric choice instrument in which each student lists names of his or her five best friends.</td>
<td></td>
</tr>
<tr>
<td>2. When the effects of achievement differences are controlled, there is no relationship between popularity and self-concept of sixth-grade boys.</td>
<td>2a. Achievement: as in 1a.</td>
<td>2. Partial correlation between 2b and 2c, partialing out 2a.</td>
</tr>
<tr>
<td></td>
<td>2b. Popularity: as in 1b.</td>
<td></td>
</tr>
<tr>
<td></td>
<td>2c. Self-concept: Tennessee Self-Concept Scale.</td>
<td></td>
</tr>
</tbody>
</table>

Note: The problem of this study is to determine relationships between peer-group popularity and characteristics of sixth-grade boys.

the method of analysis is given in the right-hand column. An example of such a table for a correlational study is given in table 2.1. This procedure is especially useful in helping the student think through studies that have a large number of objectives or hypotheses. For example, in descriptive questionnaire surveys, items are often included in the questionnaire that do not relate to any research objective and are often stated in a form that makes analysis difficult. By matching test items with hypotheses in a table, you are assured that all objectives are covered in your questionnaire and that no items are included that do not relate to an objective.

Using PERT in Research Planning

In the planning of research several procedures have been developed over the past 20 years. Many of these techniques were developed to improve planning for the development of complex weapons systems. They can be employed in any research or development activity, however, and are especially useful in planning
large-scale projects. In educational research, PERT (Program Evaluation and Review Technique) is the most widely used of these planning systems. In effect, PERT is an extension of the chronological list of procedures typically included in an educational research plan. By using PERT, the researcher can (1) clearly see the relationships among the various activities making up the research, (2) check one's progress and identify activities that must be changed or speeded up in order to keep the project on schedule, and (3) focus on potential or actual problems involved in carrying out the project.

The first step involved in using PERT is to identify all goals that must be reached in the process of carrying out the project. Broad goals are first identified, and these are subsequently broken down into as many specific activities and subgoals as possible. For example, one broad goal in a study of the relationship between student attitudes and achievement could be to develop a scale to measure student attitudes toward school. This could be broken down into the activities and subgoals as shown in figure 2.1.

Having made a breakdown such as this for the entire project, you can now draw a network in which the various events or subgoals are arranged in order, beginning with the first day of the project and ending with the last day. Figure 2.1 shows a PERT network for the development of the attitude scale mentioned earlier. Each circle represents one subgoal or event. The initial event, a in figure 2.1, is to "start scale development." The circles are connected by lines, which represent the activities that must be carried out to achieve the following subgoals. Activities that can be carried out simultaneously are drawn parallel to each other, while those that must be done in sequence are drawn end-to-end. A dashed line is called a "dummy activity" and is used mainly to connect the completion of one broad goal or event and the start of the next. In drawing the PERT network, make decisions about the sequence of events and how you will allocate time to accomplish them. Note that each of these activities is highly specific and deals with only one small aspect of the process of developing the needed attitude scale. It is much easier to estimate accurately how much time will be involved in achieving each specific subgoal than to estimate the work involved in achieving the broad goal without making this detailed breakdown of activities.

The next step in PERT is to make time estimates. For each subgoal make three time estimates: optimistic (a), the time that will be needed to achieve the subgoal if everything goes well; most likely (m), best estimate of time needed; and pessimistic (b), the time needed if everything goes wrong that can go wrong. These estimates are usually expressed in weeks and made to the nearest tenth of a week. Figuring a five-day week, each half day equals one-tenth of a week (1).

16. Flowcharts can also be used in research planning. See K. M. Evans, Planning Small-Scale Research, 3rd ed. (Windsor, Berkshire, England: NFER-Nelson, 1984) for a research planning flowchart.
Researchers who have made the three estimates for a given subgoal use the following formula to compute the expected elapsed time ($t_r$) to be spent in work planning:

$$t_r = \frac{a + 4m + b}{6}$$

For example, for activity 6, "arrange field test of prototype scale," the researcher may estimate that if all goes well (a) one can make the arrangements in one-half day. However, it will probably (m) take a full day by the time telephone contacts are made, appointments are set up, and necessary meetings are held. If the necessary persons are difficult to contact, if appointments cannot be made on the same day, and if meetings take longer than anticipated, the researcher estimates that four and one-half days (b) will be needed to complete this task. Using the formula...
\[ t_r = \frac{1 + (4 \times .2) - .9}{6} = \frac{1.8}{6} = .3 \]

the researcher arrives at .3 weeks or 1.5 days as the time estimate.17

Figure 2.1 represents the PERT network for only one major step in a research project. In developing a network for the entire project, each major goal would be broken down; the resulting network would combine many networks such as figure 2.1 in chronological order to produce the network for the entire project. Since this final network will be quite complex even for a typical thesis or dissertation plan, you may want to begin by constructing a PERT network that shows only the major goals or events. Then this network can be expanded by breaking down each broad goal, as was done in figure 2.1.

THE PILOT STUDY

A preliminary trial of research measures and techniques is essential to the development of a sound research plan. Whenever possible this preliminary trial should be enlarged into a pilot study. In a pilot study the entire research procedure is carried out, including analysis of the data collected, following closely the procedures planned for the main study. Pilot studies are carried out with fewer subjects than will be employed in the main study. For some pilot studies two or three subjects are sufficient, and you rarely need to include more than 20 subjects.

In addition to serving all the purposes of the usual tryout, such as improving data-collecting routines, trying scoring techniques, revising locally developed measures, and checking the appropriateness of standard measures, the pilot study provides additional knowledge that leads to improved research:

1. It permits a preliminary testing of the hypotheses that leads to testing more precise hypotheses in the main study. It may lead to changing some hypotheses, dropping some, and developing new hypotheses when called for. 
2. It often provides ideas, approaches, and clues not foreseen prior to the pilot study. Such ideas and clues greatly increase the chances of obtaining clear-cut findings in the main study.
3. It permits a thorough check of the planned statistical and analytical procedures, thus allowing an appraisal of their adequacy in treating the data.

17. Note that the formula arbitrarily gives the greatest weight to the researcher's best estimate.
Needed alterations also may be made in the data-collecting methods, so that data in the main study may be analyzed more efficiently.

4. It greatly reduces the number of treatment errors because unforeseen problems revealed in the pilot study may be overcome in redesigning the main study.

5. It may save a major expenditure of time and money on a research project that will yield nothing. Unfortunately, many research ideas that seem to show great promise are unproductive when carried out in the field or laboratory. The pilot study almost always provides enough data for the research worker to make a sound decision on the advisability of going ahead with the main study.

6. In many pilot studies it is possible to get feedback from research subjects and other persons involved that leads to important improvements in the main study. Although the pilot study should follow the main study procedures for the most part, variations such as trying alternate instruments and procedures and seeking feedback from subjects on the treatment, measures, and other aspects of the research are usually desirable. In deciding what variations are appropriate, you should remember that the pilot study is not an end in itself but is only a means by which the main study can be improved.

7. In the pilot study, the research worker may try out a number of alternative measures, and then select those that produce the best results for the main study with some tentative evidence that they would be productive. If you plan to continue beyond the master's degree, the master's research may sometimes serve as a pilot study for later research to be carried out as part of a doctoral program. The less research experience you have, the more likely you are to profit from the pilot study. Because of this, you should attempt a pilot study whenever possible.

MISTAKES SOMETIMES MADE IN PLANNING RESEARCH

1. The researcher puts off selection of a problem until completing all or most of the courses.
2. Uncritically accepts the first research idea thought of or that is suggested.
3. Prepares fuzzy or untestable hypotheses.
4. Hurries the planning of the research and, as a result, ends up with a poorly designed study that contributes nothing to educational knowledge.
5. Fails to carry out a preliminary trial of the measures and, as a result, makes serious mistakes when collecting data for the study.
6. Fails to conduct a pilot study and, as a result, encounters many unforeseen problems that weaken the research.
7. Overlooks important steps in preparing a chronological list of procedures.
ANNOTATED REFERENCES


Aimed both at the graduate student who wants to develop a thesis proposal and the professional educator who wants to prepare a grant proposal. The Research Proposal Outline and the Guidelines for the Research Proposal provide a detailed, step-by-step description of the process. The section on methodology is much too brief to be of any value to those who are not already familiar with this topic. It cannot, however, help remind the writer of the bases that must be covered in a proposal.


Describes how the learning theories of Ausubel and the motivation theories of White and Berylne were used as guides in the development of an elementary school mathematics curriculum. The author demonstrates how the theoretical constructs were directly applied, modified, and combined in developing the curriculum. This paper provides a good example of how theory can be applied to the development of curriculum materials, which in turn could be used in research to test the theories involved.


Provides a description of PERT and gives examples of PERT charts for all of the major kinds of educational research. Much useful information is also provided on implementation of PERT on educational research and development projects. Students who intend to use PERT in planning their thesis or dissertation studies should read this book.


Contains clear and simple guidelines that a student can use to evaluate a research plan. The authors pose questions that focus the student’s attention on important aspects of the research plan, discuss each question briefly, and provide a reference to which the student may go for further information. There is also a chapter on the language of research that contains definitions of many terms the student will encounter in reviewing research literature.


Provides a useful model for those who want to use PERT on the planning of their research. A 34-event PERT chart was developed for a three-year curriculum development project. When the PERT projections were compared with actual
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## CHAPTER

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Educational Research
An Introduction
Fifth Edition

Walter R. Borg
Utah State University

Meredith Damien Gall
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Longman
New York & London
OVERVIEW

An educational researcher who would advance scientific knowledge must first identify and understand the research that has already been done in the field of interest. This chapter is designed to help you acquire the skills needed to conduct a thorough and systematic review of the research literature in your area of interest. Several reasons for conducting a review of literature are given, such as seeking to delimit the research problem and to identify new approaches. A systematic method of reviewing the educational research literature is described. Also discussed are the most important reference books and services that provide reviews, indexes, and abstracts of completed research studies.

OBJECTIVES

After studying this chapter you should be able to:

1. Describe the difference between primary and secondary sources and locate examples of each. How is each typically used in the educational research process?
2. State and explain briefly six reasons for conducting a review of literature before starting a research project.
3. Conduct a review of the research literature on a given topic, following the three steps presented in this text.
4. Locate relevant articles in Education Index, Psychological Abstracts, Current Index to Journals in Education, and Resources in Education on a given research topic.
5. Describe at least four major preliminary sources specifically intended for use in educational research.
6. Plan a computer search of Resources in Education, Current Index to Journals in Education, or Psychological Abstracts on a given topic in educational research.
7. Read a research article and prepare a bibliographic citation and a note card that follows the models given.
8. Develop a system for coding research literature on a given topic.
9. Describe ways to obtain references not available in your university library.

INTRODUCTION

The review of the literature involves locating, reading, and evaluating reports of research as well as reports of casual observation and opinion that are related to the individual's planned research project. This review differs in a number of
ways from the reading program often used to locate a tentative research project. First, such a review is much more extensive and thorough because it is aimed at obtaining a detailed knowledge of the topic being studied, while the reading program is aimed at obtaining enough general knowledge and insight to recognize problems in the selected area.

Secondary Sources

The reading program generally uses textbooks, encyclopedias, and other secondary source materials. Secondary source materials in education include any publications written by an author who was not a direct observer or participant in the events described. For example, most of the material found in textbooks of Roman history are secondary source materials because the author has merely compiled the reports of others and rearranged these reports into a textbook. Most of the content of textbooks in education and psychology is also secondary source material.

Let us suppose that an individual wishes to write a textbook on methods of teaching remedial reading. The prospective author does an exhaustive review of the literature in this field, noting the results of all experiments and weighing and evaluating these results in terms of various approaches to remedial reading instruction. Then, on the basis of the interpretation of the various research reports and articles one has read, the author prepares the textbook. In the textbook, the author also reports the results of experiments that the author has carried out, then this portion of the textbook would be considered a primary source. That portion, however, is based on interpretations of the work of others would be classified as a secondary source. Secondary sources are useful because they combine knowledge from many primary sources into a single publication. A good textbook, for example, combines the work of many other persons and simplifies or eliminates much of the technical material that is not of interest to the general reader, thus providing a quick and relatively easy method of obtaining a good overall understanding of the field.

Primary Sources

The primary source differs from the secondary source in that it is a direct description of an occurrence by an individual who actually observed or witnessed the occurrence. In educational research this generally means the description of the study by the individual who carried it out.

The principal disadvantage to the research scholar of using secondary sources is that it is never possible to be sure what changes have been made by the secondary source author. In the process of simplifying and combining the results of many studies, the author of a textbook or other secondary source report may slant his or her interpretation of the primary source to agree with
his or her own views and will omit material that the person reviewing the literature needs to know. Thus, a review of the literature should be based, whenever possible, upon primary sources. Most secondary sources, such as textbooks, contain a bibliography listing the sources from which the material was obtained so that the student can usually locate the primary source.

Importance of the Review

The review of the literature is an important part of the scientific approach and is carried out in all areas of scientific research, whether in the physical, natural, or social sciences. Such reviews are also the basis of most research in the humanities. In fields such as history, the review of literature not only gives the scholar an understanding of previous work that has been done, but the results of the review actually provide the data used in the research. Historical studies in education, which we will discuss in a later chapter, are based almost entirely upon a careful study of existing printed knowledge in the field.

The review of the literature in educational research provides you with the means of getting to the frontier in your particular field of knowledge. Until you have learned what others have done and what remains still to be done in your area, you cannot develop a research project that will contribute to furthering knowledge in your field. Thus the literature in any field forms the foundation upon which all future work must be built. If you fail to build this foundation of knowledge provided by the review of the literature, your work is likely to be shallow and naive, and will often duplicate work that has already been done better by someone else. Although the importance of a thorough review of the literature is obvious to everyone, this task is more frequently slighted than any other phase of research. Research workers are always tempted to let a sketchy review of the literature suffice so that they can get started sooner on their own research project. However, you should make every effort to complete a thorough review before starting your research because the insights and knowledge gained by the review almost inevitably lead to a better-designed project and greatly improve the chances of obtaining important and significant results. Often the insights gained through the review will save as much time in conducting the project as the review itself required.

PURPOSES OF THE REVIEW

Although the general purpose of the review is to help you develop a thorough understanding and insight into previous work and the trends that have emerged, the review can also help you in reaching a number of important specific goals.
Delimiting the Research Problem

The review of literature can help in both limiting and more clearly defining your research problem. Many studies attempted by graduate students are doomed to failure because the researcher has not limited the problem to an area small enough and sufficiently specific to work with satisfactorily. Selecting a limited problem and treating it well is far better than attempting the study of a broad general problem and doing it poorly. Many graduate students also commit themselves to research problems before they have adequately thought them out. A fuzzy or poorly defined problem can sometimes result in the student collecting data and then learning that the data cannot be applied to the problem one wishes to attack. Before starting your review of the literature, do sufficient background reading from secondary sources to permit a tentative outline of your research problem. The review of the literature will then provide you with the knowledge you need to convert your tentative problem into a detailed and concise plan of action.

Seeking New Approaches

In the process of reviewing the literature, you not only should learn what work has been done but should also be alert to research possibilities that have been overlooked. The unique experience and background of a given individual may make it possible for that person to see a facet of the problem that other research workers have not seen. Such new viewpoints are likely to occur most frequently in areas where little research has been done, but even in well-researched areas someone occasionally thinks of an approach that is unique and creative. A good example is C. E. Thompson's classic study of administration of the Thematic Apperception Test (TAT) to black subjects. Prior to this study, many clinicians were administering the standard TAT cards to clients regardless of racial background. Persons pictured on the standard TAT cards are white, and Thompson saw that the use of these cards with black subjects might well lead to different responses because of perceptual differences. In his research he developed a comparable set of cards in which blacks were substituted for whites in the TAT pictures and found that his hypothesis was correct. Although hundreds of research projects had been carried out using the TAT prior to Thompson's work, his special insight led to a unique and valuable contribution to our knowledge of this important instrument.

Avoiding Sterile Approaches

In reviewing the literature, be on the lookout for research approaches in your area that have proved to be sterile. Not uncommonly, literature reviews will produce several very similar studies done over a period of years, all of which employ approximately the same approach and all of which failed to produce significant results. One or two repetitions of an unproductive approach can be justified on the grounds that these confirm the previous finding that the area is unproductive. Repetitions beyond that, however, serve no useful purpose and generally suggest only that the persons repeating the study have not done an adequate review of the literature.

Insight into Methods

The review of the literature can also provide insight into the methods, measures, subjects, and approaches used by other research workers and can thus lead to significant improvement of your design. A mistake many graduate students make when reading research reports is to give scant attention to anything but the results reported. Very often a study that has little to contribute in the way of results can help a great deal by suggesting methods and useful approaches. For example, discussions of the various measures used can help you decide which of these measures would be best suited for your own research. A sampling pattern discussed by one research worker can help other research workers in the field avoid the same difficulties, and insights into research methods gained in one study can help subsequent investigators design studies leading to more significant research findings.

For example, a study concerned with training in-service teachers to use specific classroom management skills found that although the teachers could be taught to use a set of three specific skills in one week of instruction and practice, their use of the skills was awkward and unnatural. The training program was revised and four weeks were added during which teachers did nothing but practice the skills they had learned earlier. This change resulted in much more effective teacher performance. The methodological insights gained in these studies would be useful to any researchers concerned with training teachers in classroom skills.

Recommendations for Further Research

The authors of research articles often include specific suggestions and recommendations for persons planning further research in the field. These suggestions should be considered very carefully because they represent the insights gained by the research worker after experience in the problem area. Specific research topics are often suggested that are particularly useful in helping you delimit the research problem.

Sampling Current Opinion

Although research reports make up the most important source of information that you should cover, you need also study newspaper accounts, nontechnical articles, and opinion articles related to your topic. Such articles occasionally contain unique ideas that can be tested through research and also help the research worker gain insight into those aspects of the problem area that are considered critical or controversial by educators. For example, a study of opinion articles in the field of ability grouping shows that most of the disputes among educators regard the possible effects of ability grouping on the child's personality and social development. Yet nearly all the research reported in the field of ability grouping is concerned with the achievement of children in ability-grouped situations. These studies contribute valuable knowledge, but they have had little effect on the judgments of most educators. Only research that presents objective data concerning the variables that educators consider critical is likely to have any effect on their decisions to establish or support an ability-grouping program.

SCOPE OF THE REVIEW

Perhaps the greatest frustration encountered by graduate students carrying out their first review of literature is generated by their attempt to determine what they should and should not read. Unfortunately, no pat formulas exist that we can give to help you make this decision. Obviously you should read all those studies that are closely related to your research problem. The decisions that will cause you difficulty involve those studies that are only partially related to your problem, or that are related only to one phase of the problem.

Relatively new research areas usually lack an organized body of secondary-source information to provide general background and thus require a more stringent and broader review, in which even those studies that are only peripheral to the main area of your own problem should be read, to provide you with the foundation of knowledge you will require.
For example, suppose you are interested in the causes of "teacher burnout." Because widespread interest in this phenomenon is fairly new in education, you should probably read most of the studies in the broad area of "burnout" and occupational stress even if they are not closely related to your topic. An article that discusses ways to train teachers to cope with stress, for instance, although only peripheral to the causes of teacher burnout, should probably be checked. Studies that deal with the causes of burnout in other professional groups, such as nurses and social workers, should also be reviewed. In new research areas like this one, you may find no more than two or three studies that are very close to your topic. Your search must therefore be broader, to provide you with sufficient insight into your problem.

In more thoroughly explored areas, where research activity has extended over a longer period of time and where much of the early work is covered in secondary sources, you can usually develop adequate insight into your chosen field by reading only those studies that are closely related to your research topic. In such areas, much more information is available, and you can cover a narrower topic range in greater depth. A study in a more thoroughly explored area might, for instance, be concerned with the effectiveness of high school counseling in bringing about certain personality changes as measured by the Thematic Apperception Test (TAT). In this area, you would find studies that relate personality changes to counseling and involve the use of various personality instruments, and you should cover all of these. In addition, some studies using the TAT in other related research areas should be read; for example, studies involving changes in personality during psychotherapy. As the TAT is a well-established instrument that has been used in a great many research projects, you should not try to read all research involving its use, however. In fact, over 2,000 references dealing with the TAT have been listed in the Mental Measurements Yearbooks. Most of these would be of little value in carrying out the research described previously. Considerable background reading on the TAT in secondary sources, however, would be desirable.

CONDUCTING A REVIEW OF THE LITERATURE

Although a review of the literature is a preliminary step in all scientific research, the methods of conducting a review differ from field to field to some extent. The method that is described in detail in this section is one that works well in the field of education. This method has been developed over a number of years, and we advise you to follow it closely until you have built up sufficient experience to make intelligent adaptations.
Step One—Listing Key Words

In most sciences, abstracts or indexes are available that cover most material published in the science in question. In education, the most useful sources are Resources in Education, Current Index to Journals in Education, Psychological Abstracts, and Education Index. These sources are organized by subject. Therefore, you need to identify key words related to your topic, in order to look up these key words in the index to locate sources of information related to your topic. For example, let us say that you wish to search Education Index for studies related to the following question: What are student and teacher attitudes toward handicapped children in elementary mainstream classrooms? Your first step in reviewing the literature would be to make a list of key words that relate to this question. Your first list might include the following: Attitudes, Mainstream Classrooms, Mentally Handicapped Children, Emotionally Disturbed Children, and Learning-Disabled Children. This preliminary list of key words will almost certainly be incomplete and will be changed when the actual search of Education Index begins. It does, however, provide a starting point, and as many possible key words as you can think of should be listed in order to reduce the likelihood of important studies being overlooked. Key words for Resources in Education and Current Index to Journals in Education are contained in the Thesaurus of ERIC Descriptors, which is described later in this chapter. Key words for searching Psychological Abstracts are listed in the Thesaurus of Psychological Index Terms.

Step Two—Checking Preliminary Sources

References, such as indexes and abstracts, that are intended to help one identify and locate research articles and other primary sources of information are called preliminary sources. (See Annotated References for complete bibliographic data on preliminary sources described in this section.) Many of the preliminary sources that are likely to be of help to you in reviewing the literature in education and related fields are discussed in this section. We first discuss manual search procedures. However, some of these preliminary sources can be searched by computer. The procedure for conducting a computer search is described later in this chapter.

Education Index

Education Index provides an up-to-date listing of articles published in hundreds of education journals, books about education, and publications in related fields. Both an author and subject index are included, that is, each article is listed once.

4. Mainstream classrooms are those in which mildly handicapped children are placed in regular classrooms with nonhandicapped children for all or part of the school day.
under its subject and again under the name of the author. *Education Index* is published monthly, except for July and August. It lists only the bibliographical data concerning each article or book reference. The year for *Education Index* runs from September to the following June. For the current quarter each of the monthly issues must be searched, but these monthly issues are combined quarterly, and the quarterly issues in turn are combined in a yearly volume for the immediate past year. Most reviews of the literature in education cover a minimum of 10 years, but for some studies you may need to search a longer period. In this case, *Education Index*, which has been published since 1929, is especially valuable.

You should develop and follow a systematic method of searching *Education Index* for the period of the review. We have found that preparing a checklist of key words, such as that shown in Table 4.1, is an effective method for ensuring a systematic search. After preparing this checklist, start with the most recent issue of *Education Index* and look up each key word. In this process, be alert for other possible key words that you might want to add to your list to provide more complete coverage.

To check each key word in the index, look up the word and read the titles of articles listed under it. If you find titles that indicate articles that deal with some phase of your topic, copy the bibliographical data (author, title, and source of publication) on a 3 x 5 index card. Use a separate card for each article or other reference. You may find it difficult to judge the contents of an article from its

### Table 4.1

<table>
<thead>
<tr>
<th>Key Words</th>
<th>Volume 12/86</th>
<th>Volume 9/86</th>
<th>Volume 36</th>
<th>Volume 35</th>
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</thead>
<tbody>
<tr>
<td>Attitudes, elementary school students'</td>
<td>✓</td>
<td>✓</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Attitudes, teachers'</td>
<td>✓</td>
<td>✓</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Attitudes toward the handicapped</td>
<td>✓</td>
<td>✓</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Mainstreaming</td>
<td>✓</td>
<td>✓</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Mentally handicapped children</td>
<td>N</td>
<td>N</td>
<td>✓</td>
<td></td>
</tr>
<tr>
<td>Emotionally disturbed children</td>
<td>N</td>
<td>✓</td>
<td>N</td>
<td>N</td>
</tr>
<tr>
<td>Learning-disabled children</td>
<td>N</td>
<td>N</td>
<td>✓</td>
<td></td>
</tr>
<tr>
<td>Student opinion</td>
<td>N</td>
<td>N</td>
<td>✓</td>
<td></td>
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</table>

* Indicates volume checked and bibliography cards made.

* Indicates volume contained no usable references under key word.

* This is a quarterly compilation covering October, November, December, 1986.
title, and many articles for which you prepare bibliography cards will later prove
to contain nothing pertinent to your topic. In deciding whether or not to prepare
a card and check a particular article, you should generally assume that it is better
to check an article that proves useless than to overlook an article that may be
important. Thus, when in doubt, prepare a card and check the article.

After checking titles under key words and making up bibliography cards,
place a check on your checklist. If you have found nothing under a given key
word after checking several volumes of Education Index, drop the word from your
checklist.

In the above example, a review of several volumes of Education Index would
suggest that some of the original key words are appropriate, some are unpro-
ductive and can be eliminated, some do not fit the subject and must be changed,
and some new ones must be added. Attitudes would be replaced by three more
specific phrases: Attitudes, Elementary School Students; Attitudes, Teacher; and
Attitudes Toward the Handicapped. Mainstream Classrooms would be changed to
mainstreaming, and Mentally Handicapped to Mentally Handicapped Children.
Student Opinion would be added, as opinions are closely related to attitudes, and
studies of student opinion may therefore prove relevant.

The revised list of key words is given in table 4.1.

Psychological Abstracts

Another valuable preliminary source in education is Psychological Abstracts. This
reference, published monthly by the American Psychological Association,
contains abstracts of articles appearing in over 1,000 journals and other sources
in psychology and related areas. Every issue has 16 sections, each covering a
different area of the field. The monthly issues also include brief subject and
author indexes.

Sections that are most pertinent to research in education are Developmental Psychology, Psychometrics, and Experimental Psychology (Human). Coverage in these areas is very thorough, and many journals that are predomin-
antly educational, such as Elementary School Journal, Harvard Educational Review,
and Journal of Reading Behavior, are covered. You should select key words for your Psychological Abstracts search from the Thesaurus of Psychological Index Terms, which you can find in the reference section of your library. Although this Thesaurus was not developed until 1973, the terms you select will, for the most part, be satisfactory for searching earlier volumes, for the Thesaurus includes
most of the 800 index terms used before 1973. Always look up the index term
bibliography in Psychological Abstracts; under this heading, you will find a listing of
bibliographies on a wide variety of subjects. If you can locate a recent
bibliography in your area of interest, it will be of great help to you in carrying out
your review of the literature. We will discuss other sources for bibliographies
later in this chapter.
Two volumes of Psychological Abstracts are currently published each year, one covering the January to June issues and one covering the July to December issues. Separate volumes of subject and author indexes are published for each volume of abstracts. In using Psychological Abstracts, turn first to the subject index to check key words. The subject index volumes do not contain complete bibliographical data such as are found in Education Index but do provide 10 to 15 word descriptions of the subject. You will find a number after each of these brief descriptions. This number refers to the number assigned to the abstract. Write down the abstract numbers for all articles that appear to relate to your topic and then look these up in the abstract volume.

For example, in the April 1987 monthly issue (Vol. 74, No. 4) under "handicapped (attitudes toward)" we find six abstract numbers. A check of these abstracts produces the reference shown in figure 4.1.

Note that, in addition to the bibliographical data needed to locate the original article, the entry shown in figure 4.1 provides a brief but informative abstract. These abstracts are very helpful because they assist you in making a decision about whether or not a given article actually pertains to your research. This decision is much easier to make on the basis of an abstract than solely on the basis of the bibliographical data supplied in Education Index. After reading the abstract, decide whether the article is pertinent and, if it is, record the bibliographical data on your 3 × 5 card.

When the research topic is exclusively education, such as school lunch programs, little is gained from checking Psychological Abstracts. In areas relating to educational psychology, on the other hand, you may decide to check both

5. Note that the monthly issues for the current year are always searched first.
Psychological Abstracts and Education Index to be assured of getting full coverage in your field. When you use both these sources, check Psychological Abstracts first because of the advantage of an abstract over a bibliographical entry only. You may want to use a checklist like the one in Table 4.1 in searching Psychological Abstracts as well.

The Cumulated Subject Index to Psychological Abstracts is also a helpful reference for the student who wishes to conduct an exhaustive long-term search. The initial volumes cover the years 1927 through 1960, which makes it possible for you to find all references on a given subject in one place, without searching 34 separate volumes. Two supplements cover the period from 1961 to 1969, and subsequent volumes cover three-year periods to the present. If you wish to search all references by a given author, a companion set of volumes, titled the Author Index to Psychological Index, 1894-1935 and Psychological Abstracts, 1927-1958, is also available. Supplements to the Cumulative Author Index are being published periodically to bring this reference up to date.

Educational Resources Information Center (ERIC)

ERIC, an acronym for the Educational Resources Information Center, was initiated in 1965 by the U.S. Office of Education to transmit the findings of current educational research to teachers, administrators, researchers, and the public. Two very useful preliminary sources are published by ERIC. These are Resources in Education (RIE) and Current Index to Journals in Education (CIJE). Although ERIC abstracts some of the same documents as Education Index and Psychological Abstracts, it includes many documents not abstracted by these services. For example, RIE provides abstracts of papers presented at education conferences, progress reports of ongoing research studies, studies sponsored by federal research programs, and final reports of projects conducted by local agencies such as school districts and Title III centers, which are not likely to appear in education journals. Thus, RIE will be valuable to the student in providing an overview of the most current research being done in education. In contrast, many of the studies currently referenced in Education Index and Psychological Abstracts were completed several years previously because of the time lag between completion of the study, publication in a journal, and abstracting by the service.

ERIC provides a variety of services to the researcher through its central office and 16 clearinghouses. Each clearinghouse is responsible for cataloguing, abstracting, and indexing relevant documents in its subject area. In addition, each clearinghouse publishes its own newsletters, bulletins, and bibliographies. We suggest that you write to the clearinghouse in your area of interest to obtain information that may help you in locating pertinent research literature and in planning your study. The addresses of the 16 clearinghouses can be found in Appendix A.
The abstracts prepared by each clearinghouse appear in the monthly ERIC publications RIE and CIJE. RIE includes approximately 1,000 document abstracts in each issue, classified by subject area, institution, and accession number. To use Resources in Education, first select key search terms in your area of interest. To assist the user in identifying search terms, ERIC has published a Thesaurus of ERIC Descriptors, which lists all terms used to classify ERIC documents by subject; for a given subject area, it provides synonyms, narrower terms, broader terms, and related terms. For example, the general search term “dropout” is further analyzed into such terms as “high school dropouts,” “potential dropouts,” “dropout identification,” and “dropping teaching.”

After selecting the appropriate descriptors, search the subject index in the monthly issues of Resources in Education for the current year and in the semiannual index volumes for previous years. When you locate a reference in the subject index that relates to your topic, copy the ED number given at the end of the bibliographical data. Then look up each ED number in the Document Résumés section, where you will find a description of the reference such as the sample entry shown in figure 4.2. Notice in this figure that the Document Résumé contains a great deal of useful information in addition to the usual brief abstract.

If you wish to obtain the full document that is abstracted in the entry, you can order it through the ERIC Document Reproduction Service. A Reproduction Service price is listed in the Document Résumé for each entry. If you need an RIE document quickly, you can order it by computer using the ORBIT or DIALOG systems, which are available through most university libraries. See a current issue of RIE for detailed instructions. Whether you order by mail or by computer, the document can be ordered on microfilm, which are small sheets of microfilm, each containing up to 60 pages of text, or in hard copy form at about 70 percent of the document’s original size. The advantages of microfiches are their low cost and small size; however, they require a special microfiche reader, which enlarges the image to normal page size. Most libraries now have these special readers. Most university libraries also maintain a collection of ERIC microfiches, so you needn’t order them through the Reproduction Service unless you want a personal copy.

Since 1969 ERIC has also published CIJE, which indexes nearly 800 education journals and journals in related fields and includes more than 1,000 articles each month. Like RIE, CIJE is published monthly and cumulated semiannually. The monthly numbers contain a subject index, an author index, and a main entry section. First, select descriptors related to your topic from the Thesaurus of ERIC Descriptors and, then, search the subject index and note the relevant ED reference numbers. Then look up these numbers in the main entry section, which provides the same information as is given in the Document Résumés in RIE. Compared with Education Index, CIJE has the advantages of a more comprehensive index (based on the Thesaurus of ERIC Descriptors), multi-
**SAMPLE RESUME**

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**ERIC Digest Information**

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**Figure 4.2** Sample Entry from Resources in Education and Identifying Characteristics

Disciplinary journal coverage, and abstracts of the articles indexed. *Education Index* covers a much longer time span of journal publication (1929 to date) than does *CIJE* (1969 to date). For most educational topics, the most productive strategy for conducting an exhaustive review would probably be to search *RIE* and *CIJE* for the years 1969 to
date, search RIE and Education Index for the years 1966 to 1968, and then search Education Index from 1965 back as far as you plan to extend your review. The typical literature review for a thesis or dissertation, however, focuses primarily on the most recent 10 years.

Other Useful Preliminary Sources

Several preliminary sources are useful for locating certain kinds of information needed in some literature reviews or for searching specific subject areas. Those that are often useful to the researcher in education are described below.

The Citation Indexes

Let us suppose that in the course of your review of literature you have located two or three key references that were published several years ago. It is often very useful if you can trace the effects of these earlier works on subsequent research. Also, if your review has uncovered a controversial article, you can gain valuable insights by reading what later authors say in support or opposition. An easy way to locate later works that have cited such an article is to look up each key author in Science Citation Index (SCI) or Social Science Citation Index (SSCI), depending on the field of study. SCI covers the literature of Science, Medicine, Agriculture, Technology, and the Behavioral Sciences; SSCI covers literature of the Social, Behavioral, and Related Sciences. Articles in psychology are cited in both indexes, but work in education is most likely to be cited in SSCI.

You would start your search of SCI or SSCI with the year the key reference was published and check all volumes up to the current one. Under the name of the author of the key reference with which you are concerned you will find bibliographical data for all sources that have cited the key reference. For example, Arthur R. Jensen's famous article from the 1969 Harvard Educational Review entitled "How Much Can We Boost I.Q. and Scholastic Achievement?" was cited in two articles in the 1986 volume of SCI. In checking SSCI for 1986 we find 20 articles listed that have cited the Jensen article, reflecting the heavier behavioral science coverage. A review of these articles would give you a clear picture about current thinking regarding this controversial topic.

In using these indexes you should check each author's name with both given initials, only the first initial, and no initials; for example, Jensen, A. Jensen, as well as A. R. Jensen. If an author cites the article as by A. Jensen, that is the way it will be listed in the Index. In compiling the Indexes, the A. Jensen citations are not combined with the A. R. Jensen citations, even though, since the same article is cited, they are obviously the same man. In SSCI for 1986, the Harvard Educational Review article is cited once under "A. Jensen," once under
"Jensen," and 18 times under "A. R. Jensen." If we wanted to check all articles that had cited Jensen’s 1969 article, we would, of course, have to check SCI back to 1969, and SSCI back to its beginning in 1973.

National Technical Information Service (NTIS)

There is a considerable lag between the time a research project is completed and the time it is indexed in the preliminary sources, such as Psychological Abstracts. If a researcher wants information on recently completed and ongoing research projects in an area of interest, NTIS is the best preliminary source available. To use NTIS, see the section of this chapter dealing with computer searches.

Literature Related to Measures

Because all research involves measurement, you often need to obtain information on educational measures that are relevant to your own research, or are reported in the research of other investigators. Two widely used sources are described below:

Mental Measurements Yearbooks

The Mental Measurements Yearbooks are very valuable if you wish to locate articles related to published tests that you are considering for use in your own research. In addition to providing bibliographies, the yearbooks also print critical reviews of many of the measures listed.⁶

Test Critiques

Test Critiques, in seven volumes, have attempted to provide information on the most widely used psychological, educational, and business tests. Over 700 tests are reviewed in these volumes and additional volumes are expected. Each test has been reviewed by a specialist knowledgeable about tests in the area. The reviews are quite detailed, averaging about six pages in length. A typical review starts with an Introduction, which contains a detailed description of the measure; a Practical Applications section, which includes information on appropriate subjects, administration, scoring and interpretation; Technical Aspects such as validity and reliability are then covered and finally an overall critique is provided. There are four indexes: Test Titles, Test Publishers,

⁶ The most recent, The Ninth Mental Measurements Yearbook (1985), is published by the Bureau of Mental Measurements at the University of Nebraska. Many published measures have been in use for several years and are reviewed in earlier editions of the Mental Measurements Yearbook.
Authors-Reviewers, and Subject. The indexes in Volume 7 cover the tests reviewed in all seven volumes.7

These two sources as well as other references to educational and psychological measures will be discussed in greater detail in a later chapter.

Abstracts and Indexes in Content Areas Related to Education

Child Development Abstracts and Bibliography covers articles in this area that are drawn from over 170 publications in medicine, psychology, biology, sociology, and education. Each issue includes abstracts under six major subject headings, as well as an author index and subject index. These are combined into annual volumes.

Sociological Abstracts is published five times each year. Journals dealing mainly with sociology are fully abstracted, whereas those concerned with related areas such as anthropology, education, and political science are abstracted selectively. Each issue contains subject, author, and source indexes in addition to abstracts that are similar in format to Psychological Abstracts. The subject index is also similar to Psychological Abstracts, listing the abstract numbers for each citation after a brief description of about 10 to 15 words.

Exceptional Child Education Resources (ECER) have been published quarterly since 1969 by the Council for Exceptional Children. More than 200 journals are regularly searched for material concerning exceptional children. The format is similar to that used in Current Index to Journals in Education since the Council operates the ERIC Clearinghouse on Handicapped and Gifted Children. However, many journals searched for ECER are not covered by CIJE. Each issue contains subject, author, and title indexes, and the final issue each year contains indexes for the entire volume.

State Education Journal Index has been published twice a year since 1963. This is a subject index that provides bibliographical data on articles published in over 100 state education journals, such as Alabama School Journal, California School Boards, and Oregon Education. This index focuses on periodicals not covered in other indexes such as Education Index. Very brief annotations are provided for articles with misleading titles. The journals indexed cover a wide range of educational subjects but are probably most useful for topics of state concern such as federal aid, collective bargaining, state education agencies, and teacher certification.

Business Education Index is a combined author-subject index of articles in the field of business education published annually since 1940. Articles from about 60 periodicals are indexed along with the books and some theses relevant to business education.

Educational Administration Abstracts have been published since 1966. There are four issues a year. Approximately 140 journals containing articles related to educational administration are reviewed and abstracted. Abstracts are classified into 42 content areas. An author index and journal index are included in each issue, but no subject index is provided. A listing of recently completed dissertations in educational administration is generally included in each issue.

Physical Education Index has been published quarterly since 1978. It is a subject index covering about 170 periodicals, both domestic and foreign, that deal with physical education and related topics.

Bibliographies and Reviews of Research Literature

Recently, the improved procedures developed by Gene Glass and others to pull together research evidence have stimulated interest in literature reviews. If you can locate a recent review of literature related to your research topic, you can get a useful overview with little effort. The quality of such reviews varies, however, and you should look at reviews critically before accepting the conclusions of the reviewer. J. T. Guthrie provides some useful guidelines for evaluating review articles. Gregg Jackson’s analysis of 36 randomly selected review articles can also be a help to students who want to know more about this topic.

Bibliographic Index

An early step in searching preliminary sources is to consult Bibliographic Index, a subject list of bibliographies that have been published separately or as parts of books or journals. About 2,600 periodicals are regularly searched for bibliographic materials. The format is similar to the Education Index except that only references which contain a bibliography of 50 or more citations are listed. If the bibliography is annotated, the abbreviation “annot” is given. If you can locate a recent annotated bibliography on your topic, you will save much of the labor of searching the preliminary sources.

Review of Educational Research

Review of Educational Research is published quarterly by the American Educational Research Association. A typical issue contains five to seven critical, integrative reviews of research literature bearing on important topics and issues. Recent issues have reviewed research on such topics as educational objectives, teacher...
decisions, college teaching, and student ratings of instruction. Each article includes an extensive bibliography. Graduate students should check the most recent five years of this journal to see if a review has been published in their area of interest. If so, the relevant review and bibliography will give you an excellent start on your own search of the literature.

Review of Research in Education

The purpose of the *Review of Research in Education* is to present critical essays that survey and synthesize research in important problem areas. The first volume in this annual series was published in 1973 and contains nine essays in the areas of Learning and Instruction, School Organization, History of Education and Research Methodology. Subsequent volumes have covered such topics as Child Development and Educational Intervention, Economics of Education, Comparative Education, Teacher Effectiveness, and Application of Cognitive Psychology to Education. Essays are written by leading educational researchers and provide thorough and perceptive overviews of the areas covered.

Encyclopedia of Educational Research

The fifth edition of the *Encyclopedia of Educational Research*, a monumental work, became available late in 1982. This is perhaps the best single source of information on educational research currently available. The four volumes are organized into 19 major topics ranging from Agencies and Institutions Related to Education to Teachers and Teaching. The 317 contributors are among the nation's leading educational researchers. The student planning a review of the literature should start by reading relevant entries in this encyclopedia.

The International Encyclopedia of Education: Research and Studies

The *International Encyclopedia of Education: Research and Studies* consists of nine volumes containing 1,448 articles in over 5,600 pages, plus a volume of indexes. In the first nine volumes entries are listed alphabetically by subject. A typical entry will contain about four pages including a brief bibliography. Students interested in a given topic should first consult the subject index. A check of the Classified List of Entries is also recommended. The index volume also contains a List of Contributors, that is, persons writing the entries, and an author index, that is, all authors cited in the articles.

This important work is truly international, with contributors from virtually every country in the world, and coverage of most of the world's major educational journals. There is also an article for virtually every country, which describes its educational system. For example—a three-page article on Vanuatu and a four-page article on Trinidad and Tobago are included.
Educators' Handbook—A Research Perspective

Educators' Handbook—A Research Perspective is designed to provide teachers and administrators with a practical review of educational research in which the technical aspects of research methodology are deemphasized. Each of the 25 chapters is written by educational researchers with research experience in the chapter topic. An extensive bibliography is included in each chapter. The book is divided into five sections: What Should I Teach?, How Should I Teach It?, What Should I Know About My Students?, The School, and Professional Issues.

NSSE Yearbooks

The yearbooks of the National Society for the Study of Education (NSSE) contain major overviews of important educational topics. Recent yearbooks have been concerned with such topics as classroom management, adolescence, microcomputers in education, and social studies. Each yearly volume consists of two books dealing with different major areas of education. The typical book contains 10 to 12 chapters concerned with different aspects of the topic. Chapter authors, who are recognized authorities, attempt to give a clear picture of the state of knowledge in the field by focusing on a few major research and theoretical articles. Exhaustive bibliographies, such as are found in the Review of Educational Research, are usually not included in the yearbooks. However, if your area of interest has been the focus of a recent yearbook, you may find an excellent overview of important research findings, current approaches to studying the topic, and the thinking of leaders in the field.

Handbook of Research on Teaching, Third Edition

The Handbook of Research on Teaching, Third Edition, contains excellent reviews of virtually every aspect of research on teaching. The 35 chapters are organized under five major areas that deal with Theory and Method of Research on Teaching, Research on Teaching and Teachers, The Social and Institutional Context of Teaching, Adapting Teaching to Differences Among Learners, and Research on the Teaching of Subjects and Grade Levels. The chapters are written by recognized authorities, and each includes a very comprehensive bibliography. Reading the chapters related to one's topic provides an excellent introduction to the literature for any student who plans to do research on teaching.

Annual Reviews of Psychology

The Annual Reviews typically contain several chapters that deal with areas of psychology such as counseling psychology, attitudes, and human learning that are pertinent to many educational research topics. An annual volume usually
consists of approximately 20 chapters. Each chapter deals with recent research in one topic of psychology and includes an extensive bibliography covering important work in that area. An author index, subject index, and cumulative indexes are included in each volume. Students interested in problems related to some aspect of psychology should check the most recent five volumes for reviews pertinent to their work.

Preliminary Sources Covering Theses and Dissertations

Because many theses and dissertations are never published, a check of the following is necessary for a thorough coverage of the research literature.

Dissertation Abstracts International

_Dissertation Abstracts International (DAI)_ is a monthly compilation of abstracts of doctoral dissertations submitted by nearly 400 cooperating institutions, mostly in the United States and Canada but also including a few institutions from other countries. It has been published in various forms since 1938 when it first appeared as _Microfilm Abstracts_. At present there are three sections: Section A contains dissertations in the humanities and social sciences including education; Section B covers the sciences (including psychology) and engineering, and Section C publishes abstracts of doctoral and postdoctoral dissertations accepted at European institutions. The abstracts within each issue of Section A are organized into 32 major content areas, one of which is Education. There are 35 subtopics under the Education content area such as "adult," "art," "higher," and "teacher training." Students interested in checking dissertations in one of these subtopics of education should check the table of contents to locate pages containing relevant abstracts.

Each monthly issue also contains a keyword title index in which the bibliographic entries are classified and arranged alphabetically by important key words contained in the title. To search a specific topic check the keyword title index to locate relevant abstracts. For example, a student who is interested in the social development of preschool children could check "social," "development," and "preschool" in the keyword title index; read the titles listed under each key word; and copy the page numbers for abstracts related to her topic. The student would then read each of the selected abstracts. Abstracts in education vary in length up to a full page and usually give a good coverage of the essentials of the dissertation. Any dissertation covered in _Dissertation Abstracts International_ may be purchased from University Microfilms International on either microfilm or Xerox, the order number being given at the end of the abstract.
Comprehensive Dissertation Index

*Comprehensive Dissertation Index* provides a subject and author index covering virtually every doctoral dissertation accepted in U.S. and Canadian universities from 1861 through 1972, a total of nearly a half-million entries. More than 86,000 of the entries are in the area of education. Since 1972, yearly supplements have been published to keep the *Index* up to date. A 10-year cumulation for the years 1973–1982 has also been published, which is somewhat easier to use than the annual supplements. This reference source would normally be used in conjunction with *Dissertation Abstracts International*. First check the subject index and note the bibliographical data on any dissertations that appear related to your topic, as well as the volume and page of DAI on which the abstract of a given dissertation can be found. Once you have recorded this information on all relevant dissertations, read the abstracts. The final step is to obtain microfilm copies of any dissertations that are sufficiently important so that they can be studied in detail.

Master’s Theses in Education

*Master’s Theses in Education* has been published annually since 1951. Master’s theses are listed under about 40 major educational topics covered in the table of contents, such as Achievement and Progress, Adult Education, Delinquency, and Higher Education. Only the author, title, and institution are given. The coverage is quite complete, however, listing nearly all institutions in the United States and Canada that offer master’s degrees in education. Earlier volumes contain an Author Index, a Subject Index, and an Institutional Index in which theses written at a given institution may be located. However, since 1980, only the Institutional Index is included. Any theses that appear to be very closely related to your proposed topic may be obtained through interlibrary loan.

Masters Abstracts International

Master’s theses available from University Microfilms International, about 1,500 per year, starting in 1962, are summarized by their authors in *Masters Abstracts*. Entries are grouped by field of study and indexed by key words and author names. There are subtopics under Education that cover major educational areas. Scan the table of contents to locate areas related to your interests.

Preliminary Sources Covering Periodicals and Newspapers

Education is a topic of wide general interest, and as a result much is written about it in popular magazines and newspapers. If your research topic is in an area that has received public attention, the following sources should be checked.
Reader's Guide to Periodical Literature

The Reader's Guide, published in New York by H. W. Wilson Co., 1900 to date, is an author and subject index similar in format to Education Index but covering general and nontechnical periodicals published in the United States. The magazines that are indexed change from time to time because the aim is to maintain a good subject balance and to overlook no major field rather than provide exhaustive coverage. At present about 200 magazines are being indexed. Reader's Guide is an excellent source for studying the layperson's views on education. Because many of the magazines covered have wide circulation, their influence upon public opinion can be significant.

Social Sciences Index

Published in New York by H. W. Wilson Co., 1974 to date, the Social Sciences Index is an author and subject index that covers approximately 350 English-language periodicals in the social sciences, including many foreign publications. It is a good source of references concerning how education is viewed by social scientists in fields such as anthropology, economics, environmental science, law, medical science, and sociology.

The New York Times Index

Published from 1851 to date, the New York Times Index provides an index of news printed in the New York Times. It is primarily a subject index but is extensively cross-referenced; it is also referenced by the names of persons covered in news stories. Brief summaries of most articles are given, along with date, page, and column of the issue in which the story may be found. This index is an excellent source of current information about education and permits studying the development of educational issues and events that could not be traced as accurately through any other source. We recommend you look up some current topic that interests you, such as federal aid to education, school building programs, or racial integration, in order to get some insight into the value of this index as a source of educational information. Most university libraries have the New York Times on microfilm, so searching this source is fairly easy once relevant articles are located in the Index.

Facts on File

Facts on File, Inc., published in New York from 1941 to date, summarizes news reported in more than 30 foreign and U.S. newspapers and magazines. This is a weekly digest of world news that is indexed twice monthly. Indexes are
cumulative through the year. The weekly digests are combined into a yearbook along with an annual index. Material from newspapers, magazines, broadcasts, government reports, and so forth are processed daily to produce the weekly digest. Material is indexed by subject and names of persons appearing in the news. Date of the event, page, and location on page in the digest section of the yearbook are given. Because the yearly index and weekly digests are bound together in one volume, Facts on File permits the student to locate and read summaries of important educational news stories without going to another source. It is much easier to use than The New York Times Index, but coverage is less thorough.

Sources of Information on Educational Materials

In planning a research project, researchers are often interested in locating curriculum materials or educational products that will be useful in their research. Many graduate students carry out studies in which two groups of pupils are trained using different instructional programs and materials in order to determine which results in greater gains in pupil achievement. For example, comparisons between different first-grade reading programs or conventional versus “new” mathematics programs are often conducted and can make a useful contribution since they provide evidence that can be used by educators to help make curriculum decisions.

Because the review of literature must often be concerned with locating educational materials that can be employed in research, this section briefly describes several major sources of information that index such materials. If you fail to locate needed materials in these sources, you will find other catalogues and indexes of educational materials in the reference section of your college library.

NICEM Indexes

Published in Albuquerque, New Mexico, by Access Innovations, Inc., with current volumes dated from 1980 to 1985, NICEM Indexes (The National Information Center for Educational Media) contains a set of indexes that lists audiovisual educational materials in eight nonbook formats such as educational films, film strips, audiotapes, videotapes, slides, and overhead transparencies. Each index includes a subject guide, an alphabetical guide by title, and a producer-distributor code so that the reader can determine what items are available in his area of interest and where they may be obtained. A very brief description of each entry is included in the alphabetical guide.
Audio Video Market Place

Published annually in New York by R. R. Bowker, Audio Video Market Place covers about 4,500 producers of audio visual learning materials. Entries include name of organization, address, phone number, name of one or more executives, and list of products, services, or interests. There is an alphabetical index.

Educators' Guide to Free Films (and others as listed below)

From Educators Progress Service in Randolph, Wisconsin, Educators' Guide to Free Films is published annually. This series of guides covers free films, filmstrips, guidance materials, science materials, social studies materials, teaching aids, audio and video materials, and health, physical education, and recreation materials. They are revised annually, and because a large percentage of the items listed change from year to year, you need to refer to the latest edition. The guides usually include brief descriptions and are indexed by title, subject, and source.

Many indexes and guides to educational materials are listed in The Directory of Directories. The latest edition to this guide should be checked for new sources of educational materials and for specialized sources not described in this chapter.

Educational Film Locator

Educational Film Locator, published in New York by R. R. Bowker in 1980, contains annotations and complete bibliographic data on over 40,000 films available from the Consortium of University Film Centers.

The Educators' Handbook of Interactive Videodiscs

Educators' Handbook of Interactive Videodiscs is a comprehensive list of videodiscs for educators.

The Elementary School Library Collection, 15th edition

Edited by Lois Windel of Brodart Co., Greensboro, North Carolina, 1986. The Elementary School Library Collection is a classified catalogue of books, filmstrips, recordings, videocassettes, and microcomputer software for preschool to sixth-grade children.

11. See the Annotated References at the end of this chapter.
Conducting a Computer Search

In a comprehensive review of the literature, a computer search can be used to accomplish step 2 of the manual search process; that is, checking preliminary sources. You must still read the references that you select from the computer search, and you should make notes following essentially the same procedures described in this chapter. This work, however, is made easier because computer searches often provide printouts of abstracts; these belong to you and can be used to reject references that are not close enough to your topic to be read. If you receive a computer printout of your search, the bibliographical data and abstracts of the articles you plan to read can be cut out and pasted onto note cards, and you are thereby saved the effort of copying this information from a preliminary source. In many cases you will have to make additional notes when you read the reference to supplement the abstract obtained in the computer search, but the savings in time will still be significant.

A manual search of preliminary sources is a dull, time-consuming activity that the computer can carry out in a matter of minutes at low cost. Most of the computer search services described in this chapter mail the computer printouts shortly after the on-line search is completed so you usually receive them within ten days or less. For searches that involve only a few references, a printout may be obtained immediately from the terminal at which you are conducting the search. This procedure, however, becomes expensive for long searches since it greatly increases the time that the terminal is connected to the computer, that is, on-line time.

Manual searches are difficult to conduct for problems that involve several concepts that must all be present in a reference in order to fit the researcher’s needs. For example, a problem such as “the effects of television violence on the aggressive behavior of preschool children” involves four major concepts: television, violence, aggression, and preschool children. In a manual search, you would have to search at least one of these concepts (e.g., television) very thoroughly and then read the abstracts or the articles themselves to find references in which the other three concepts are also present. The computer can search designated preliminary sources in a matter of seconds to locate references in which all four concept terms are present.

Where Can You Have a Computer Search Conducted?

Many universities have terminals that link them to one of the information retrieval systems such as DIALOG Information Services, or the SDC/ORBIT system. You should visit the reference section of your library and see if a terminal is available. If not, many organizations provide computer searches of ERIC, which includes RIE and CJE and is probably the most useful single data
base for researchers in education. Having an on-line terminal available speeds up the computer search process, permits you to check the number of relevant references and to get other information that will usually result in a better search. If an on-line terminal is not available, commercial information retrieval services provide order forms on which you can list your problem, descriptors, and other information. These forms are then mailed to the service center where the information is fed into the computer and the search is carried out.

The cost of a computer search varies with the service used, the data base searched, and the length of the search. On-line computer time ranges from about $30 to $120 per hour, while the cost of printouts of the selected citations ranges from 10 cents to 35 cents for each citation. Careful planning of the search is essential in order to keep on-line computer time to a minimum. It is usually advisable to go over your search strategy with the person who operates the terminal before going on-line. A typical ERIC search on the Lockheed DIALOG system including a printout of 200 abstracts that is mailed to you will cost about $35.

The ERIC data base is also available on compact disc. We anticipate that many university libraries will purchase these discs, which should further reduce the cost of conducting searches.

In addition to ERIC, many other data bases can be very useful for reviewing literature on research problems. For example, there are currently more than 140 data bases available in the DIALOG system. A few of those most relevant to behavioral science research are listed below. 12

Exceptioonal Child Education Resources (ECER) (1966 to present) focuses on the education of handicapped and gifted children. References are indexed using ERIC descriptors. This data base covers published and unpublished literature and is a valuable supplement to ERIC since only about one-fourth of the ECER citations are duplicated in ERIC. Information can be obtained from the Council for Exceptional Children, 1920 Association Drive, Reston, VA 22091.

PsycINFO (1967 to present) is essentially the computer form of Psychological Abstracts. The data base covers the world literature in psychology and related behavioral sciences. References are indexed using the Thesaurus of Psychological Index Terms. Many of the descriptors in this thesaurus differ from the ERIC descriptors. Check to see which descriptors best fit your problem. You may want to search both data bases. For further information contact the American Psychological Association, 1200 Seventeenth Street NW, Washington, DC 20036.

PsycALERT is a companion file to PsycINFO. It provides full bibliographic data for all material subsequently included in PsycINFO. Items are entered in

12. For a complete list of data bases available in DIALOG, check the most recent Database Catalog published by DIALOG Information Services.
PyscALERT very promptly and thus this file is useful for searching the most recent sources. Once complete data have been prepared, an item is transferred to PsyChINFO and dropped from PyscALERT.

Dissertation Abstracts On-Line (1861 to present) is based on material from Dissertation Abstracts International and American Doctoral Dissertations. It is a definitive subject, title, and author guide to virtually every American dissertation, thousands of Canadian dissertations, and many from institutions abroad. Abstracts are included for most dissertations completed after January 1980. You may search this source using DIALOG or use the DATRIX system by obtaining an order form from University Microfilms, 300 North Zeeb Road, Ann Arbor, MI 48106. List key words and other information about your topic, mail your order form, and you will receive a printout giving the title, author, degree date, and university for each reference. The issue and page reference in Dissertation Abstracts International (DAI) is also given if the dissertation has been abstracted. For dissertations completed before 1980, you must locate the abstracts you need to read in DAI.

Federal Research in Progress data base provides access to information on ongoing and recently completed federally funded research projects in all fields, including the behavioral sciences. Data for each project typically include project title, funding organization, performing organization, principal investigator, period covered, funding level, and a brief summary of the work to be performed. This information can be useful in avoiding duplication of research effort, learning about current work, and locating possible funding sources for similar work. For further information contact the National Technical Information Service, 5285 Port Royal, Springfield, VA 22161.

In addition to the aforementioned, there are many data bases in the DIALOG system that are occasionally useful to researchers in the behavioral sciences. Among these are:

A-V ONLINE gives a comprehensive coverage of nonprint educational material such as films, filmstrips, audio tapes, and phonograph records. File currently contains nearly 400,000 items.
Child Abuse and Neglect (1965 to present) contains more than 15,000 records related to this topic.

Magazine Index (1973 to present) provides a very broad coverage of general magazines. Over 435 popular magazines are covered.

Medline (1966 to present) is produced by the U.S. National Library of Medicine. It currently contains over 5.2 million records and is a major source of biomedical literature. This data base is often useful to students doing research in physical education.

Mental Health Abstracts (1969 to present) covers worldwide information related to mental health. Sources include over 460,000 records from 1,200 journals published in 41 countries.

National Newspaper Index (1979 to present) indexes virtually everything
Steps in Conducting an On-Line Computer Search

The following steps have been carried out using the DIALOG system as an example. This system contains the data bases that are usually the most important for educational research problems. The same procedure can be used, with some adaptation, for conducting on-line searches with other systems.

1. Define research problem. To conduct a successful search you must write a short but precise statement of your research problem or topic. If your description is too general your search will probably produce a large number of items that are not closely related to your problem and that will increase the cost. A statement such as "the academic self-concept of handicapped children in the elementary school" describes the researcher's interest in a few words and is written in terms that will help focus the search, such as handicapped, self-concept, elementary. In contrast a topic such as "the self-concept of schoolchildren" is not precise enough to describe a viable research problem.

2. State specific purpose of search. Literature searches are conducted for several reasons. You should think through the precise purpose of your search since you will use different approaches for different kinds of searches.

Most searches are conducted as part of an exhaustive review of literature to be included as part of your thesis or dissertation. This kind of review must be very sharply focused but usually should include all relevant references for the past 10 years. All relevant narrow descriptors are chosen when possible, and the computer is instructed to locate references that contain combinations of descriptors, which further narrows the search. How narrow your search should be is determined partially by your topic, as discussed earlier in this chapter.

The computer can also be useful in assisting in a preliminary review of literature conducted to locate possible research problems. A computer search can locate recent references in your area of interest; these in turn can assist in limiting and better defining the problem. Usually such searches use broader descriptors and fewer combinations of descriptors since you have not yet settled on a narrow problem. To avoid getting very large numbers of references, it is
advisable to instruct the computer to select only the 10 to 30 most recent references for each descriptor or descriptor combination.

Computer searches can also be helpful in updating a review of literature. It is not uncommon for graduate students to take two or three years after completing the review of literature to complete a research project and write their thesis or dissertation. By this time the review will be somewhat out of date. Using the same descriptors employed in the initial search, you can update your review by instructing the computer to select only those references published since your initial computer search was conducted.

3. Select database. The next step is to select one or more data bases that are most relevant to the research problem. For most educational studies a search of the ERIC data base will produce most of the relevant literature. For the self-concept problem given as an example above, a search of Exceptional Child Education Resources and Psychological Abstracts, both of which are also available in the DJALOG system, could be added to ERIC to give a more complete coverage or could be used instead of ERIC.

4. Select descriptors. Using the procedures prescribed for your data bank, select the descriptors, index terms, or key words (all synonymous terms) that best describe your problem in terms the computer will accept. Remember that the exact terms used in indexing the materials into the system must be used. If you spell a descriptor incorrectly or make some similar error such as adding an s, the computer will not recognize the descriptor and will report no references.

Using the *Thesaurus of ERIC Descriptors 11th Edition* we would locate the descriptors that would fit our study of “the academic self-concept of handicapped children in the elementary school.” First we would find that there is no descriptor for academic self-concept. Instead, we find self-concept and self-esteem, both of which seem to fit our topic. Since there is no source available that gives precise definitions of the ERIC descriptors, we have no way of knowing how a reviewer decides to use one of these descriptors or the other. In this case it is best to include both in our search and to instruct the computer to select articles that use either. We also find two broad descriptors that could be used for handicapped schoolchildren. These are handicapped children and handicapped students. However, we find that both of these broad descriptors are listed as “invalid” descriptors, which means they are no longer used to describe the sources. We are advised to use the broad descriptor “disabilities,” or preferably select more narrow descriptors that identify the specific disabilities we are most interested in. When we check the list of more narrow terms (NT) under “disabilities” we find learning disabilities and mild mental retardation. We decide that these are the two groups we are most interested in. Our final descriptors are elementary school students, and elementary education.¹⁷

¹³ In the ERIC system the reviewer must include an “educational level” descriptor. The appropriate mandatory descriptor for our example would be elementary education. Although elementary school students better fit our problem it is advisable to use both since some reviewers will use the mandatory descriptor in place of elementary school students.
If we decided to use the Psychological Abstracts database instead of ERIC, we would find the following in the *Thesaurus of Psychological Index Terms, Fifth Edition*: self-concept, self-perception, self-esteem, educable mentally retarded, learning disabilities, and elementary school students. Note that, although similar, these index terms are not identical to our ERIC descriptors.

5. **Plan the computer search.** In planning your search it is usually best to start with combinations of descriptors that produce references that precisely fit your needs. Descriptors may be combined using and or or. For example, using the six ERIC descriptors: (1) self-concept, (2) self-esteem, (3) learning disabilities, (4) mild mental retardation, (5) elementary school students, and (6) elementary education we can instruct the computer to select references having the following combination of descriptors:

\[
\begin{array}{c}
(1) \text{Self-Concept} \\
\text{or}
\end{array}
\quad
\begin{array}{c}
(2) \text{Self-Esteem} \\
\text{or}
\end{array}
\quad
\begin{array}{c}
(3) \text{Learning Disabilities} \\
\text{or}
\end{array}
\quad
\begin{array}{c}
(5) \text{Elementary School Students} \\
\text{and}
\end{array}
\quad
\begin{array}{c}
(4) \text{Mild Mental Retardation} \\
\text{or}
\end{array}
\quad
\begin{array}{c}
(6) \text{Elementary Education}
\end{array}
\]

For the computer, we would print this combination as (1 or 2) and (3 or 4) and (5 or 6). This asks the computer for any reference that includes a combination of either self-concept or self-esteem and either learning disabilities or mild mental retardation and elementary school students or elementary education. Notice that or connections tend to increase the number of references selected since there are more references that have one descriptor or the other than have either by itself. But and connections tend to reduce the number of selections since only references that have all the descriptors connected by-and would be selected. We have limited the three sample searches described below to a few descriptors. A far more complete search may be achieved if more descriptors are selected and sets of related descriptors are connected with or. This procedure is illustrated in figure 4.3.

Our search of the above combination produced 74 references, which indicates that our search was satisfactory for a typical thesis review. Often, when three or more descriptors are connected with and, the search will produce very few references, although the few produced will be on target.

You will recall that for research topics on which much work has been done, a narrow search is called for, whereas for topics on which little has been done the search must cover a broader area. In our example, if our initial search had been too narrow, we could have broadened it by removing the grade-level descriptors, that is, elementary school students and elementary education. When we ask the computer for references having (1 or 2) and (3 or 4), we find that there are 342 references. This search would produce many references that would not be relevant, but would also produce some that could provide valuable background information. In most cases a search that produces 342 references is too broad.
In order to provide more insight on how the various data bases are related, we then repeated our initial search using the Exceptional Child Education Resources (ECER) data base. This search located 103 references, of which 46 duplicated those found in the ERIC search.

We then carried out a third search using the PsycINFO data base. The index terms selected were (1) self-concept, (2) self-perception, (3) self-esteem, (4) educable mentally retarded, (5) learning disabilities, and (6) elementary school students. The search we conducted may be written (1 or 2 or 3) and (4 or 5) and (6). Note that this is essentially similar to the ERIC and ECER searches. We located 82 references, only 17 of which were duplicated in either the ERIC or Exceptional Child Education Resources searches. Forty of the references located by PsycINFO were dissertations, which are not adequately covered in the ERIC data base. These results suggest that in order to obtain a complete search it is advisable to check all relevant data bases.

The importance of using combinations of descriptors is illustrated by the fact that the ERIC search produced 7,054 references with the learning disabilities descriptor and 9,973 references with the self-concept descriptor. Obviously, using a single descriptor will usually result in a very broad search and will produce many references that are of no importance to the researcher.

**Broad versus Narrow Descriptors**

One of the rules for assigning ERIC descriptors requires that a document be indexed to the specific level of subject matter covered. In other words, the reviewer should select the most specific descriptor that fits the subject matter of the article or document. This means that an article dealing with speech handicaps would not be given the additional descriptor disabilities, unless it deals with both disabilities in general and also with speech handicaps. This often confuses the researcher, who is likely to assume that a general term such as teaching would also be assigned to all the narrow terms under teaching such as diagnostic teaching, creative teaching, and peer teaching. In terms of planning a search, this rule means that in order to get the most complete coverage of your topic, you may choose to include both the broad descriptors and the narrow descriptors that are directly related to your research problem. Using broad descriptors, however, may result in your locating some references that are not closely related to your problem. Such references may provide useful background data or may help place your problem in a broader context, but they will usually be less important than those you locate using more specific descriptors. For example, in our ERIC search related to self-concept, if we used the broad descriptor disabilities instead of the two narrow descriptors learning disabilities and mild mental retardation, we would locate more references (82 versus 74) but many of these would deal with children having disabilities in which we are not interested.

In addition to descriptors, ERIC reports are also classified by author, by
Figure 4.3 Sample Computer Search, Illustrating Various Search Techniques
I LIMIT11/MAJ [We ask C how many of the 62 items in Set 11 have descriptors 1, 3, 4, 5.
6, 7 as major descriptors.]  
S12  55  [There are 55 that have major descriptors.]

I LIMIT12/ER [We ask C how many items in Set 12 come from CIRJE.]  
S13  39  [Of the 55 items come from CIRJE. The remaining 16 items therefore come from REL.]

IS SLOW LEARNERS [We enter a new descriptor that we believe may help locate additional relevant references.]  
S14  594  [There are 594 items with “slow learners” as a descriptor.]  
S15  556  [We believe that the descriptors “slow learners” (Set 14) and “mild mental retardation” (Set 3) might be applied to the same references. We ask C how many references have “slow learners” as a descriptor but NOT shown by minus sign “mild mental retardation.” There are 556, indicating that the two descriptors are usually not applied to the same references.]  

I (1 OR 3) AND 15  
S16  20  [(1 OR 3) and 15 [We ask C how many references have Set 1 (self-concept) or Set 3 (self-esteem) and Set 15 (slow learners minus mild mental retardation). There are 20 which we may want to check.]]

IS ACADEMIC/SELF (WCONCEPT) [We ask C how many items in ERIC have the term “academic self-concept” some place in the entry (i.e., title, abstract, etc.). This is a proximity search.]  
S17  105  [There are 105; we may want to check those that also include Sets 4 or 5 and 6 or 7). This is done later in our search; see Sets 23 and 24.]

IS PERS/W/HARRIS/SELF (WCONCEPT) [We ask C how many items in ERIC have the name of this test as an identifier (ID).]  
S18  0  [No items have this identifier. Searching identifiers is often nonproductive; Proximity searches are recommended instead.]

IS SELF/W/INEVENTORIES [We ask C how many items have the name of this test as an identifier (ID).]  
S19  0  [No items have this identifier. Searching identifiers is often nonproductive; Proximity searches are recommended instead.]

IS SEI [Proximity search—How many items have SEI some place in the ERIC entry? SEI is the name commonly used for the Self-Esteem Inventories.]  
S20  14  [There are 14 references that contain this term.]

Figure 4.3 (continued)
5 PIERSW/HARRIS
57 PiERSW/HARRIS [Proximity search: How many items in ERIC have this term in the entry? This term is commonly used in the literature to refer to the Piers Harris Self-Concept Scale.]
58 PIERSW/HARRIS/ID [How many ERIC items have this term as an identifier (ID)?]
59 74 PIERSW/HARRIS/ID [74 items have this term as an identifier. Note that the proximity search (Set 21) produced many more references than the identifier search (Set 22).]

/ (4 OR 5) AND 17 [This search aims at locating references that are closely "on target," i.e., directly concerned with academic self-concept.]
60 8 (4 OR 5) AND 17 [There are 8 references in this set.]
61 (6 OR 7) AND 23 [How many of Set 23 are relevant to the elementary level?]
62 3 (6 OR 7) AND 23 [There are 3 items in this set.]
63 DISABILITIES [This is a broad descriptor, entered to show effect of using broad descriptors.]
64 21106 DISABILITIES (PHYSICAL, MENTAL, OR SENSORY IMPAIRMENTS THAT - .) [Note the very large number of items having this broad descriptor.]
65 (1 OR 3) AND 25 [This search combines the two self-concept descriptors with the broad "disabilities" descriptor.]
66 (6 OR 7) AND 26 [This search incorporates the two elementary descriptors with the previous search.]
67 82 (6 OR 7) AND 26 [There are 82 references; many will be off target because of using the broad descriptor.]
68 DT = 040 [How many dissertations, i.e., document type 040, are in ERIC data base?]
69 2586 DT = 040 [There are 2586 dissertations in the ERIC file. This is only a small fraction of dissertations in Education and related fields that have been completed since ERIC was started and shows that ERIC is a poor source for dissertations.]
70 AND 28 [How many dissertations in the ERIC data base are related to our problem as described by Set 8?]
71 0 8 AND 28 [There are no dissertations in ERIC data base in problem area described by Set 8.]
72 AND 28 [How many dissertations in the ERIC data base are related to the broader problem as described by Set 9?]
73 0 9 AND 28 [No dissertations in file on topic of Set 9.]
74 (1 OR 3) AND 28 [How many dissertations on self-concept or self-esteem?]
75 92 1 OR 3 AND 28 [There are 92.]
institutions, and by identifier. For most computer searches these classifications are of little value. However, if you know that much important work in your area of interest has been conducted by a specific author or at a specific institution, you may want to search these classifications. Identifiers include terms such as geographical locations, trade names, equipment names, specific theories, texts, and testing programs. These may be useful in some searches, but we have found them of little value in the kinds of computer searches usually conducted by graduate students.

6. Conduct the search. Once you are on-line, the first step is to enter your descriptors and determine how many references are available under each descriptor. For example, in the ERIC search on self-concept, we found the following frequencies: self-concept, 9,973; self-esteem, 3,084; learning disabilities, 7,054; mild mental retardation, 2,746; elementary school students, 9,485; and elementary education, 35,384. (See figure 4.3.)

The next step is to enter each of your planned combinations of descriptors and ask the computer how many references are available for each combination. Next, you may decide to have the computer print out the bibliographical data on 5 to 10 of the references in a given combination to see what sort of references have been selected.

You would then select a combination of descriptors that will produce between 50 and 200 items and instruct the computer to send you a printout. Before proceeding, study figure 4.3 carefully. It shows how our sample search was entered into the computer and illustrates many of the techniques that you can employ in conducting a computer search. The information in brackets has been added to help you understand the process. For some data bases such as ERIC, you can request titles with ED or EJ numbers, complete bibliographical data, or complete bibliographical data plus an abstract. When available, the abstracts are usually worth the additional cost; for a DIALOG search of ERIC, the cost is 10 cents per citation for bibliographical data only and 14 cents for bibliographic data plus abstract. If you need only the ED and EJ numbers and the title, you can have these printed out on-line at no extra cost except contact time.

7. Review the printout. Once you have received the printout of references located in your computer search, study the abstracts and proceed with the rest of your literature review, using the procedures described in this chapter. If, in checking the bibliographies of articles you read, you locate important references that were not found in your computer search, study these carefully and try to determine why they were missed.

Researchers are often suspicious of computer searches because of having carried out a search in which references that they knew were relevant to their topic did not appear. The usual reasons for this are (1) the researcher's failure to use a sufficient number of related terms with "or" connectors, and (2) the reviewer's failure to select the correct descriptors. Keep in mind the process that is employed in preparing abstracts and selecting descriptors for a given article.
The article is assigned to one of the ERIC clearinghouses and someone who is presumably knowledgeable on the subject reads the article, prepares the abstract, and selects the descriptors. Unfortunately, both the preparation of the abstract and decision as to which descriptors are relevant are quite subjective. Therefore, if the same article were assigned for review to a half dozen different persons, it is unlikely that any two of these persons would include the same material in their abstract or would list exactly the same descriptors. This subjectivity is clearly illustrated by the two CJE printouts from the ERIC system shown in figure 4.4.

A close look at these references confirms that they are two different reviews of the same article. However, if you read the two abstracts, you will see that they have very little in common. A look at the descriptors is even more surprising. The first review lists nine descriptors; whereas the second review lists only six descriptors. Note furthermore that only four of the descriptors, "autism," "middle schools," "peer teaching" and "program descriptions" are common to the two reviews. This clearly illustrates the fallibility of this system.

**Figure 4.4** Two CJE Entries on the Same Article
Unless you are very thorough in planning the computer search, you may miss a great many important references. Therefore you may well want to conduct a second search after becoming more familiar with the field of study.

**Proximity Searching**

Proximity searching, also called full text searching, is a procedure for searching the citations entered in the database for specific words or phrases. This technique is very useful (1) when you want to search a very narrow and sharply defined topic or (2) when there are no descriptor terms that really fit your topic.

Proximity searching may be carried out with any of the DIALOG data bases, although the coverage may differ from one data base to another. The search may be carried out for single words, phrases, or for two or more words that appear in close proximity in the material searched. These words do not have to be descriptor terms; any combination of words can be used.

You may also conduct a full text search using terms that have been truncated so that only the root term remains. For example, a search of the root term library would locate references containing any variation of that root term, such as library, libraries, librarians, thus providing a broader coverage of relevant citations.

For ERIC, the material searched for each reference includes the title, descriptions, identifiers, and abstract. For example, suppose we are interested in studies concerned with homeless people. Because no descriptor for homeless people is included in the ERIC Thesaurus, we select the descriptors economically disadvantaged and housing needs. We find that there are 2,483 items with the first as a descriptor, 354 with the second, but only 11 items when economically disadvantaged is joined with housing needs using an “and” connector. This combination seems to be about as close to our topic as we can get, using regular descriptors. A search of these 11 items would probably produce some references related to homeless people, but some of the 11 would also be “off target.”

You will obtain much more sharply focused citations if you carry out a full text or proximity search using the words “homeless people.” In conducting a proximity search, different instructions can be given to the computer so that different criteria will be met before a citation is selected. For example, if the “W-limiter” is used, one of the selected words (people) must directly follow the other (homeless) in order for the reference to be selected. If the “F-limiter” is used, both words must appear in the same field (for example, both words must be somewhere in the title). If the “C-limiter” is used, the selected words must only appear somewhere in the citation. Thus, the limiters can be used to broaden or narrow the search as desired.

When we searched homeless (W) people, we located 41 references. These citations were virtually all “on target,” thus providing much better coverage of
available literature than was obtained from combining the descriptors economically disadvantaged and housing needs.\textsuperscript{14}

For most educational topics closely relevant descriptors or combinations of descriptors will be found in the ERIC Thesaurus, and in this case a search of these descriptors is the best choice. Proximity search, however, is a very useful tool when descriptors that are closely related to your topic are not available or when you need a few references that are sharply focused on a very specific topic.\textsuperscript{15}

Proximity searching is also an excellent way to locate references that provide information on measures you plan to use in your research. For example when we conducted a proximity search of Piers (IV) Harris (the name usually used for the Piers Harris Self-Concept Scale) we located 157 references (see Set 21 in figure 4.3).

Step Three—Reading and Noting Selected References

Bibliography Card\textsuperscript{16}

During your search of the preliminary sources, prepare a bibliography card for each book or article that you believe might contain material pertinent to the review. Although information included in the bibliographical data for a given citation is always about the same, these data can be recorded in many different formats. Before starting your review of the literature, check the rules in effect at your college concerning acceptable format for the bibliography section of the thesis or dissertation. Some schools permit you to use any format that is generally acceptable in your field of study. Other schools have a specific format that must be followed by all graduate students. If your school permits the use of any form that is acceptable in your field, the easiest approach will be for you to use the format of the preliminary source from which you expect to obtain most of your references. \textit{Current Index to Journals in Education} is the most productive source for most students working in education, and therefore its format is advantageous to use when permitted. Most of the references will come from the subject index of CIJE, and articles listed by subject give the title of the book or article before the author's name. For your bibliography card, the author's name (last name first) should be listed before the title. This change is necessary because it is much more convenient for you to maintain your note-card file in

\textsuperscript{14} As of January 1986. “Homeless People” was added to the ERIC system as a descriptor. New descriptors are regularly added to the system. To find out what descriptors have been added since the current edition of the Thesaurus, check the most recent issue of \textit{RIE} or CIJE.

\textsuperscript{15} For another example of a proximity search see Set 17 in figure 4.2. In this case, even though the descriptors “Self-Concept” and “Self-Esteem” are fairly close to our topic, a proximity search of Academic (IV) Self (IV) Concept is more sharply focused and produced a few very relevant references when combined with descriptors (4 or 5) and (6 or 7).
Sylwester, Robert, and others.

Educational Implications of
Recent Brain Research.

Educational Leadership; v 38 n 1
pp 6-19 Oct 1981

Figure 4.5 Sample Bibliography Card in CIJE Format

alphabetical order by author, and the bibliography as prepared for your thesis
normally will be listed in this order. It is advisable to print the author’s name;
misspelled names are a common source of errors and are difficult to detect when
proofreading.

Figure 4.5 shows a bibliography card in the CIJE format. If this format is
chosen, the bibliographic data from articles found in other sources, such as
Education Index and Psychological Abstracts, should be converted to the CIJE
format. Let us compare bibliographical data for an article as it appears in CIJE,
Education Index, and Psychological Abstracts:

Current Index to Journals in Education:

Education Index:
BATTISTA, Michael Interaction between two instructional treatments of algebraic structures and spatial-visualization ability. J Educ Res 74:337-41 My/Ju'81

Psychological Abstracts:
Although these forms are similar, note that the *Journal of Educational Research* is abbreviated in *Education Index* and not in the other two sources and that the volume number, pages, and year are given in different format. Note also that all main words in the title are capitalized in *CIJE* whereas only the first word is capitalized in the other sources. Finally, note that *Education Index* format omits "The" when this is the first word in the title. Obviously, many errors and inconsistencies can be avoided if you select one format and convert all references to that format when making up bibliography cards. Students reviewing the literature in one of the areas of educational psychology will normally obtain the majority of their references from *Psychological Abstracts,* and in this case, the *Psychological Abstracts* format may be preferred.

If your college has specified a format for the thesis bibliography that differs from the one used by your preliminary sources, the easiest procedure is to copy all bibliographic data from preliminary sources in whatever form it is found. Then, when you check the reference to determine whether or not it is relevant to your review of the literature, you may recopy the bibliographic data in the required school format at the bottom of your bibliographic card. You will need to do this only for those studies that contain pertinent information; usually, that is one out of every three or four preliminary references.

Accuracy is extremely important in preparing bibliography cards. A mistake in copying the data can often cause a great deal of extra work. For example, if you incorrectly copy the name of a journal, the date, volume or page numbers, you will fail to find the article when checking the source. Then you will be faced with the problem of trying to determine which part of your bibliographic citation is incorrect. These mistakes are easy to make unless you take special care. As you may well have covered a large number of preliminary sources, a mistake in the early stages may mean a lengthy second search. Even if you make an error in some portion of the bibliographic data that does not interfere with your locating the actual material, such as misspelling the author's name, the error is still serious, for you will probably repeat it in your thesis. Nothing reflects more unfavorably on the scholarship of a research worker than frequent errors in bibliographic data.

**Using the Library**

Now that you have completed your search of preliminary sources and have assembled a set of bibliography cards, the time has come to start checking these references in the library. The majority of your references will probably be in professional journals, because these are the principal outlets for primary source research articles.

If you visit several academic libraries, you will find two common arrangements for shelving and handling professional journals. Newer and smaller libraries often have these journals on open shelves in the reference area along
with desks or tables that students can use when reading the journals. This system is simplest for you, for you can locate the journals you need, read them, and usually make copies, all in the same area.

Older and larger university libraries, on the other hand, usually have their professional journals shelved in closed stacks. Ordering these materials through basic library procedures can waste a great deal of your time. If you are using a closed-stack library, we advise you to obtain a stack permit and examine the layout of the library, to determine what method of obtaining materials will require the least amount of time. In a library where periodicals in a given field are all shelved in a central location and where study space is available in the stacks, you will probably want to work in the stacks. Some libraries, however, do not permit students to enter the stacks, and some, because of space limitations, shelve journals in such a way that they are difficult to find and cannot be used in the immediate area in which they are shelved. In this case, you can usually save time by making out a call slip for about 10 periodicals and then, while waiting for the library clerk to return with your requests, making out another call slip for a second group of 10. While the clerk hunts down your second group, you can scan and make notes on the first group, and so on. Because a certain percentage of references that you ask for will prove to have nothing relevant, or will be lost, checked out, or in the bindery, you should always submit call slips for 10 or more references at a time.

Many professional journals are now available on microfilm. Libraries are making increasing use of this format because it is less expensive and requires less space than storing printed journals. Check the room in your library where microfilms and microfiches are stored. Most university libraries have equipment available for copying microfilm onto regular-sized sheets of paper; this is useful if you need a copy of an article or report for later reference.

Few of us except the most experienced reference librarians have a complete grasp of the many resources available in the typical university library. Most university libraries conduct tours for students at the beginning of each year or semester, and you will almost surely learn something new if you take such a tour. Also, don’t hesitate to ask questions; librarians as a group tend to want to help whenever possible.

Obtaining Materials Not Available Locally

You will almost certainly find that some of the materials you wish to examine are not available in your college library. There are several ways to obtain these materials, and you shouldn’t give up merely because a source is not immediately available. The quickest way to obtain copies of articles published in professional journals is to write directly to the author and ask for a reprint of the article. Authors usually have such reprints and are willing to send a reprint to anyone requesting it. Do send a stamped, self-addressed envelope with your request.
Reprints thus received are your personal property and should be kept in your
file so that you may recheck them if necessary. The main problem in writing for
reprints is obtaining the author's address. *Psychological Abstracts* usually pro-
vides such addresses. This information is not given in *Eudication Index*, however.
A great many authors may be located by checking the various professional
directories that are available, such as *Who's Who in American Education*, *Biographi-
cal Directory of the American Psychological Association*, and *American Educational
Research Association Directory of Members*. Your reference librarian can usually
suggest other directories if an individual is not listed in any of the above sources.
If you are unable to obtain a reprint of an article from its author, the next
step is to see if the needed journal is available in another library in the vicinity.
In large population centers where several colleges or universities are located
within a small geographical area, you can usually find the materials you need at
another local library. In areas where other libraries are few and far between, you
may obtain needed materials through interlibrary loan. Check your library's
policies on interlibrary loan; many libraries place restrictions on this service
because it is rather expensive.

Often you may wish to examine a thesis or dissertation that is available
only through the school library where the work was actually done. Such studies
may be obtained through interlibrary loan, or microfilm copies of most disser-
tations may be obtained from University Microfilms, Inc. (Ann Arbor, Michi-
gan). Microfilm copies of a dissertation can often be obtained at less expense
than borrowing the dissertation itself through interlibrary loan. Even when it
proves more expensive, microfilm is often preferable, since the copy need not be
returned and is available for future reference.

You can usually obtain either microfilm or photostatic copies of any
reference not available at your own library. The librarian at your library will
locate the needed materials and arrange for their reproduction, but the cost of
reproduction and shipping is usually yours. This varies considerably, usually
from 13 cents to 35 cents per page, so having material photocopied is generally
more practical for short articles than for books or lengthy documents. If,
however, the reference appears to be of major importance, you should obtain it
by some means. The satisfaction of knowing that you have done a thorough and
scholarly review of the literature will more than compensate for the expense.

Taking Notes on Research Articles

Check through your bibliography cards and identify those covering studies that
appear most important to your review of the literature. Then begin your review
by checking the most recent of these important studies. The reason for starting
with the most recent is that these, having earlier research as a foundation, are
likely to be more valuable. By reading the most important articles first, you
quickly build up a reasonably deep understanding of your problem, and this
makes it possible for you to profit more from the subsequent study of articles
that are only peripherally related to your topic. This insight makes it much easier
for you to fit these less important studies into the overall picture you are
building of your field through the literature review.

When you finally open the journal to an article you wish to check, first read
the abstract. Most research articles begin with a brief abstract or end with a
summary. By reading these, you can usually determine whether or not the
article contains any information that would justify reading the entire article. If,
after reading the abstract or summary, you decide that the article is pertinent,
first check the accuracy of your bibliographical data, because the source where
you obtained these data might have been in error. Then record the same
bibliographical data on the top of a 5 × 8 note card and take notes on the article as
you read it. In order to save time, you may abbreviate the bibliographical data on
this second card.

In a research article, the writer attempts to present the essential materials
in as brief a form as possible. You will find that the average research article is
only five or six pages long and thus takes little time to read, and that the majority
of research articles follow a standard pattern that further reduces the time
needed to review them. This format usually includes (1) a brief introduction, (2)
the hypotheses to be tested, (3) a statement of the procedure including a
description of the subjects, measures used, and research design, (4) a section
giving the findings, and (5) a summary and conclusions. In taking notes, be as
brief as possible without omitting anything that you feel you may want to use in
the design of your study or the preparation of your research report. A brief
outline of the reference using short sentences or phrases with headings for the
problem or hypothesis, procedure, findings, and conclusions will usually be
sufficient.

The procedures and findings usually require the most detailed notetaking.
In order to make comparisons among related studies later on, record the number
of subjects, sampling methods, treatments (independent variable), measures
employed (dependent variable), research design, and any other procedure
worthy of attention.

Findings should also be reported in some detail, especially for studies that
are very relevant to your problem. Both significant and nonsignificant findings
should be recorded, along with levels of significance for the former. In order to
categorize studies as significant (+), nonsignificant (+), nonsignificant (−), and
significant (−). The meta-analysis technique developed by Gene Glass and his
associates provides a more sophisticated method of combining the results of
related studies. If you plan to use this method, record the means and standard
deviations of the experimental and control groups in experimental and quasi-

Problem: Effects on teacher interest to participate in a res. proj. of the following 3 variables: (1) nature of the res; ie, exp vs. non-exp (in exp, teacher randomly assigned to treatment; in non-exp could choose treatment); (2) monetary reward vs. no reward; (3) time required to participate, ie, 1-4 hour vs. 4-12 hour over 2-week period.

Procedure: Subj. were 58 teachers, gr. 2-8, 15 teachers gr. K, 1, & special subject. dropout after data collected. Randomly assigned to 8 treatments, N per cell 5-11. Each gr. contained desc. of 5 proposed studies. Des. identical except that the 3 indep. variables were manipulated.

Findings: ANOVA gave sig. higher interest for groups getting kinaesthetic (10% level); NSD exp vs. non-exp, NSD time, no interactions were sig.

Conclusions. Financial incentive sig. increased teacher interest in participating.

Comments. Request for teacher commitment instead of interest would be more realistic. Cell size small. Dropping K, 1, & special. teachers indicates poor planning.
experimental studies and the product-moment correlations in correlational studies.

It is also desirable for you to record your own evaluation of the study and to note how it may relate to your research while the article is still fresh in your mind. In addition to your outline of the study, it is often profitable to record promising or unusual techniques employed in the study, new measures that may be of use, interesting theoretical points, and a critical evaluation including apparent weaknesses that make the results questionable. This critical evaluation of the research is important because you will often find several research reports that test similar hypotheses but yield different results. Unless you can make a critical evaluation of the research, it is difficult to determine which of the conflicting results is more likely to be correct. Chapter 5 presents a detailed discussion of methods for critically evaluating research articles (see figure 4.6 for a sample note card).

Taking Notes on Opinion Articles

In education many of the articles that you encounter will not be reports of research projects, but will describe the experiences or opinions of the author concerning some educational topic. Opinion articles do not follow the research article format and usually do not contain a summary. When checking the opinion article, first scan the article to get some idea of its content. One method of scanning is to read only the first sentence in each paragraph. After scanning, decide whether the article contains material of importance. If so, read the entire article. An abstract of the opinion article can usually be prepared most quickly using a sentence outline approach.

Quotations

When reading articles be alert for quotations that might be useful in preparing the review of the literature for your thesis or dissertation. If you find material you may wish to quote, the material to be quoted should be copied very carefully on the note card, enclosed in quotation marks, and the page from which the quote was taken noted. Most systems of referencing require that the page be given for direct quotations, and this also facilitates checking the quotation if necessary.

Students often use far too many quotations in their reviews. A good rule to follow is to copy for possible quotations only materials that are stated very skillfully, or in very concise terms, or are typical and clear reflections of a particular point of view you wish to illustrate in your thesis. After copying a

16. See chapter 5 for a discussion of meta-analysis.
quotation, recheck to be sure that you have copied it exactly. Inaccurate quotations are a serious reflection on the scholarship of the writer, and it is almost certain that some of the quotations will be checked for accuracy by the faculty members who read the thesis.

Classifying Articles You Read

In reading articles for your review of the literature, you should keep constantly in mind the objective of your research and should attempt to relate the material you read to your research plan. Do not restrict yourself to the narrow study of only that research that is closely related to the work you are planning. Very often studies that are only partially related to your work will give you new theoretical viewpoints and acquaint you with new tools and methods that can be profitably applied to your research plan.

In reviewing the literature, you will usually find that the articles you read can be classified into several categories. For example, in doing a review of literature in the field of ability grouping, one of the authors found some articles that compared the achievement of students in ability-grouping and random-grouping systems, some articles that made comparisons of sociometric scores and social status measures between the two systems, some that discussed methods of grouping, and so on. In carrying out your review, be alert for such natural subdivisions because they form a basis for classifying note cards.

A Coding System

As some such pattern for your review emerges, develop a system of coding that will permit you to indicate what type of material is contained on a given note card. The coding system adopted by the research worker will be different for each review of the literature. An example of a coding system used by one of the authors in a review of the literature in ability grouping may be helpful in developing your own coding. These codes are generally placed in the upper-right-hand corner of the note card.

+ An important study
S Studies dealing with social interaction
A Studies dealing with achievement of pupils in different grouping systems
G Studies describing grouping systems and studies discussing problems involved in grouping, such as individual variability, and so forth
B Studies relating grouping to behavior problems
P Studies relating grouping to personality adjustment, personality variables, and self-concept

Using such a code is helpful in several ways. It makes you actively aware of the major areas of concentration in your topic. It makes it possible for you to
check quickly your notes on a specific portion of the literature, and it makes the job of writing up your review of the literature much easier. The more extensive studies, of course, may contain material relating to two or three subtopics. These are recorded by indicating all the codes for subtopics.

MISTAKES SOMETIMES MADE IN REVIEWING RESEARCH LITERATURE

1. The researcher carries out a hurried review of the literature to get started on the research project. This usually results in overlooking previous studies containing ideas that would have improved the student’s project.

2. Relies too heavily upon secondary sources.

3. Concentrates on findings when reading research articles, thus overlooking valuable information on methods, measures, and so forth.

4. Overlooks sources other than education journals, such as newspapers and popular magazines, which often contain articles on educational topics.

5. Fails to define satisfactorily the topic limits of the review of the literature. Searching too broad an area often leads to the student becoming discouraged or doing a slipshod job. Searching too narrow an area causes students to overlook many articles that are peripheral to their research topic but contain information that would help them design a better study.

6. Copies bibliographic data incorrectly and is then unable to locate the reference needed.

7. Copies far too much material onto note cards. This often indicates that the student does not have a clear understanding of the project and thus cannot separate important from unimportant information.

8. Fails to use all relevant narrow descriptors when conducting a computer search.

ANNOTATED REFERENCES


Critically analyzes procedures used by reviewers of the educational research literature. Because your thesis or dissertation will include a literature review, you can learn much from studying this article. The study analyzes 36 randomly sampled review articles and relates the findings to 6 basic tasks involved in conducting an integrative review: (1) selecting questions or hypotheses for the review, (2) sampling research articles to be reviewed, (3) describing the characteristics of the studies, (4) analyzing the findings, (5) interpreting the results, and (6) reporting the review. Jackson’s work identifies many deficiencies...
QUANTITATIVE RESEARCH QUESTIONS, OBJECTIVES, AND HYPOTHESES

In quantitative studies, as in qualitative studies, questions, objectives, and hypotheses represent specific restatements of the purpose of the study. In survey projects these restatements typically take the form of research questions and objectives, in experiments, they are hypotheses. Especially in doctoral dissertations, advisors recommend hypotheses in experiments because they represent the traditional, classical form of raising questions.

As discussed earlier, researchers present questions, hypotheses, and objectives as either a comparison between two or more groups in terms of a dependent variable or as a relationship of two or more independent and dependent variables. Researchers also write descriptive questions to describe responses to the independent or dependent variables. Several general guidelines, grounded in the quantitative paradigm, might direct the development of quantitative questions, objectives, and hypotheses.

- Develop the hypotheses, questions, or objectives from theory.
  In the deductive methodological process of quantitative research, they are testable propositions deduced from theory [Kerlinger, 1979].

- Keep the independent and dependent variables separate and measure them separately. This procedure reinforces the cause-and-effect logic of quantitative research.

- When writing this passage, select one form—write questions, objectives, or hypotheses—but not a combination. A hypothesis represents a declarative statement of the relationships between two or more variables [Kerlinger, 1979; Mason & Bramble, 1989]. A research question also poses a relationship, but phrases the relationship as a question [Krathwohl, 1988]; an objective is the same relationship statement in declarative form. Mixing hypotheses with questions or objectives conveys an informal [and redundant] style of writing.

- If hypotheses are used, consider the alternative forms for writing them and make a choice based on the audience for the research. In the rhetoric of research, the formal, traditional language is to write hypotheses. Moreover, the traditional approach is to use "null" hypotheses, which simply state that there is no significant relationship between or among the variables (e.g., There is no significant difference in the accumulation of resources and the productivity of faculty). Researchers employ this form because it has philosophical advantages in statistical testing, and good researchers tend to be conservative and cautious in their statements of conclusions [Armstrong, 1974]. Alternatively one finds in current journals the use of the "directional" or "alternative" hypothesis, in which the researcher
posits a direction for the relationship (e.g., The more the accumulation of resources, the more productive the researcher). One tends to use the alternative if the literature suggests a hypothesized direction for the variables [Kreithwolo, 1988].

Consider, then, writing hypotheses in one of four forms: literary null, literary alternative, operational null, and operational alternative. The literary form means that the variables will be stated in abstract, concept-oriented language, the operational form represents specific language. Examples of each type of hypothesis follow.

Example 3. Types of Hypotheses

Literary null hypothesis (concept oriented, no direction): There is no relationship between support services and academic persistence of nontraditional-aged college women.

Literary alternative hypothesis (concept oriented, directional): The more that nontraditional-aged college women use support services, the more they will persist academically.

Operational null hypothesis (operational, no direction): There is no relationship between the number of hours nontraditional-aged college women use the student union and their persistence at the college after their freshman year.

Operational alternative hypothesis (operational, directional): The more that nontraditional-aged college women use the student union, the more they will persist at the college after their freshman year.

Example 4. An Example of Literary Alternative Hypotheses

Mascarenhas (1989) studied the differences between type of ownership [state owned, publicly traded, and private] of firms in the offshore drilling industry. Specifically the study explored such differences as domestic market dominance, international presence, and customer orientation. The study was a "controlled field study" using quasi-experimental procedures. This example illustrates hypotheses stated as "alternative" or "directional" in form, and he employed the language of variables written in the concept or "literary" form:

Questions, Objectives, and Hypotheses

Hypothesis 1: Publicly traded firms will have higher growth rates than privately held firms.

Hypothesis 2: Publicly traded enterprises will have a larger international scope than state-owned and privately held firms.

Hypothesis 3: State-owned firms will have a greater share of the domestic market than publicly traded or privately held firms.

Hypothesis 4: Publicly traded firms will have broader product lines than state-owned and privately held firms.

Hypothesis 5: State-owned firms are more likely to have state owned enterprises as customers overseas.

Hypothesis 6: State-owned firms will have a higher customer base stability than privately held firms.

Hypothesis 7: In less visible contexts, publicly traded firms will employ more advanced technology than state-owned and privately held firms. [Mascarenhas, 1989, pp. 585-588]

▼ Unless the study merits a close examination of demographic variables, use variables other than demographics as independent variables. Because quantitative studies verify a theory, demographic variables (e.g., age, income level, educational level) typically enter these models as intervening or mediating variables in theories instead of major, independent variables.

▼ Use the same pattern of word order in the questions, objectives, or hypotheses to establish a formal rhetorical style. Repeat key phrases and order the variables by beginning with the independent and concluding with the dependent variables. An example of word order with independent variables stated first in the phrase follows.

Example 5. Standard Use of Language in Hypotheses

1. There is no relationship between use of ancillary support services and academic persistence of nontraditional-aged college women.

2. There is no relationship between family support systems and academic persistence of nontraditional-aged college women.

3. There is no relationship between ancillary support services and family support systems.
A MODEL FOR QUANTITATIVE QUESTIONS OR HYPOTHESES

Consider a model for writing questions or hypotheses based on writing descriptive questions (or hypotheses) followed by multivariate (or inferential) questions or hypotheses. I prefer the term multivariate because the researcher uses multiple variables. I also employ it to reflect both independent and dependent variables, though in experimental designs, multivariate clearly refers only to dependent variables.

In this model, the writer specifies descriptive questions for each independent and dependent variable (and important mediating variables) in the study. These descriptive questions then are followed by multivariate questions that relate variables or compare groups. Finally, the multivariate questions are followed by questions that add any mediating or controlled variables.

Example 6. Descriptive and Multivariate Questions

To illustrate this approach, assume that one wants to examine the relationship of critical thinking skills (an independent variable measured on an instrument) and student achievement (a dependent variable measured by grades) in science classes for eighth-grade students in a large metropolitan school district. One wants to control for the mediating effects [intervening variables] of prior grades in science classes and parents' educational attainment. Following the model proposed above, the research questions might be written as follows:

- Descriptive Questions
  
  1. How do the students rate on critical thinking skills? (A descriptive question focused on the independent variable)
  
  2. What are the student's achievement levels (or grades) in science classes? (A descriptive question focused on the dependent variable)
  
  3. What are the student's prior grades in science classes? (A descriptive question focused on the mediating variable, prior grades)
  
  4. What is the educational attainment of the parents of the eighth-graders? (A descriptive question focused on the mediating variable, educational attainment of parents)

- Multivariate Questions
  
  5. Does critical thinking ability relate to student achievement? (A multivariate question relating the independent and dependent variables)
  
  6. Does critical thinking ability relate to student achievement, controlling for the effects of prior grades in science and the educational attainment of the eight-graders' parents? (A multivariate question relating the independent and dependent variables controlling for the mediating effects of the two intervening variables)

This example illustrates how one can take the purpose statement and first create specific research questions organized around descriptive analyses of the variables and then advance multivariate questions that relate variables. In other quantitative examples, the researcher may want to compare groups, and the language may change to reflect this comparison in the multivariate questions. Still, I would recommend the descriptive-multivariate model. Also, in other studies, many more independent and dependent variables may be present in the model being tested, and a longer list of descriptive and multivariate questions would result.

Example 7. Combining Descriptive and Multivariate Questions

In the dental school example to follow, taken from a doctoral dissertation, notice how the author writes a descriptive research question followed by a multivariate question. This study examined the relationship between organizational structure and clinical instruction in dental college clinics.

What is the structure of clinical science instruction as measured by student/faculty ratios for each discipline in dental college clinics? . . . What are the relationships among measures of organizational size, organizational technology, organizational environment and discipline on student-faculty ratios? [DuBois, 1986, p. 13]
SUMMARY

Research questions, objectives, and hypotheses become signposts for explaining the purpose of the study and guiding the research. Writers use all three forms in studies. Questions are the most popular form for qualitative and survey projects, and hypotheses are for experimental studies. Qualitative researchers use the model of a grand tour question followed by a small, limited number of subquestions. These questions are descriptive in nature, evolve in design, and employ appropriate qualitative language. Quantitative questions, objectives, and hypotheses flow from a theory, use a language that orders the variables from independent to dependent, often include demographic variables as mediating influences, and employ standard wording to enable a reader to understand clearly the variables in the study. A model for writing quantitative questions is to pose descriptive questions, followed by multivariate questions.

WRITING EXERCISES

1. For a qualitative study, write one or two grand tour questions followed by five to seven subquestions.
2. For a quantitative study, write two sets of questions: In the first set pose description questions about the independent and dependent variables in the study, in the second set pose questions that relate (or compare) the independent variable(s) with the dependent variable(s).
3. Return to the working draft of your title. Retitle your study to reflect a qualitative or quantitative approach to the study. To write a qualitative title, consider the suggestions in Chapter 1 and be sure to state a central focus and use a literary style such as a question. To write a quantitative title, include the major independent and dependent variables and separate them with the conjunction and. Order the variables from independent to dependent so that they are consistent with the purpose statement and research questions/hypotheses.

Question: "Object", and Hypotheses

ADDITIONAL READINGS


In this brief article Robert Armstrong suggests that beginning researchers often are hindered by a lack of understanding of the nature and meaning of hypotheses. He provides a clear guide to the major implications of two types of hypotheses: the research hypothesis and the null hypothesis. Any hypothesis goes beyond the research question by proposing an answer. The proposed answer very likely exhibits the expectations of the researcher. However, if the research question is a genuinely exploratory one (as opposed to one seeking verification), the use of hypotheses may be inappropriate, for they will focus the researcher's efforts.


These three authors emphasize that the research question is appropriate when the research is exploratory. However, a researcher should aim to state hypotheses when existing knowledge and theory permit formulation of reasonable predictions about the relationship of variables. Hypotheses permit more powerful and persuasive conclusions than do research questions, especially if hypotheses are small and perfectly testable, rather than large and amorphous.


Catherine Marshall and Gretchen Rossmnn emphasize how qualitative questions and problems usually come from real-world observations. These questions are not stated as hypotheses derived from theory, but rather as concerns that focus on interactions and processes in sociocultural systems and organizations. Such questions (and any subsequent answers) are enriched by the complexities of their empirical context. At the same time, Marshall and Rossman stress the need to place these research questions within a logical
A Guide to Research for Educators and Trainers of Adults

Second Edition

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CHAPTER 6

MEANING AND INTERPRETATION: QUALITATIVE METHODS

Rather than determining cause and effect, predicting, or describing the distribution of some attribute among a population, researchers may want to uncover the meaning of a phenomenon for those involved. Qualitative methods allow us to do just that. Qualitative methods are especially well suited for investigations in applied fields such as adult education and training because we want to improve practice. The improvement of practice comes from understanding the experiences of those involved. Further, applied fields often lack well-developed theories from which hypotheses can be deduced and tested; qualitative research is an inductive strategy which allows us to develop theory. This chapter will first present an overview of qualitative research, including the philosophical assumptions upon which it is based. Second, three major types of qualitative research—ethnography, case study, and grounded theory—will be discussed.

COMMON CHARACTERISTICS

We use the term qualitative research to cover a number of research strategies that share some common characteristics. In addition to the three types noted above, qualitative research has also been termed naturalistic inquiry, interpretive research, field study, phenomenological research, participant observation, and inductive research. The key philosophical assumption upon which all types of qualitative research are based, is the view that reality is constructed by individuals in interaction with their social worlds. Thus, there are many "realities" rather than the one, observable, measurable reality which is key to research based in the positivist paradigm (see Chapter 4).
Drawing from phenomenology and symbolic interaction in particular, qualitative researchers are interested in how people interpret their experiences, how they construct their worlds, what meaning they attribute to their experiences. The overall purposes of qualitative research are to achieve an understanding of how people make sense out of their lives, to delineate the process (rather than the outcome or product) of meaning-making, and to describe how people interpret what they experience.

In all forms of qualitative research, the researcher is the primary instrument for data collection and analysis. Since understanding is a key goal of this research, the human instrument, which is able to be immediately responsive and adaptive, would seem to be the ideal instrument for collecting and analyzing data. Guba and Lincoln (1981) point out that in addition to responsiveness and adaptability, the researcher as primary instrument is also able to: consider the total context of the phenomenon, rather than a particular segment; immediately process data as it is being collected, leading, if necessary, to refining data collection procedures; clarify and summarize material, checking with respondents for accuracy of interpretation; explore atypical or idiosyncratic responses. Of this last ability they write,

within the boundaries of standardized inquiry the atypical or idiosyncratic response would be lost, masked, or treated as a statistical deviation... The ability to encounter such responses and to utilize them for increased understanding is possible, in fact only with human... instruments. (p. 130)

Being the primary instrument for data collection and analysis carries with it a responsibility to identify one’s shortcomings and biases that might impact the study. One does this not to make a qualitative study more “objective,” but to understand how one’s subjectivity shapes the investigation and its findings. Pesklin (1988, p. 55), in fact, points out that subjectivity “can be seen as virtuous, for it is the basis of researchers’ making a distinctive contribution, one that results from the unique configuration of their personal qualities joined to the data they have collected.”

Another characteristic of qualitative research is that it usually involves field work. The researcher physically goes to the site, the group of people, the institution, “the field” to collect data. This is, of course, always the case in anthropology where the intent is to learn about people of different cultures. Field work involves becoming intimately familiar with the phenomenon under study, whether it be a
case study of a single individual or a grounded theory study of a complex social interaction. Occasionally, qualitative studies have been conducted using written documents alone, but these are the exceptions.

Finally, qualitative research is primarily an inductive research strategy. As mentioned above, qualitative research is a particularly appropriate strategy to use where there is little knowledge about the problem. If there is a lack of theory, or if existing theory does not adequately explain the phenomenon, hypotheses cannot be used to structure an investigation. Rather, the researcher goes into the field with the intent of discovering the meaning a phenomenon has for those involved. What is uncovered is mediated through the researcher's own perspective, resulting in an interpretation, description, or explanation of the phenomenon. Typically, the researcher presents the findings in the form of categories, typologies, concepts, working hypotheses, even theory, which have been inductively derived from the data.

THE DESIGN OF A QUALITATIVE STUDY

Your beliefs about the nature of reality and about how knowledge is constructed, in addition to the problem you have identified and the question(s) you seek to answer, determine the selection of your research design. If you want to understand a phenomenon, uncover the meaning a situation has for those involved, or delineate a process—how things happen—then a qualitative design would be most appropriate. Most problem areas can be shaped to reflect these goals. For example, if you were interested in how to retain students in adult basic education programs, you could identify a program with a high retention rate and conduct a qualitative case study of that program, delineating those factors which seem to contribute to its success in retaining students. In another example, a researcher identified the problem area as how women executives have managed to be successful in a work setting (corporate America) that has not been particularly conducive to their advancement (B雷una, 1993). The researcher could have identified barriers and strategies from the literature and from her personal experience and surveyed women executives in Fortune 500 companies. However, she was more interested in how these women themselves perceived how they learned to succeed in a white male-dominated culture and undertook a qualitative study to address that purpose.
Once one has formulated a problem statement and research purpose (see Chapter 2) that is best addressed from a qualitative perspective, the next step is to select a sample and then collect data. Sample selection in qualitative research is purposeful. Since you are interested in the in-depth understanding of those who know the most (rather than the average opinion of the many), you select a purposeful sample. A purposeful sample, according to Patton (1990), is one from which you can learn the most; it is an “information-rich” case. In Bierema’s study above, she selected high-level executive women in Fortune 500 companies to interview. She was not interested in the secondhand opinions of others about how woman in the organization had become successful. (For more on sample selection in qualitative research see LeCompte & Preissle, 1993; Merriam, 1988; Patton, 1990).

There are three basic ways to collect data in qualitative research. Interviewing is probably the most used in qualitative studies in adult education and training. Interviews range from highly structured, where specific questions and the order in which they are asked are determined ahead of time, to unstructured where one has topic areas to explore but neither the questions nor the order are predetermined. Most interviews fall somewhere in between in what is known as the semi-structured interview (Merriam, 1988). A second major means of collecting data is through observation. Like interviewing, there is a range here also from being a complete observer to being an active participant. A complete observer is unknown to those being observed, such as from behind a one-way mirror or in a public place. A very active participant observer might be someone who is a member of the group or organization who is thus participating while observing. A third major source of data is documents (written, oral, and visual) and artifacts. These are a natural source of information and usually already exist within the context of the study (interoffice memos, mission statements, press releases, student papers, photographs, to name a few). Documents can also be researcher-generated as when an investigator asks participants to keep logs or diaries regarding the phenomena of interest.

In qualitative research, data are analyzed simultaneously during collection. That is, one analyzes data as they are being collected. This allows the researcher to make adjustments along the way, even to the point of redirecting data collection, and to “test” emerging concepts, themes, hypotheses. There are several strategies for data analysis, the most common being the constant comparative method discussed under grounded theory further in this chapter (see also Merriam, 1988; Miles & Huberman, 1994; Patton, 1990; Strauss, 1987; Wolcott, 1994).
The final step in a qualitative study is writing up the findings. While this is covered regarding research in general in Chapter 9, some points can be made about writing up qualitative research in particular. There is a standard format for writing up a research study that can be generally followed for qualitative research. However, since findings are usually in the form of words rather than numbers, it is sometimes difficult to know how much supporting data to include versus interpretation and analysis. Probably the best rule-of-thumb is to be sure to present as much data in the form of quotes from interviews, episodes from field observations, or documentary evidence to adequately and convincingly support your findings. In qualitative research it is the rich, thick descriptions, the words (not numbers) that persuade the reader of the trustworthiness of your findings. Nevertheless, in any report, there is tension between having the right amount of supporting data versus analysis and interpretation. A second problem is finding the right “voice” to present your findings. In qualitative research, writeups can vary from intimate, first-person accounts to more formal presentations (see Van Maanen, 1988; Wolcott, 1990). Reading a number of reports of qualitative research might be helpful in striking a balance between these two components.

VALIDITY AND RELIABILITY

Both producers and consumers of research want to be assured that the findings of an investigation are to be believed and trusted. In applied fields where practitioners intervene in people’s lives, it is particularly important that new practices derived from research are solidly supported. Thus, issues of validity and reliability are important considerations in any kind of research. But how one views validity and reliability in qualitative research differs somewhat from positivist research. Following is a brief discussion of internal validity, reliability, and external validity or generalizability and the strategies that can be employed to ensure for each (for fuller discussions see Firestone, 1993; Guba & Lincoln, 1981; Merriam, 1988).

Internal validity asks the question, How congruent are one’s findings with reality? In quantitative research this question is usually construed as, Are we observing or measuring what we think we are observing or measuring? The question hinges on our understanding of reality and as was discussed earlier, qualitative inquiry assumes that there are multiple, changing realities. Reality is constructed by individuals. Thus in qualitative research the understanding of reality is really the researcher’s interpretation of someone else’s in-
terpretation. Because qualitative researchers are the primary instruments for data collection and analysis, interpretations of reality are accessed directly through observations and interviews. We are "closer" to reality than if an instrument had been interjected between the researcher and the researched. For this reason, internal validity is considered a strength of qualitative research.

To ensure that we are getting as close to reality as possible, we can use several strategies: (1) triangulation - the use of multiple investigators, multiple sources of data, or multiple methods to confirm the emerging findings (Mathison, 1988); (2) member checks - taking data collected from study participants and your tentative interpretations of these data back to the people from whom they were derived, asking if the data "ring true"; (3) peer/colleague examination - asking colleagues to examine your data and to comment on the plausibility of the emerging findings; (4) statement of researcher's experiences, assumptions, biases; and (5) immersion/engagement in the research situation - collecting data over a long enough period of time to ensure an in-depth understanding of the phenomenon.

Reliability asks the question of the extent to which one's findings will be found again. That is, if the inquiry is replicated, would the findings be the same? In social science, the notion of reliability is problematic because human behavior is never static, nor is what many experience necessarily more reliable than what one person experiences. Consider the magician who can fool the audience of hundreds, but not the stagehand watching from the wings. Replication of a qualitative study will not yield the same results but this does not discredit the results of any particular study; there can be numerous interpretations of the same data. The more important question for qualitative researchers is whether the results are consistent with the data collected. Guba and Lincoln (1981), in fact, prefer to think of reliability as consistency or dependability.

There are at least three strategies one can use to ensure consistency. Triangulation and peer examination, defined above, can be used. The third, suggested by Guba and Lincoln (1981), is the audit trail. The audit trail operates on the same premise as when an auditor verifies the accounts of a business. "In order for an audit to take place, the investigator must describe in detail how data were collected, how categories were derived, and how decisions were made throughout the inquiry" (Merriman, 1988, p. 172).

External validity, or the extent to which findings can be generalized to other situations, has been the source of much debate in the qualitative research literature (Firestone, 1993). Findings cannot be
generalized in the statistical sense, that is, from a sample to a population. However, generalizability can be viewed as something different than this. Some authors think empirical generalizations are too lofty a goal for social science; instead we should think in terms of working hypotheses—hypotheses that reflect situation-specific conditions in a particular context. While there are other ways to think of generalizability, the most common conception is reader or user generalizability. In this view, the extent to which findings from an investigation can be applied to other situations is determined by the people in those situations. It is not up to the researcher to speculate how findings can be applied to other settings; it is up to the consumer of the research.

As with internal validity and reliability, there are strategies one can employ to strengthen this aspect of rigor. Thick description is most often cited. This involves providing enough information/description so that readers will be able to determine how closely their situations match the research situation, and hence, whether findings can be transferred. Multisite designs is another strategy. The use of several sites, cases, situations, especially those representing some variation, will allow the results to be applied to a greater range of other situations. Modal comparison is a third strategy that involves describing how typical the program, event, or sample is compared with the majority of others in the same class. Finally, one could randomly sample within the phenomenon being studied since there may be numerous component parts (teachers, administrators, students in a school system, for example), each of which could be sampled for inclusion in the study.

In summary, the trustworthiness of the findings of a study with a small, nonrandom sample is dependent upon the internal validity, reliability, and external validity of the study. As discussed above, there are ways to view each of these concerns that are congruent with the underlying assumptions and worldview of qualitative research. Likewise, there are strategies that investigators can employ to ensure for each of these components of rigor.

THREE TYPES OF QUALITATIVE RESEARCH

As mentioned earlier in the chapter, qualitative research is an umbrella term that covers several distinct forms of qualitative research. Three of the most common are ethnography, case study, and grounded theory. A fourth common form, phenomenology, is dis-
discussed in Chapter 5 under philosophically inquiry. The three to be discussed here all draw upon the same assumptions and worldview and are characterized by (1) the goal of research being understanding, (2) the researcher being the primary instrument of data collection and analysis, (3) fieldwork (in most instances), and (4) the inductive building of concepts, themes, categories, hypotheses, or theories. Each approach is distinguishable from the other two, however. A more detailed discussion of each method's purposes and procedures follows.

ETHNOGRAPHY

Ethnography is the research methodology developed by anthropologists to study human society and culture. Recently the term ethnography has been used interchangeably with field study, case study, naturalistic inquiry, qualitative research, and participant observation. Anthropologists and others familiar with ethnography, however, do not find these terms interchangeable. The term ethnography has two distinct meanings. Ethnography is (1) a set of methods or techniques used to collect data and (2) the written record that is the product of using ethnographic techniques.

Ethnographic techniques are the methods researchers use to uncover the social order and meaning a setting or situation has for the people actually participating in it. The five procedures commonly used in this type of investigation are participant observation, in-depth interviewing, life history, documentary analysis, and investigator diaries (records of the researcher's experiences and impressions). Employing any one of these procedures involves going into the field, "immersing oneself in a collective way of life for the purpose of gaining firsthand knowledge about some facet of it" (Shaffir et al., 1980, p. 6). Fieldwork involves entering the chosen setting, establishing rapport with the residents of that setting, maintaining some type of relationship with the subjects, and, finally, leaving the setting. What comes to mind here is the archetypical anthropologist who travels to exotic places, lives with the people for a period of time, and returns home to write an account of their cultural norms and social practices. Not all ethnographic researchers travel to foreign places, however. Much fieldwork has been conducted with particular social groups within the ethnographer's own society. In the United States, ethnographic studies have been published on many segments of society including ghetto dwellers, coal miners, and suburban housewives.
Participant observation is the cornerstone technique of ethnography, and a researcher might assume any of several variations of this technique. Junker (1960, pp. 35-38) describes four variations:

1. Complete participant. The researcher becomes a member of the group being studied, concealing the fact that he or she is observing as well as participating.
2. Participant as observer. The observer’s activities are not concealed but are secondary to activities as a participant.
3. Observer as participant. The role of observer is publicly known, and participation becomes a secondary activity.
4. Complete observer. The observer is invisible to the activity (as in the case of a one-way mirror or hidden camera) or tries to become unnoticed (camera crews that live with their subjects, classroom observers).

The role assumed depends upon the type of information being sought and the idiosyncrasies of the group being investigated. The researcher’s role can also shift during the process of the investigation. In an interesting account of her firsthand experiences in a home for the aged, Posner (1980) relates how she moved from being a participant observer as a volunteer worker, to complete participant as a programmer, to the stance of observer participant.

Participant observation is a time-consuming and demanding technique. One must establish rapport and trust with a group and become familiar enough to gain insights into the meaning of their lives. At the same time, one must be an observer, remaining as objective as possible while collecting information. This schizophrenic condition is exacerbated by medical problems, ethical issues, and the psychological stress inherent in employing a relatively unstructured research procedure in unfamiliar settings (Shaffir et al., 1980, p. 18).

Indeed, several writers have commented upon the lack of description of fieldwork techniques and the lack of guidelines for conducting fieldwork (Berreman, 1966; Pelto, 1970; Shaffir et al., 1980). Pelto (1970) recommends that any extensive discussion of the art of fieldwork should include (among other things) sections on selection of informants, on gifts and payments, on how to take notes, on tactics with photographic equipment, on interactions with outsiders, on the giving of parties, on when to break taboos, and on many other subjects related to the central issue of ‘impression management.’ (p. 225)

Another ethnographic technique used in fieldwork—interviewing—has been described and refined in recent years. Prospective re-
searchers can take courses in interviewing techniques, or they can read about the technique in the many books and articles on the topic. An interview is a "conversation with a purpose" (Dexter, 1970, p. 136). In ethnographic research, interviewing usually follows, or is integrated with, participant observation. Observations will often reveal which persons are important to interview as well as the type of information the researcher wants to extract in the interview. Interviewing is an indispensable tool in certain situations. "The ability to tap into the experience of others in their own natural language, while utilizing their value and belief frameworks, is virtually impossible without face-to-face and verbal interaction with them" (Guba & Lincoln, 1981, p. 155).

There are several types of interviews that can be employed in an investigation: team and panel interviewing, covert or overt interviewing, oral history interviewing, structured and unstructured interviewing (Guba & Lincoln, 1981). In most ethnographic studies, interviews are open ended or loosely structured so that the respondents' views of the topic can be obtained. By using an open-ended format, investigators hope to avoid predetermined the subjects' responses and, hence, their "views" of reality. Interviewing as a data collection technique is discussed more fully in Chapter 8.

Occasionally interviewing key informants (people who have a great amount of knowledge and can conceptualize their group's norms and beliefs) leads to the collection of life histories. Life histories are intensive autobiographical studies of selected members of the sociocultural group under study. "The richness and personalized nature of life histories afford a vividness and integration of cultural information that are of great value for understanding particular life ways" (Pelto, 1970, p. 99).

In addition to using participant observations, interviews, and life histories, an ethnographer may want to evaluate all available documents on the phenomenon being studied. As a resource, documents and records often (1) are easily accessible, low-cost, or free; (2) constitute a legally unassailable base from which to defend oneself against allegations; (3) represent the context of the research problem; (4) may be more objective sources of information than an interview; and (5) provide a base for further inquiry (Guba & Lincoln, 1981, pp. 232–234).

Fieldworkers are also encouraged to keep a diary (in addition to fieldnotes) of each day's happenings and record personal feelings, ideas, impressions, or insights with regard to those events. This diary becomes a source of data and allows researchers to trace their own development and biases throughout the course of the investigation.
From the foregoing description of ethnographic techniques, the role of investigator as instrument emerges as a paramount consideration. Several writers have elaborated on the personal qualities essential in a researcher who intends doing ethnographic research. Most suggest that the researcher needs to be empathetic, bright, flexible, energetic, imaginative, and adventuresome. Guba and Lincoln (1981), commenting on the many lists of desirable attributes, note that a person who possessed all of the suggested qualities

not only could be a good inquirer but undoubtedly would make a good president, a fine doctor, another Margaret Mead, or could lead the United Nations to a peaceful resolution of world conflict... They are above all human beings who attend carefully to the social and behavioral signals of others and who find others intrinsically interesting. Many of these skills can be taught; others can be continuously cultivated and refined. (pp. 144-145)

The centrality of the investigator in ethnographic research has remained untouched even with the introduction of quantitative research methods. Statistical tools have become important aids in gathering demographic information, in assessing the magnitude and regularity of certain cultural behaviors and values, and in evaluating the strength of relationships among cultural phenomenon. But, as Mitchell (1967) points out.

The fieldwork data, quantitative or qualitative, which social anthropologists use to base their conclusions on are all derived ultimately from observation. From this point of view there is no essential difference in the two types of data. Quantification has no magical property to confer accuracy on the data; if the basic observations are inaccurate or incomplete, statistics derived from them will assuredly also reflect those weaknesses. What quantification achieves is a condensation of facts so that the regularities and patterns in them are more easily discernible. (pp. 25-26)

The techniques of ethnography—participant observation and interviewing in particular—have been adopted by people in applied fields of study where research problems or questions have warranted an exploratory, rather than hypothesis-testing, approach. However, anthropologists take issue with educators and others who use ethnographic techniques and then think they are doing ethnography. For ethnography is more than techniques; it is also an account of the data, an account that interprets the data within a sociocultural framework. Ethnography has as its intent the interpretation of a situation that incorporates the participants' symbolic meanings and ongoing patterns of social interaction. Concern with the cultural context is what
distinguishes ethnography from grounded theory—which builds
to theory—and case study—which describes and interprets a situation
or social unit from the perspective of the researcher. Wolcott (1980)
makes this distinction between technique and account:

Specific ethnographic techniques are freely available to any researcher
who wants to approach a problem or setting descriptively. It is the es-
sestual anthropological concern for cultural context that distinguishes
ethnographic method from fieldwork techniques and makes genuine
ethnography distinct from other "on-site-observer" approaches. And
when cultural interpretation is the goal, the ethnographer must be
thinking like an anthropologist, not just looking like one. (p. 59)

Many of the same techniques of ethnography are used in case
studies and grounded theory studies. Case study and grounded the-
ory approaches do not have as a major focus sociocultural inter-
pretation and so are even more useful to educators and trainers of
adults who wish to conduct exploratory research within their field
of practice.

CASE STUDY

The case study is an intensive description and analysis of a phenom-
omen or social unit such as an individual, group, institution, or com-
munity. In contrast to surveying a few variables across a large
number of units, a case study tends to be concerned with investigat-
ing many, if not all, variables in a single unit. By concentrating upon
a single phenomenon or entity ("the case"), this approach seeks to
uncover the interplay of significant factors that is characteristic of the
phenomenon. The case study seeks holistic description and inter-
pretation. "The content of a case study is determined chiefly by its pur-
pose, which typically is to reveal the properties of the class to which
the instance being studied belongs" (Guba & Lincoln, 1981, p. 571). If
conducted over a period of time, the case study may be longitudinal;
thus, changes over time become one of the variables of interest. Other
case studies are concerned with describing a phenomenon as it exists
at a particular time.

Unlike ethnography, which has been associated with only one dis-
cipline in particular, the case study method can be appropriately
used in many fields. There are legal case studies, medical case stud-
ies, psychological case studies, and social case studies; there are even
anthropological case studies of primitive cultures. Perhaps because
of its widespread use, case study is sometimes confused with the
term case work, case method, and case history. Case study, as defined
above, refers to an intensive study of a particular social unit, whereas case work denotes "the developmental, adjustment, remedial, or corrective procedures that appropriately follow diagnosis of the causes of maladjustment" (Good & Sates, 1954, p. 729). Case method is an instructional technique whereby the major ingredients of a case study are presented to students for illustrative or problem-solving purposes. Case history—the tracing of a person, group, or institution's past—is sometimes part of a case study.

The case study is a basic design that can accommodate a variety of disciplinary perspectives (Merriam, 1988). In particular, case studies in education often draw upon concepts, theory, and research techniques from anthropology, history, sociology, and psychology. Thus a sociocultural analysis of a single social unit or phenomenon would produce an ethnographic case study, whereas a description of an institution, program or practice as it has evolved over time would be a historical case study.

One of the characteristics of the case study approach is its adaptability to different research problems in many fields of study. Merriam (1988, pp. 11-13) has delineated four essential properties of a qualitative case study. Case studies are:

1. Particularistic. Case studies focus on a particular situation, event, program, or phenomenon.
2. Descriptive. The end product of a case study is a rich description of the phenomenon under study.
3. Heuristic. Case studies illuminate the reader's understanding of the phenomenon under study. They can bring about the discovery of new meaning, extend the reader's experience, or confirm what is known.
4. Inductive. Qualitative case studies for the most part rely upon inductive reasoning for the formulation of concepts, generalizations, or tentative hypotheses.

The process of conducting a case study consists of several steps, the first of which is the selection of the "case" to be analyzed. The selection is done purposefully, not randomly; that is, a particular person, site, program, process, community, or any other social unit is selected because it exhibits characteristics of interest to the researcher. The next step is to collect raw data. A wide range of data-collection techniques can be used by the case study researcher: observation, interviewing, and document analysis are probably the most common, although surveys and other instruments are sometimes used, depending upon the unit under investigation.
As information from various sources is being collected, the researcher may begin aggregating, organizing, and classifying the data into manageable units. Data can be organized chronologically, categorically, or placed within a typology. Aggregation is a process of abstracting generalities from particulars, of looking for patterns characteristic of most of the pieces of data. Several publications give detailed instructions for organizing and analyzing data (Merriam, 1988; Miles & Huberman, 1994; Patton, 1990; Strauss, 1987; Wolcott, 1994). Following is the sequence of procedures described by Guba and Lincoln (1981): First, any item of information from interviews, observations, or documents should be abstracted onto index cards, the first card beginning the first pile; “the second card is then assessed to determine whether it is similar or different from the first. If it is similar, it is placed into the same pile, but if it is different, a new pile is formed” (p. 314). Each pile is then given a name that best reflects the content of the cards in that pile. This name becomes a category or concept central to the study. As new data are collected, these categories become refined and reinforced. New data may also necessitate the formation of a new pile, and thus a new category.

While the index card method described by Guba and Lincoln may sound cumbersome, it is a good representation of the process of inductive data analysis. Essentially, the researcher’s task is to sort, analyze, and interpret the data collected in the study. This can be done with index cards as described, with zeroed pages of data which can be sorted into labeled file folders, or with software programs. The use of computers in qualitative research has become quite common within the last decade or so (Fielding & Lee, 1991; Pfaffenberger, 1988; Tesch, 1990). Miles and Huberman (in Miles & Huberman, 1994) in fact, review 22 different software programs designed for qualitative research. The vast majority of computer programs allow you to efficiently manage your data through coding, memoing, counting, searching, and retrieving; they do not analyze your data for you. The more sophisticated programs may allow you to link data through rule-based or logic-based formats, but the hard work of analysis, of figuring out how data might be linked and what it all means, still resides with the researcher.

The data organization procedure described above by Guba and Lincoln is essentially inductive and results in the uncovering of new categories and concepts. Maimon et al. (1981) make the suggestion that grouped observations might also be labeled according to theoretical concepts already present in the social sciences, for example,
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"in child development—sibling rivalry, attention-getting behavior, motor skills, language development; in sociology—alienation, conformity, deviance; in psychology—identity diffusion, depression; in political science—single-issue campaigning, fear mongering" (p. 225). Categories, concepts, and themes can thus be derived from the literature in an area, from an interpretation of the data by the researcher, or from exact words used by participants themselves (Constan, 1992).

Writing the case study narrative constitutes the final step in the process. The narrative is a highly readable, descriptive picture of a phenomenon or social entity. It should "take the reader into the case situation, a person’s life, a group’s life, or a program’s life" (Patton, 1990, p. 386).

As with other research strategies, the case study has obvious strengths counterbalanced by limitations. The strengths of the case study approach are that it offers large amounts of rich, detailed information about a unity or phenomenon; it is useful as supporting information for planning major investigations in that it often reveals important variables or hypotheses that help structure further research; it allows researchers the flexibility to understand and even to answer questions about educational processes and problems. Some of the limitations of the case study are the following:

- Case studies can be expensive and time consuming.
- Training in observation and interviewing techniques and/or documentary analysis is necessary.
- Case study narratives tend to be lengthy documents, which policy makers and others have little time to read; also, writing the narrative to meet the needs of potential, though perhaps unknown, readers is a difficult task.
- Findings from case studies cannot be generalized in the same manner as findings from random samples; generalizability is related to what each user is trying to learn from the study.

In applied fields such as the education and training of adults, counseling, and vocational education, the case study has been used to describe and/or evaluate the efficacy of a new program or new approach to ongoing problems. For example, a multi-case study of in-service in innovative schools attempted to "determine the features of effective in-service and to establish the impact of these programs in terms of educational change at the school level" (van Tulder, van der Vegt, & Veenman, 1993, p. 129). Others have used
the case study to explore aspects of practice not previously examined. Rowden’s (1993) study of how human resource development functions in small to mid-size successful manufacturing businesses is an example as is Tisdell’s (1993) study of power relations in adult higher education classes.

Finally, readers are referred to a case study by Zeph (1991) of a career enhancement award program for community-based adult educators. Data were collected through interviews with participants, through observations of three group seminars, and through reviewing documents related to the program including the participants’ applications for the award. Zeph found that involvement in the program resulted in significant personal development, which she labeled “The Expanded Self,” and significant career development, labeled “The Reflective Practitioner.”

In summary, the case study is a particularly useful methodology for exploring an area of a field of practice not well researched or conceptualized. In-depth describing and understanding of a phenomenon are needed before generalizations can be made and tested. Case study, which has as its purpose the description and interpretation of a unit of interest, can result in abstractions and conceptualizations of the phenomenon that will guide subsequent studies.

GROUNDED THEORY

Grounded theory is a distinctive research methodology popularized in the late 1960s with the publication of Glaser and Strauss’s book, *The Discovery of Grounded Theory* (1967). As with ethnography and case study, the investigator in a grounded theory study is the primary instrument of data collection and analysis, and the mode of investigation is characterized by inductive fieldwork rather than deductive hypothesis testing. The end result of a grounded theory study is the building of theory—theory that emerges from, or is “grounded” in, the data. Grounded theory research emphasizes discovery: description and verification are secondary concerns.

As a qualitative, exploratory methodology, grounded theory is particularly suited to investigating problems for which little theory has been developed. The explanation of an area of human interaction or a social process emerges from a grounded theory study as either substantive or formal theory. Substantive theory deals with phenomena limited to particular real-world situations such as nursing home care, the academic life of community college adult students, or the budgeting of community resources. Formal theory is
more abstract and general (Weber’s theory of bureaucracy, for example) and usually requires analysis of data from more than one substantive area.

In one scholar’s opinion, generating substantive theory “is, or should be, a concern of researchers in applied professional fields such as adult education” (Darkenwald, 1980, p. 67). Darkenwald goes on to list several substantive areas well suited to grounded theory building: “literacy education in development countries, program development in university extension, rural community development, and continuing professional education” (p. 69). The major purpose of doing grounded theory research in an applied field “is to improve professional practice through gaining a better understanding of it” (p. 69).

Just how professional practice is enhanced is discussed at length by Glaser (1978) in a followup publication to the original book on grounded theory. Glaser recognizes that practitioners are knowledgeable, efficient, even expert in their particular fields of practice. “What the man [sic] in the know does not want is to be told what he already knows. What he wants to be told is how to handle what he knows with some increment in control and understanding of his area of action” (p. 13). A practitioner’s knowledge is usually experiential and nontheoretical. The researcher can offer ideas, categories, and a theory that integrates the diverse elements of practice. Grounded theory—if it has truly been generated from the situation and is “grounded” in the data—will give the practitioner a conceptual tool with which to guide practice. As Glaser points out:

With substantive theory the man [sic] in the know can start transcending his finite grasp of things. His knowledge which was heretofore not transferable, when used to generate theory, becomes transferable to other areas well known to him. His knowledge which was just known but not organized, is now ideationally organized. This allows him perceptible breakthroughs. (p. 13)

Grounded theory, whether substantive or formal, consists of categories, properties, and hypotheses. Categories, and the properties that define or illuminate the categories, are conceptual elements of the theory. Categories and properties need to be both analytic—“sufficiently generalized to designate the characteristics of concrete entities, not the entities themselves”—and sensitizing—“yield a meaningful picture, abetted by apt illustrations that enable one to grasp the reference in terms of one’s own experience” (Glaser & Strauss, 1967, p. 38). Hypotheses are relationships among categories
and properties. Unlike hypotheses in experimental studies, grounded theory hypotheses are tentative and suggestive rather than tested. In a study of a college faculty's participation in in-service workshops, for example, the researcher identified "workshop credibility" as one of several categories explaining faculty participation (Rosenfeldt, 1981). A property that helped to define workshop credibility was called "identification with sponsoring agent." The author hypothesized that "workshop participation will depend on the extent to which faculty members identify with the workshop sponsors. Namely, the greater the identification of the potential participants with the sponsoring agent, the greater the likelihood that professors will participate in a given workshop" (p. 189). In another grounded theory investigation, a study of middle-aged men uncovered "career malaise" as a category reflective of the career situation of most of the men in the study. "Boredom," "inertia," and "feeling trapped" defined the category. It was hypothesized that the more acute one's "career malaise," the more burdensome the sense of responsibility to one's children and one's parents (Merriam, 1980). Numerous other examples of grounded theory studies in sociology can be found in a reader compiled by Glaser (1993). Several of the studies, such as "Cutting Back After a Heart Attack: An Overview," "New Identities and Family Life: A Study of Mothers Going to College," and "Doing Time: A Grounded Analysis of the Altered Perception of Time in the Prison Setting and Its Effects" are likely to be of interest to educators and trainers for both content and grounded theory methodology.

Two studies that investigated concepts related to continuing professional education were ones by Wagner (1990) and Ritt (1990). Wagner used grounded theory methodology to identify factors that influenced professional nurses who were recognized by their colleagues to be lifelong learners. Her study resulted in two major propositions—(1) lifelong learning for the professional nurse is a value developed early in life through family support as part of the socialization process that is strengthened through professional education; and (2) the result of lifelong learning is an expanded personal and professional understanding of self that is the source of empowerment.

In a contrasting grounded theory study, Ritt (1990) examined the evolution of a rather recent phenomenon in the nursing profession—the role of the nurse consultant. Through in-depth interviews with nurse consultant practitioners, Ritt discovered how an individual becomes a nurse consultant and interventions that appropriately pre-
pared the nurse to function in that role. The study resulted in a theo-
retical model that described the development of the role of the nurse
consultant.

In most grounded theory studies, data come from interviews and
participants' observations. Glaser and Strauss (1967) note that a wide
variety of documentary materials, fiction, and previous research are
also potential sources of valuable data. Procedures for collecting and
handling data can best be understood through familiarity with the
techniques of grounded theory research. Theoretical sampling, com-
parison groups, constant comparative analysis, and saturation are
grounded theory techniques that determine what data to collect, how
to handle the data, and when to stop gathering data.

Data collection is guided by theoretical sampling in which "the ana-
lyst jointly collects, codes, and analyzes his data and decides what
data to collect next and where to find them, in order to develop his
theory as it emerges" (Glaser & Strauss, 1967, p. 45). An initial sam-
ple is chosen by its logical relevance to the research problem. The
reader uses insights gleaned from early analysis to determine where
to go next for more data. In a grounded theory study of adult educa-
tion growth in New Jersey community colleges (MacNeil, 1981), for
example, data were originally gathered from divisions of continuing
education and community service. Early fieldwork revealed that
studying adult student participation could not be limited to a single
administrative unit. Subsequently, data were collected from inter-
views with a wide range of personnel involved in adult education
programming.

The discovery of grounded theory is facilitated through the use of
comparison groups. Comparing several groups reveals quickly the
similarities and differences that give rise to theoretical categories.
The strength of these emerging categories is tested by collecting data
from diverse groups. In Glaser and Strauss's study of the process of
dying (1965a), premature babies who died were first studied, and the
emergent concepts then tested with terminal cancer patients. Glaser
and Strauss (1965b) describe the use of comparison groups as
follows:

Significant categories and hypotheses are first identified in the emerg-
ing analysis, during the preliminary fieldwork in one or a few groups
and while scrutinizing substantive theories and data from other stud-
ies. Comparison groups are then located and chosen in accordance
with the purposes of providing new data on categories or combina-
tions of them, suggesting new hypotheses, and verifying initial hy-
potheses in diverse contexts... These groups can be studied one at a time or a number can be studied simultaneously. They can also be studied in quick succession in order to check out major hypotheses before too much theory is built around them. (pp. 292-293)

The basic procedure in grounded theory research is the constant comparative analysis of data, which consists of four stages (Glaser & Strauss, 1967; Strauss, 1987). In the first stage one compares incidents, generates tentative categories and/or properties to cover the incidents, and codes each incident into as many tentative categories as are appropriate. The researcher also records in memo form any insights that occurred during the comparison of incidents.

In the second stage the comparison of units changes from “incident with incident” to “incident with properties of the category” (Glaser & Strauss, 1967, p. 108). The researcher attempts to integrate categories and their properties.

The third stage is characterized by the delimitation of the theory. Here, similar categories are reduced to a smaller number of highly conceptual categories; hypotheses are generated; data are further checked for their “fit” into the overall framework. The simultaneous collection and analysis of data end when the categories become saturated. Saturated means that “no additional data are being found” whereby the researcher “can develop properties of a category” (Glaser & Strauss, 1967, p. 61). Further incidents of that category need not be coded since so doing “only adds bulk to the coded data and nothing to the theory” (p. 111).

The fourth stage—the actual writing of the theory from coded data and memos—occurs when “the researcher is convinced that his analytic framework forms a systematic substantive theory, that it is a reasonably accurate statement of the matters studied, and that it is couched in a form that others going into the field could use” (Glaser & Strauss, 1967, p. 113).

In order to assess the credibility of theory generated through constant comparative analysis of comparison groups, it is essential that readers be told how data were collected, how coding was done, and how the categories, properties, and hypotheses emerged from the data. The value of the theory itself can be determined by the following criteria suggested by Glaser and Strauss (1967):

1. Fitness. A theory must fit the substantive area to which it will be applied; a theory that is closely related to the reality of the substantive area of investigation is one that has been carefully inducted from the data.
2. Understanding. Laypersons working in the substantive area should be able to understand and use the theory.

3. Generality. Categories of the generated theory "should not be so abstract as to lose their sensitizing aspect, but yet must be abstract enough to make ... theory a general guide to multiconditional, everchanging daily situations" (p. 242).

4. Control. A theory must provide understanding of enough concepts and their interrelations "to enable the person who uses it to have enough control in everyday situations to make its application worthwhile" (p. 245).

Grounded theory as a research methodology is not without its critics. Some consider the approach to be undisciplined and impressionistic. The constant comparative method, if used properly, however, allows for a very systematic and even rigorous handling of data. Admittedly, the success of a grounded theory investigation depends to some extent upon the sensitivity and analytical powers of the investigator. Discovery, or the process of arriving at an insight that may later form a category or property in the theory, is not a process that can be mapped out for other researchers to follow. Only the tools that may facilitate discovery can be given to the researcher.

The investigator remains central to this type of research.

Finally, the charge has been made that other investigators would have evolved different theories from the same data. While this may be true, it does not mean that the theory that has been developed is invalid or inconsistent with the data. Rather, the validity of the theory is judged by its overall explanatory power, by how well assertions are supported, by how well integrated the elements are, and by whether there is an internal, logical consistency to all dimensions of the theory. These same canons are applied to any theory.

Most would agree that applied professional fields such as those related to the education and training of adults do not yet have theoretical bases sufficient to structure all of future research. These fields can be advanced by the addition of theoretical frameworks derived from practice. These frameworks, in turn, can be tested by professionals who are concerned with expanding the knowledge base of their field.

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The Practice of Social Research

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MUSA ABU HASSAN
4  Research Design

What You'll Learn in This Chapter
Here you'll learn the wide variety of research designs available to social science researchers: variations concerning who or what is to be studied when, how, and for what purpose.

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**Introduction**

Science is an enterprise dedicated to “finding out.” No matter what you want to find out, though, there are likely to be a great many ways of doing it. That’s true in life generally. Suppose, for example, that you want to find out whether a particular automobile—say, the new Burpo-Blasto—would be a good car for you. You could, of course, buy one and find out that way. You could talk to a lot of B-B owners or talk to people who considered buying one and didn’t. You might check the classified ads to see if there were a lot of B-Bs being sold cheap. You could read a consumer magazine evaluation of Burpo-Blasto, or you could find out in a number of other ways. The same situation occurs in scientific inquiry.

Research design, the topic of this chapter, addresses the planning of scientific inquiry—designing a strategy for finding out something. Although the special details vary according to what you wish to study, there are two major aspects of research design. First, you must specify precisely what you want to find out. Second, you must determine the best way to do that. Interestingly, if you can handle the first consideration fully, you’ll probably handle the second in the same process. As mathematicians say, a properly framed question contains the answer.

Ultimately, scientific inquiry comes down to making observations and interpreting what you’ve observed. (Parts 3 and 4 of this book deal with those two major aspects of social research.) Before you can observe and analyze, however, you need a plan. You need to determine what you’re going to observe and analyze: why and how. That’s what research design is all about.

Let’s say you are interested in studying corruption in government. That’s certainly a worthy and appropriate topic for social research. But what specifically are you interested in? What do you mean by corruption? What kinds of behavior do you have in mind? And what do you mean by government? Who do you want to study: all public employees? Only civilian employees? Elected officials? Civil servants? Finally, what is your purpose? Do you want to find out how much corruption there is? Do you want to learn why corruption exists? These are the kinds of questions that need to be answered in the course of research design.

This chapter provides a general introduction to research design, and the other chapters in Part 2 elaborate on specific aspects. In practice, all aspects of research design are interrelated. I have separated them here to permit a reasonably coherent picture of research by doing that. In this chapter, I want to lay out the various possibilities for social research. In later chapters, the interrelationships among parts will become clearer.

We’ll start with a brief examination of some main purposes for social research. Then we’ll consider units of analysis—the what or whom you want to study. This topic will be elaborated further in Chapter 8, which deals with sampling.

Next, we’ll look at some of the points of focus you might take in studying those units of analysis. Chapters 5 and 6 elaborate on this topic by discussing the process of refining your measurements of whatever it is you choose to focus your research on. As we’ll see, this aspect of research design is inextricably tied to the method of observation you use.

There are two additional topics dealing with research design covered in this chapter. First, I want to draw your attention to alternative ways of handling time in social research. As we’ll see, it is sometimes appropriate to examine a static cross section of social life, but other studies follow social processes across time.

Next, a brief overview of the overall research process serves two purposes: (1) it gives you a map to the remainder of this book, and (2) it gives you a sense of how you might go about designing a study. In this latter regard, I’ve suggested some inexpensive research projects you could undertake.

Finally, I’ve said a little about research proposals. Often the actual conduct of research needs to be preceded by this detailing of your
intensions—to obtain funding for a major project or perhaps to get an instructor’s approval for a class project. We’ll see that this offers an excellent excuse and forum for ensuring you have considered all aspects of your research in advance.

So, let’s get started. We’ll begin with the various purposes of research.

Purposes of Research

Social research, of course, serves many purposes. Three of the most common and useful purposes are exploration, description, and explanation. Although a given study can have more than one of these purposes—and most do—it will be useful to examine them separately because each has different implications for other aspects of research design.

Exploration

Much of social research is conducted to explore a topic, to provide beginning familiarity with that topic. This purpose is typical when a researcher is examining a new interest or when the subject of study is itself relatively new and unstudied.

As an example, let’s suppose that widespread taxpayer dissatisfaction with the government erupts into a taxpayers’ revolt. People begin refusing to pay their taxes and they organize themselves around that issue. You might like to learn more about the movement: How widespread is it? What levels and degrees of support are there within the community? How is the movement organized? What kinds of people are active in it? You might undertake an exploratory study to obtain at least approximate answers to some of these questions. You might check figures with tax-collecting officials, collect and study the literature of the movement, attend meetings, and interview leaders.

Exploratory studies are also appropriate in the case of more persistent phenomena. Perhaps a college student is unhappy with the college’s dormitory regulations and wants to work toward changing them. He or she might study the history of dormitory regulations at the college, meet with college officials to learn the reasons for the regulations, and talk to a number of students to get a rough idea of student sentiments on the subject. This latter activity would not necessarily yield a precise and accurate picture of student opinion, but it could suggest what the results of a more careful study might be.

Sometimes exploratory research is pursued through the use of focus groups, guided small-group discussions. This technique is frequently used in market research, and we’ll examine it in further detail in Chapter 9 on experimentation.

Exploratory studies are most typically done for three purposes: (1) to satisfy the researcher’s curiosity and desire for better understanding, (2) to test the feasibility of undertaking a more careful study, and (3) to develop the methods to be employed in a more careful study.

Not long ago, for example, I became aware of the growing popularity of something called “channeling,” in which a person known as a channel or medium enters a trance state and begins speaking with a voice that asserts it originates outside the channel. Some of the voices say they come from a spirit world of the dead; some say they are from other planets; and still others say they exist on dimensions of reality difficult to explain in ordinary human terms. You may be familiar with channeling through the “Seth” books of Jane Roberts (1974) or more recent books by Shirley MacLaine (1983).

The channelled voices are often referred to by the term entity, and the entities sometimes use the metaphor of radio or television for the phenomenon they represent. “When you watch the news,” one told me in the course of an interview, “you don’t believe Dan Rather is really inside the television set. The same is true of me. I use this medium’s body the way Dan Rather uses your television set.”
The idea of channeling interested me from a number of perspectives, not the least of which was the methodological question of how to study scientifically something that violates so much of what we take for granted, including scientific staples such as space, time, causation, individuality, and the like.

Lacking any rigorous theory or precise expectations, I merely set out to learn more. Using the various methods of field research discussed in Chapter 10, I began amassing information and forming categories for making sense of what I observed. I read books and articles about the phenomenon and talked to people who had attended channeling sessions. I then attended channeling sessions myself, observing those who attended as well as the channel and entity. Subsequently, I conducted personal interviews with numerous channels and entities.

In most interviews, I began by asking the human channel questions about how they first began channeling, what it was like, why they continued, as well as standard biographical questions. The channel would then go into a trance, and the interview soon continued with the entity speaking. "Who are you?" I might ask. "Where do you come from?" "Why are you doing this?" "How can I tell if you are real or a fake?" Although I went into these interview sessions with a number of questions prepared in advance, each of the interviews followed whatever course seemed appropriate in the light of answers given.

I've given you this example of exploration because it so nicely illustrates where social research often begins. Whereas researchers working from deductive theories have the key variables laid out in advance, one of my first tasks was to identify some of the possibly relevant variables. For example, I might note a channel's sex, age, education, religious background, regional origins, and previous participation in things metaphysical. I noted differences in the circumstances of channeling sessions. Some channels said they must go into deep trances; some use light trances; and others are essentially conscious throughout the sessions. Most sit down while channeling, but others stand and walk about. Some channels operate under very ordinary conditions; others seem to require metaphysical props such as dim lights, incense, chanting, and so forth.

As regards the entities, I have been interested in classifying where they say they come from. Over the course of my interviews, I've developed a set of questions about specific aspects of 'reality,' attempting to classify the answers they give. Similarly, I asked each to speak about past events.

Over the course of this research, my examination of specific topics has become increasingly focused as I've identified variables that seem worth pursuing. Note, however, that I began with a reasonably blank slate.

Exploratory studies are very valuable in social scientific research. They are essential whenever a researcher is breaking new ground, and they can almost always yield new insights into a topic for research. Exploratory studies are also a source of grounded theory as discussed in Chapter 2.

The chief shortcoming of exploratory studies is that they seldom provide satisfactory answers to research questions. They can hint at the answers and can give insights into the research methods that could provide definitive answers. The reason exploratory studies are seldom definitive in themselves is the issue of representativeness, discussed at length in Chapter 8 in connection with sampling. Once you understand sampling and representativeness, you will be able to know whether a given exploratory study actually answered its research problem or only pointed the way toward an answer.

Description
A major purpose of many social scientific studies is to describe situations and events. The researcher observes and then describes what was observed. Because scientific observation is
careful and deliberate, however, scientific descriptions are typically more accurate and precise than casual descriptions.

The U.S. Census is an excellent example of descriptive social research. The goal of the census is to describe accurately and precisely a wide variety of characteristics of the U.S. population, as well as the populations of smaller areas such as states and counties. Other examples of descriptive studies are the computation of age-sex profiles of populations done by demographers and the computation of crime rates for different cities.

A Gallup Poll conducted during a political election campaign has the purpose of describing the voting intentions of the electorate. A product marketing survey normally has the purpose of describing the people who use, or would use, a particular product. A researcher who carefully chronicles the events that take place on a labor union picket line has, or at least serves, a descriptive purpose. A researcher who compiles and reports the number of times individual legislators voted for or against organized labor also has or serves a descriptive purpose.

Explanation

The third general purpose of social scientific research is to explain things. Reporting the voting intentions of an electorate is a descriptive activity, but reporting why some people plan to vote for Candidate A and others for Candidate B is an explanatory activity. Reporting why some cities have higher crime rates than others is a case of explanation, but simply reporting the different crime rates is a case of description. A researcher has an explanatory purpose if he or she wishes to know why an anti-abortion demonstration ended in a violent confrontation with police, as opposed to simply describing what happened.

Returning to the earlier issue of premarital sex, what factors do you suppose might have shaped people's attitudes? How about gender? Do you think men and women might differ in their opinions? Which do you think would be the most permissive about premarital sex? An explanatory analysis of the GSS data indicate that 45 percent of the men and 38 percent of the women said premarital sex was "not wrong at all."

Political orientations correlate strongly with attitudes about premarital sex. Among liberals, 53 percent say premarital sex is all right, compared to 42 percent of the moderates and 29 percent of the conservatives.

Religion also bears a strong influence on the issue. For example, 54 percent of those who never attend religious services say premarital sex is wrong at all, contrasted with 5 percent of those who attend more than once a week. Or, 52 percent of those who do not believe in an afterlife say premarital sex is okay, contrasted with 36 percent of those who do believe in an afterlife.

These abbreviated analyses should give you an indication of what the explanation purpose looks like in social science research. We'll get much deeper into this in Part 4 of the book.

Although it is useful to distinguish the three purposes of research, it bears repeating that most studies will have elements of all three. Suppose, for example, that you have set out to evaluate a new form of psychotherapy. Your study will have exploratory aspects, as you map out the impacts of the therapy. You will want to describe recovery rates, and you will undoubtedly seek to explain why the therapy works better for some types of people than for others.

You will see these several purposes at work in the following discussions of other aspects of research design. Let's turn now to a consideration of whom or what you want to explore, describe, and explain.

Units of Analysis

In social scientific research, there is a wide range of variation in what or who is studied: what are technically called the units of analysis.
Social scientists most typically perhaps have individual people as their units of analysis. You may make observations describing the characteristics of a large number of individual people, such as their sexes, ages, regions of birth, attitudes, and so forth. You can then combine the descriptions of the many individuals to provide a composite picture of the population that all those individuals compose.

For example, you may note the age and sex of each individual student enrolled in Political Science 110 and then characterize the students as a group as being 53 percent men and 47 percent women, and as having a mean age of 18.6 years. This is a descriptive analysis of the students taking Political Science 110. Although the final description would be of the class as a whole, the individual characteristics are aggregated for purposes of describing some larger group.

The same situation would exist in an explanatory study. Suppose you wished to discover whether students with a high grade point average received better grades in Political Science 110 than did students with a low grade point average. You would measure the grade point averages and the Political Science 110 grades of individual students. You might then aggregate all those students with a high grade point average and aggregate all those with a low grade point average and see which group received the best grades in the course. The purpose of the study would be to explain why some students do better in the course than others (looking at overall grade point averages as a possible explanation), but individual students would still be the units of analysis.

Units of analysis in a study are typically also the units of observation. Thus, to study voting intentions, we would interview ("observe") individual voters. Sometimes, however, we "observe" our units of analysis indirectly. For example, we might ask husbands and wives their individual voting intentions, for the purpose of distinguishing couples who agree and disagree politically. We might want to find out whether political disagreements tend to cause divorce, perhaps. In this case, our units of analysis would be families, though the units of observation would be the individual wives and husbands.

Units of analysis, then, are those units or things we examine in order to create summary descriptions of all such units and to explain differences among them. This concept should be clarified further as we now consider a number of common social science units of analysis.

Individuals

As mentioned previously, individual human beings are perhaps the most typical units of analysis for social scientific research. We tend to describe and explain social groups and interactions by aggregating and manipulating the descriptions of individuals.

Any variety of individuals may be the unit of analysis for social scientific research. This point is more important than it may seem at first reading. The norm of generalized understanding in social science should suggest that scientific findings are most valuable when they apply to all kinds of people. In practice, however, social scientists seldom study all kinds of people. At the very least, their studies are typically limited to the people living in a single country, though some comparative studies stretch across national boundaries. Often, our studies are even more circumscribed.

Examples of circumscribed groups whose members may be units of analysis—at the individual level—would be students, residents, workers, voters, parents, and faculty members. Note that each of these terms implies some population of individual persons. The term population will be considered in some detail in Chapter 8 on sampling. At this point, it is enough to realize that descriptive studies having individuals as their units of analysis typically aim to describe the population that comprises those individuals, whereas explanatory studies aim to discover the social dynamics operating within that population.

Individuals, as the units of analysis, may be characterized in terms of their membership in
social groupings. Thus, an individual may be described as belonging to a rich family or to a poor one, or a person may be described as having a college-educated mother or not. We might examine in a research project whether people with college-educated mothers are more likely to attend college than those with non-college-educated mothers or whether high school graduates in rich families are more likely to attend college than those in poor families. In each case, the individual would be the unit of analysis—not the mother or the family.

Groups
Social groups themselves may also be the units of analysis for social scientific research. Realize that this case is not the same as studying the individuals within a group. If you were to study the members of a criminal gang in order to learn about criminals, for example, the individual (criminal) would be the unit of analysis; but if you studied all the gangs in a city in order to learn the differences, say, between big gangs and small ones, between "uptown" and "downtown" gangs, and so forth, the unit of analysis would be the gang, a social group.

Families might be the units of analysis in a study. You might describe each family in terms of its total annual income and according to whether or not it had a videotape recorder. You could aggregate families and describe the mean income of families and the percentage with computers. You would then be in a position to determine whether families with higher incomes were more likely to have computers than those with lower incomes. The individual family in such a case would be the unit of analysis.

Other units of analysis at the group level could be friendship cliques, married couples, census blocks, cities, or geographic regions. Each of these terms also implies some population. Street gangs implies some population that includes all street gangs. The population of street gangs could be described, say, in terms of its geographical distribution throughout a city, and an explanatory study of street gangs might discover, say, whether large gangs were more likely than small ones to engage in intergang warfare.

Organizations
Formal social organizations may also be the units of analysis in social scientific research. An example would be corporations, implying, of course, a population of all corporations. Individual corporations might be characterized in terms of their number of employees, net annual profits, gross assets, number of defense contracts, percentage of employees who are from racial or ethnic minority groups, and so forth. We might determine whether large corporations hire a larger or smaller percentage of minority group employees than small corporations. Other examples of formal social organizations suitable as units of analysis would be churches, colleges, army divisions, academic departments, and supermarkets.

When social groups are the units of analysis, their characteristics may be derived from the characteristics of their individual members. Thus, a family might be described in terms of the age, race, or education of its head. In a descriptive study, then, we might find the percentage of all families that have a college-educated head of family. In an explanatory study, we might determine whether families with a college-educated head have, on the average, more or fewer children than families with heads who have not graduated from college. In each of these examples, however, the family would be the unit of analysis. (Had we asked whether college graduates—college-educated individuals—have more or fewer children than their less educated counterparts, then the individual person would have been the unit of analysis.)

Social groups (and also individuals) may be characterized in other ways: for instance, according to their environments or their membership in larger groupings. Families, for example, might be described in terms of the type of dwelling they reside in: We might want to determine whether rich families are more likely to re-
side in single-family houses (as opposed to, say, apartments) than poor families. The unit of analysis would still be the family.

If all this seems unduly complicated, be assured that in most research projects you are likely to undertake, the unit of analysis will be relatively clear to you. When the unit of analysis is not so clear, however, it is absolutely essential to determine what it is; otherwise, you will be unable to determine what observations are to be made about whom or what.

Some studies have the purpose of making descriptions or explanations pertaining to more than one unit of analysis. In these cases, it is imperative that the researcher anticipate what conclusions he or she wishes to draw with regard to what units of analysis.

Social Artifacts

Another large group of possible units of analysis may be referred to generally as social artifacts, or the products of social beings or their behavior. One class of artifacts would include social objects such as books, poems, paintings, automobiles, buildings, songs, pottery, jokes, and scientific discoveries.

Each of these objects implies a population of all such objects: all books, all novels, all biographies, all introductory sociology textbooks, all cookbooks. An individual book might be characterized by its size, weight, length, price, content, number of pictures, volume of sale, or description of its author. The population of all books or of a particular kind of book could be analyzed for the purpose of description or explanation.

A social scientist could analyze whether paintings by Russian, Chinese, or American artists showed the greatest degree of working-class consciousness, taking paintings as the units of analysis and describing each, in part, by the nationality of its creator. You might examine a local newspaper’s editorials regarding a local university for purposes of describing, or perhaps explaining, changes in the newspaper’s editorial position on the university over time; individual editorials would be the units of analysis.

Social interactions form another class of social artifacts suitable for social scientific research. Weddings would be an example. Weddings might be characterized as racially or religiously mixed or not, religious or secular in ceremony, resulting in divorce or not, or they could be characterized by descriptions of one or both of the marriage partners. Realize that when a researcher reports that weddings between partners of different religions are more likely to be performed by secular authorities than those between partners of the same religion, the weddings are the units of analysis and not the individual partners to them.

Other examples of social interactions that might be the units of analysis in social scientific research are friendship choices, court cases, traffic accidents, divorces, flash lights, hijackings, airline hijackings, race riots, and congressional hearings.

Units of Analysis in Review

The purpose of this section has been to stretch your imagination somewhat regarding possible units of analysis for social scientific research. Although individual human beings are typically the units of analysis, that need not be the case. Indeed, many research questions can more appropriately be answered through the examination of other units of analysis.

Realize further that the units of analysis I’ve named and discussed here are not the only possibilities. Rosenberg (1968:234-248), for example, speaks of individual, group, organizational, institutional, spatial, cultural, and societal units of analysis. It is more important, therefore, that you grasp the logic of units of analysis than that you be able to repeat a list of the units of analysis.

The concept of the unit of analysis may seem more complicated than it needs to be. It is irrelevant what you call a given unit of analysis: a group, a formal organization, or a social artifact. It is essential, however, that you be
Figure 4-1: Illustrations of Units of Analysis

Units of Analysis

Sample Statements

60% of the sample are women
10% of the sample are wearing an eye patch
10% of the sample have pigtails

Families

20% of the families have a single parent
40% of the families have two children
20% of the families have no children

The mean number of children per family is 1.2
Figure 4-1  Illustrations of Units of Analysis (continued)

Units of Analysis
Households

Sample Statements
- 20% of the households are occupied by more than one family
- 30% of the households have holes in their roofs
- 10% of the households are occupied by aliens

Notice also that 33% of the families live in multiple-family households with family as the unit of analysis
Examples would be a comparison of U.S. Censuses over time, showing growth in the national population, or a series of Gallup Polls during the course of an election campaign, showing trends in the relative strengths and standing of different candidates.

Michael X. Delia Carpini and Scott Keeter (1991) wanted to know whether Americans today are better or more poorly informed about politics than those of an earlier generation. To find out, they compared the results of several Gallup polls conducted during the 1940s and 1950s with a 1989 survey that asked several of the same questions tapping political knowledge.

Overall, the analysis suggests current citizens are slightly better informed. In 1989, for example, 74 percent of the sample could name the vice president of the United States, compared with 67 percent in 1952. In 1989, substantially higher percentages could explain presidential votes and congressional overrides of vetoes than could do so in 1947. On the other hand, more of the 1947 sample could identify their U.S. representative (38 percent) than in 1989 (29 percent).

An in-depth analysis, however, indicated that the slight increase in political knowledge resulted from the fact that the people in the 1989 sample were more highly educated than those from earlier years. When educational levels were taken into account, the researchers concluded that political knowledge has actually declined (within specific educational groups).

Cohort studies examine more specific sub-populations (cohorts) as they change over time. Typically, a cohort is an age group, such as those people born during the 1920s, but it can also be based on some other time grouping, such as people born during the Vietnam War, people who got married in 1964, and so forth. An example of a cohort study would be a series of national surveys, conducted perhaps every twenty years, to study the economic attitudes of the cohort born during the depression of the early 1930s. A sample of persons 20–25 years of age might be surveyed in 1950, another sample of those 40–45 years of age in 1970, and another sample of those 60–65 years of age in 1990. Although the specific set of people studied in each of these surveys would be different, each sample would represent the survivors of the cohort born between 1930 and 1935.

James A. Davis (1992) turned to a cohort analysis in an attempt to understand shifting political orientations during the 1970s and 1980s in America. Overall, he found a liberal trend on issues such as race, sex, gender, religion, politics, crime, and free speech. But did this trend represent people in general getting a bit more liberal, or did it merely reflect more liberal younger generations replacing the conservative older ones?

To answer the question, Davis examined national surveys conducted in four time periods, five years apart. In each survey, he grouped the respondents into age groups, also five years apart. This strategy allowed him to compare different age groups at any given point in time, and it also let him follow the political development of each age group over time.

One of the questions he examined was whether a person who admitted to being a communist should be allowed to speak in the respondents' communities. Consistently, the younger respondents in each period of time were more willing to let the communist speak than were the older ones. Among those aged 20–40 in the first set of the survey, for example, 72 percent took this liberal position, contrasted with 27 percent among respondents 80 and older. What Davis found when he examined the youngest cohort over time is shown on the top of page 97.

This pattern of a slight, conservative shift in the 1970s, followed by a liberal rebound in the 1980s, was typical among the several cohorts Davis analyzed (Davis 1992: 269).

Panel studies are similar to trend and cohort studies except that the same set of people is studied each time. One example would be a voting study in which the same sample of voters was interviewed every month during an elec-
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<td>Age of Cohort</td>
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<td>Percent who would let the communist speak</td>
<td>72%</td>
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...tion campaign and asked for whom they intended to vote. Such a study would make it possible to analyze overall trends in voter preferences for different candidates, but it would have the added advantage of showing the precise patterns of persistence and change in intentions. For example, a trend study that showed that Candidates A and B each had exactly half of the voters on September first and on October first as well could indicate that none of the electorate had changed voting plans, that all of the voters had changed their intentions, or something in between. A panel study would eliminate this confusion by showing what kinds of voters switched from A to B and what kinds switched from B to A, as well as other facts.

Joseph Vero, Shirley Hatchett, and Elizabeth Douven (1982) wanted to learn about marital adjustment among newlyweds, looking for differences between white and African-American couples. To get subjects for study, they selected a sample of couples who applied for marriage licenses in Wayne County, Michigan, during April through June of 1986.

Since they were concerned about the possible impact their research might have on the couples’ marital adjustment, the researchers divided their sample in half at random: an experimental group and a control group (concepts we’ll explore further in Chapter 9). The experimental-group couples were intensively interviewed over a four-year period, whereas the control group was contacted only briefly each year.

By studying the same couples over time, the researchers were able to follow the specific problems that arose and the way the couples dealt with them. As a by-product of their research, they found that those studied the most intensely seemed to achieve a somewhat better marital adjustment. The researchers felt that the interviews may have forced couples to discuss matters that may have otherwise been buried under the surface.

Because the distinctions between trend, cohort, and panel studies are sometimes difficult to grasp at first, let’s contrast the three study designs in terms of the same variable: political party affiliation. A trend study might look at shifts in the affiliations of the American electorate over time, as the Gallup Poll does on a regular basis. A cohort study might follow shifts in party affiliations among “the Depression generation,” specifically, say, people who were between 20 and 30 in 1932. We could study a sample of people 30–40 years old in 1942, a new sample of people aged 40–50 in 1952, and so forth. A panel study could start with a sample of the whole population or of some special subset and study those specific individuals over time. Notice that only the panel study would give a full picture of the shifts in party affiliations: from Democrat to Republican, from Republican to Democrat, and so forth. Cohort and trend studies would uncover only net changes.

Longitudinal studies have an obvious advantage over cross-sectional ones in providing information describing processes over time. But very often this advantage comes at a heavy cost in both time and money, especially in a large-scale survey. Observations may have to be made at the time events are occurring, and the method of observation may require many research workers.

Panel studies, which offer the most comprehensive data on changes over time, face especial...
spective in all these regards, research design is the process of narrowing, of focusing, your perspective for purposes of a particular study.

If you are doing a research project for a course you are taking, many aspects of research design may have been specified for you in advance. If you must do a project for a course in experimental methods, the method of research will have been specified for you. If the project is for a course in voting behavior, the research topic will have been somewhat specified. Because it would not be feasible for me to anticipate all such constraints, the following discussion will assume there are none.

In designing a research project, you will find it useful to begin by assessing three things: your own interests, your abilities, and the resources available to you. Each of these considerations will suggest a large number of possible studies.

Simulate the beginning of a somewhat conventional research project: Ask yourself what you are interested in understanding. Surely you have several questions about social behavior and attitudes. Why are some people politically liberal and others politically conservative? Why are some people more religious than others? Are college students becoming more vocationally oriented or less so? Do colleges and universities still discriminate against women faculty members? Are inter racial marriages more or less successful than others? Do students learn more in large classes or small ones? Sit for a while and think about the kinds of questions that interest and concern you.

Once you have a few questions you would be interested in answering for yourself, think about the kind of information needed to answer them. What research units of analysis would provide the most relevant information: college students, corporations, voters, cities, or what? This question will probably be inseparable in your thoughts from the question of research topics. Then ask which aspects of the units of analysis would provide the information you need to answer your research question.

Once you have some ideas about the kind of information relevant to your purpose, ask yourself how you might go about getting that information. Are the relevant data likely to be already available somewhere (say, in a government publication), or would you have to collect them yourself? If you think you would have to collect them, how would you go about doing that? Would it be necessary to interview a large number of people? Could you learn what you need to know by attending meetings of certain groups? Could you glean the data you need from books in the library?

As you answer these questions, you are well into the process of research design. Keep in mind your own research abilities and the resources available to you, however. Do not design the perfect study if you will be unable to carry it out. You may want to try a research method you have not used before, since research should be a learning experience in many ways, but you should not put yourself at too great a disadvantage.

Once you have a general idea of what you want to study and how, carefully review previous research in journals and books to see how other researchers have addressed the topic and what they have learned about it. Your review of the literature may lead you to revise your research design: Perhaps you will decide to use a previous researcher's method or even replicate an earlier study. The independent replication of research projects is a standard procedure in the physical sciences, and it is just as important in the social sciences, although we tend to overlook that. Or, you might want to go beyond replication and study some aspect of the topic that you feel previous researchers have overlooked.

Here's another approach you might take. Suppose a topic has been studied previously using field research methods. Can you design an experiment that would test the findings those earlier researchers produced? Or, can you think of existing statistics that could be used to test their conclusions? The use of several different
conduct the survey over the telephone. The relative advantages and disadvantages of these and other possibilities are discussed in Chapter 10.

Data Processing
Depending on the research method chosen, you will have amassed a volume of observations in a form that probably isn't easily interpretable. Chapter 14 describes some of the ways in which social scientific data are processed or transformed for quantitative analysis.

In the case of a survey, the "raw" observations are typically in the form of questionnaires, with boxes checked, answers written in spaces, and the like. The data-processing phase for a survey typically involves the classification (coding) of written-in answers and the transformation of all information to some computer format: on magnetic diskettes or computer hard disk, for example.

Analysis
Finally, we manipulate the collected data for the purpose of drawing conclusions that reflect on the interests, ideas, and theories that initiated the inquiry. Chapters 15 through 17 describe a few of the many options available to you in analyzing data. Notice that the results of your analyses feed back into your initial interests, ideas, and theories. In practice, this feedback may very well represent the beginning of another cycle of inquiry.

In the study of student attitudes about abortion rights, the analysis phase would pursue both descriptive and explanatory aims. You might begin by calculating the percentages of students who favored or opposed each of the several different versions of abortion rights. Taken together, these several percentages would provide a good picture of student opinion on the issue.

Moving beyond simple description, you might describe the opinions of different subsets of the student body: men versus women; freshmen, sophomores, juniors, seniors, graduate students; engineering majors, sociology majors, English majors, and so forth. The description of subgroups could then lead you into an explanatory analysis, as explained in Chapter 15.

Application
The final stage of the research process involves the uses made of the research you've conducted and the conclusions you've reached. To start, you will probably want to communicate your findings, so that others will know what you've learned. It may be appropriate to prepare—and even publish—a written report. Perhaps you will make oral presentations, such as papers delivered to professional and scientific meetings. Other students would be interested in hearing what you have learned about them, in the case of the abortion rights study.

You may want to go beyond simply reporting what you have learned to discuss the implications of your findings. Do they say anything about actions that might be taken in support of policy goals? Both the proponents and the opponents of abortion rights would be interested.

Finally, you should consider what your research suggests in regard to further research on your subject. What mistakes should be corrected in future studies? What avenues—opened up slightly in your study—should be pursued further in later investigations? This aspect of the research process will be discussed further in Chapter 19.

Review
As this overview shows, research design involves a set of decisions regarding what topic is to be studied among what population with what research methods for what purpose. Whereas the earlier sections of this chapter—dealing with research purposes, units of analysis, points of focus—aimed at broadening your per-
pretty much exploratory. You probably have both descriptive and explanatory interests: What percentage of the student body supports a woman's right to an abortion, and what causes some to support it and others to oppose it? The units of analysis are individuals: college students. You might decide that a cross-sectional study would suit your purposes. Let's assume you'd be satisfied to learn something about the way things are now. Although this would provide you with no direct evidence of processes taking place over time, you might be able to approximate some longitudinal analyses as discussed earlier.

Getting Started

The topmost portion of Figure 4.2 contains a number of possible activities. In pursuing your interest in student attitudes about abortion rights, you would undoubtedly want to read something about the issue. If you have a hunch that attitudes are somehow related to a college major, you might want to find out what other researchers may have written about that. Appendix A of this book will give you some assistance in using your college library. In addition, you would probably want to talk to people—some who support abortion rights and some who don't. You would probably want to attend meetings of abortion-related groups. The purpose of all these activities is to prepare you to handle the various decisions of research design we are about to examine. As you review the previous research literature regarding abortion rights, you should note the design decisions other researchers have made, always asking whether the same decisions would satisfy your purpose.

What is your purpose, by the way? It's important that you clarify that before designing your study. Do you plan to write a paper based on your research to satisfy a course requirement or as an honors thesis? Is your purpose to gain information that will support you in arguing for or against abortion rights? Do you want to write an article for the campus newspaper or for an academic journal?

Usually, your purpose for undertaking research can be expressed in the form of a report. Appendix B of this book will help you with the organization of research reports, and I would recommend that you outline such a report as the first step in the design of your project. Specifically, you should be clear about the kinds of statements you want to make when the research is complete. Here are two examples of such statements: "X percent of State U. students favor a woman's right to choose an abortion." "Engineers are (more/less) likely than sociologists to favor abortion rights."

Although your final report may not look much like your initial image of it, this exercise will give you something against which to test the appropriateness of different research designs.

Conceptualization

We often talk pretty casually about social science concepts such as prejudice, alienation, religiosity, and liberalism, but it's necessary to specify what we mean by these concepts in order to do research on them. Chapter 5 examines this process of conceptualization in depth. For now, let's see what it might involve in the case of our hypothetical example.

If you are going to study how college students feel about abortion and why, the first thing you'll have to specify is what you mean by "the right to an abortion." Specifically, you will want to pay attention to the different conditions under which people might approve or disapprove of abortion: e.g., when the woman's life is in danger, in the case of rape or incest, or simply because the woman wants to have an abortion.

You will find that overall support for abortion varies according to the circumstances. You will, of course, need to specify all the concepts you plan to study. If you want to study the possible effect of a college major, you'll have to decide whether you want to limit that to officially declared majors or to also include students' intentions in that regard. What will you do with those who have no major?
Choice of Research Method

As we'll see in Part 3 of this book, there are a variety of research methods available to the social scientist. Each of those methods has strengths and weaknesses, and certain concepts are more appropriately studied by some methods than by others.

In terms of our hypothetical study of attitudes toward abortion rights, a survey might be the most appropriate method: either interviewing students or asking them to fill out a questionnaire. As you'll see in Chapter 10, surveys are particularly well suited to the study of individuals' attitudes. This is not to say that you couldn't make good use of the other methods presented in Part 3. Through content analysis (discussed in Chapter 12), for example, you might examine letters to the editor and analyze the different images letter-writers have of abortion. Field research (Chapter 9) would provide an avenue to understanding how people interact with one another regarding the issue of abortion, how they discuss it, and how they change their minds. As you read Part 3, you'll see ways in which other research methods might be used in studying this topic. Usually, the best study design is one that uses more than one research method, taking advantage of their different strengths.

Operationalization

Having specified the concepts to be studied and having chosen the research method to be used, we must create concrete measurement techniques. Operationalization, discussed in Chapter 6, refers to the concrete steps or operations that will be used to measure specific concepts.

If you decided to study attitudes toward abortion rights by a survey, your operationalization would take the form of questionnaire items. Thus, you might operationalize your main variable by asking respondents whether they would approve a woman's right to have an abortion under a variety of conditions: in the case of rape or incest, if her life was threatened by the pregnancy, and so forth. Ask them to approve or disapprove separately for each situation.

Population and Sampling

In addition to refining concepts and measurements, decisions must be made about who or what to study. The population for a study is that group (usually of people) about whom we want to be able to draw conclusions. We are almost never able to study all the members of the population that interests us, however. In virtually every case, we must sample subjects for study. Chapter 8 describes methods for selecting samples that give an adequate reflection of the whole population that interests us. Notice in Figure 42 that decisions about population and sampling are related to decisions about the research method to be used.

In the study of abortion attitudes we've been discussing, the relevant population is the student population of your college. As you'll discover in Chapter 8, however, selecting a sample will require you to get more specific than that. Will you include part-time as well as full-time students? Only degree candidates or everyone? International students as well as U.S. citizens? Undergraduates, graduate students, or both? There are many such questions—each of which must be answered in terms of your research purpose. If your purpose is to predict what students would vote in a local referendum on abortion, you might want to limit your population to those eligible and likely to vote.

Observations

Having decided what to study among whom by what method, we are now ready to make observations—to collect empirical data. The chapters of Part 3, which describe the various research methods, give the different observation methods appropriate to each.

In the case of the abortion survey, you might want to print questionnaires and mail them to a sample selected from the student body, or you could arrange to have a team of interviewers
both the explicit and the implicit assumptions you are making about time. Are you interested in describing some process that occurs over time, or are you simply going to describe what exists now? If you want to describe a process occurring over time, will you be able to make observations at different points in the process, or will you have to approximate such observations—drawing logical inferences from what you can observe now? Unless you pay attention to questions like these, you are likely to end up in trouble. The box entitled "The Time Dimension and Aging" explores this issue further.

How to Design a Research Project

You've now seen some of the options available to social researchers in designing projects, but what if you were to undertake research? Where would you start? Then, where would you go? These are the topics of this final section of the chapter.

Although research design occurs at the beginning of a research project, it involves all the steps of the subsequent project. The comments that follow, then, should (1) give you some guidance on how to start a research project and (2) provide an overview of the topics that follow in later chapters of the book. Ultimately, the research process needs to be seen as a whole, and you need to grasp it as a whole in order to create a research design. (The Holographic Overview at the beginning of the book was designed to reduce this problem somewhat.) Unfortunately, both textbooks and human cognition operate on the basis of sequential parts.

Figure 4-2 presents a schematic view of the social science research process. I present this view reluctantly, since it may suggest more of a step-by-step order to research than is the case in practice. Nonetheless, as I've said, it should be useful to you to have some overview of the whole process before we launch into the specific details of particular components of research.

At the top of the diagram are interests, ideas, and theories, the possible beginning points for a line of research. The letters (a, b, c, d, etc.) represent variables or concepts such as prejudice or alienation. Thus, you might have a general interest in finding out what causes some people to be more prejudiced than others, or you might want to know some of the consequences of alienation, say. Alternatively, your inquiry might begin with a specific idea about the way things are. You might have the idea that working on an assembly line causes alienation, for example. I have put a question mark in the diagram to indicate that you aren't sure things are the way you suspect they are. Finally, I have represented a theory as a complex set of relationships among several variables.

Notice, moreover, that there is often a movement back and forth across these several possible beginnings. An initial interest may lead to the formulation of an idea, which may be fit into a larger theory, and the theory may produce new ideas and create new interests.

Any or all of these three may suggest the need for empirical research. The purpose of such research can be to explore an interest, test a specific idea, or validate a complex theory. Whatever the purpose, a variety of decisions needs to be made, as indicated in the remainder of the diagram.

To make this discussion more concrete, let's take a specific research example. Suppose you are concerned with the issue of abortion and have a special interest in learning why some college students support abortion rights, whereas others oppose them. Going a step further, let's say you have formed the impression that students in the humanities and social sciences seem generally more inclined to support the idea of abortion rights than those in the natural sciences. That kind of situation often lends people to design and conduct social research.

In terms of the options we've discussed earlier in the chapter, your research would be
Figure 4.2 The Research Process

- INTEREST
  - ? \rightarrow Y
  - Y \rightarrow ?

- IDEA
  - X \rightarrow Y
  - A \rightarrow B

- THEORY
  - A \rightarrow B \rightarrow E \rightarrow F
  - C \rightarrow D \rightarrow Y

- CONCEPTUALIZATION
  - Specify the meaning of the concepts and variables to be studied

- OPERATIONALIZATION
  - How will we actually measure the variables under study?

- CHOICE OF RESEARCH METHOD
  - Experiments
  - Survey research
  - Field research
  - Content analysis
  - Existing data research
  - Comparative research
  - Evaluation research

- POPULATION AND SAMPLING
  - Whom do we want to be able to draw conclusions about? Who will be observed for this purpose?

- OBSERVATIONS
  - Collecting data for analysis and interpretation

- DATA PROCESSING
  - Transforming the data collected into a form appropriate to manipulation and analysis

- ANALYSIS
  - Analyzing data and drawing conclusions

- APPLICATION
  - Reporting results and assessing their implications
The Time Dimension

Time plays a number of roles in the design and execution of research, quite aside from the time it takes to do research. When we examine causation in detail in Part 4, we'll find that the time sequence of events and situations is a critical element in determining causation. Time is also involved in the issue of the generalizability of research findings. Do the descriptions and explanations that result from a particular study accurately represent the situation of ten years ago or ten years from now, or do they represent only the present state of affairs?

Thus far in this chapter, we have regarded research design as a process for deciding what aspects we shall observe, of whom, and for what purpose. Now we must consider a set of time-related options that cuts across each of these earlier considerations. Our observations may be made more or less at one time, or they may be deliberately stretched over a long period.

Cross-Sectional Studies

Many research projects are designed to study some phenomenon by taking a cross section of it at one time and analyzing that cross section carefully. Exploratory and descriptive studies are often cross-sectional. A single U.S. Census, for instance, is a study aimed at describing the U.S. population at a given time.

Many explanatory studies are also cross-sectional. A researcher who conducted a large-scale national survey to examine the sources of racial and religious prejudice would, in all likelihood, be dealing with a single time frame in the ongoing process of prejudice.

Explanatory cross-sectional studies have an inherent problem. Typically, their aim is to understand causal processes that occur over time, yet their conclusions are based on observations made at only one time. This problem is somewhat akin to that of determining the speed of a moving object on the basis of a high-speed, still photograph that freezes the movement of the object. Some of the ways in which you can deal with this difficult problem will be discussed later.

Longitudinal Studies

Other research projects called longitudinal studies are designed to permit observations over an extended period. An example is a researcher who participates in and observes the activities of a radical political group from the time of its inception to its demise. Analyses of newspaper editorials or Supreme Court decisions over time are other examples. In the latter instances, it would be irrelevant whether the researcher's observations and analyses were made at one time or over the course of the actual events under study. Three special types of longitudinal studies should be noted here.

Trend studies are those that study changes within some general population over time,
more relevant than others. If we were to regard
shared values as the cause of the American
Revolution, our unit of analysis would be the
individual colonist. An economist, though, might
choose the thirteen different colonies as units of
analysis and examine the economic organiza-
tions and conditions of each colony. A psycholo-
gist might choose individual leaders as the units
of analysis for purposes of examining their
personalities.

Reductionism, like the ecological fallacy, oc-
curs with the use of inappropriate units of analy-
sis. The appropriate unit of analysis for a given
research question, however, is not always clear,
and it is often debated by social scientists, espe-
cially across disciplinary boundaries.

Points of Focus

The preceding discussion of different possible
units of analysis has frequently mentioned ways
of describing or characterizing them. These
ways represent aspects of those units of analy-
sis that might be researched.

To present a general overview of this topic,
we'll consider three points of focus: characteris-
tics, orientations, and actions. Although these
do not exhaust the possibilities for research—
or are the three rigidly separate from each
other—they should broaden your view of what
social scientists can and do focus their atten-
tion on.

Characteristics

To begin, the various units of analysis may be
characterized in terms of their characteristics
or their states of being. Individual persons
might be characterized by such states as sex,
age, height, marital status, deformities, region
of origin, or hearing ability. Social groups and
formal organizations might be characterized by
size, structure, location, and aggregated de-
scriptions of their members. Physical objects as
social artifacts might be described physically—
by size, weight, and color, for example—or by
the characteristics of the humans associated
with them. Social interactions as units of analy-
sis might be characterized in terms of where
they occur, when they occur, or what the people
involved are like.

These examples are not intended to repres-
ent an exhaustive list of possibilities. Never-
theless, they should suggest some of the ways to
categorize units of analysis.

Orientations

When individual people are the units of analy-
sis, we frequently investigate what are called
orientations: attitudes, beliefs, personality
traits, prejudices, predispositions, and the like.
Individuals might be characterized as religious,
politically liberal, anti-Semitic, intellectually
sophisticated, superstitious, or scientific. Orien-
tations, then, are general tendencies, inclinations,
or predilections.

Social groups and formal organizations, simi-
larly, might be characterized in terms of their
purposes, policies, regulations, or procedures,
or in terms of the aggregated orientations of
their members.

Social interactions might be similarly charac-
terized. Airline hijackings might be character-
ized as politically or nonpolitically motivated, as
might court cases and congressional hearings.

Actions

Sometimes social action is the focus of research.
We may observe directly or accept secondhand
accounts of individual human actions such as vot-
ing, bond buying, investing, striking, dropping
out of school, going to church, or buying Brand X
toothpaste. Secondhand accounts of actions may
come from the participants themselves or from
other sources. Thus, to find out whether people
have registered to vote, we might ask them, or
we might check the list of registered voters.

Social groups and formal organizations act
as well. Families may go on picnics, pray to-
received by a female political candidate in a recent city-wide election. Let’s assume that we have the vote tally for each precinct so that we can tell which precincts gave her the greatest support and which gave her the least. Assume also that we have census data describing some of the characteristics of those precincts. Our analysis of such data might show that precincts whose voters were relatively young gave the female candidate a greater proportion of their votes than precincts whose voters had an older average age. We might be tempted to conclude from these findings that young voters were more likely to vote for the female candidate than older voters—that age affected support for the woman. In reaching such a conclusion, we run the risk of committing the ecological fallacy because it may have been the older voters in those “young” precincts who voted for the woman. Our problem is that we have examined precincts as our units of analysis and wish to draw conclusions about voters.

The same problem would arise if we discovered that crime rates were higher in cities having large African-American populations than in those with few African Americans. We would not know if the crimes were actually committed by African Americans. Or if we found suicide rates higher in Protestant countries than in Catholic ones, we still could not know for sure that more Protestants than Catholics committed suicide.

Very often the social scientist must address a particular research question through an ecological analysis such as those mentioned previously. Perhaps the most appropriate data are simply not available. For example, the precinct vote tallies and the precinct characteristics mentioned in our initial example might be easy to obtain, but we may not have the resources to conduct a postelection survey of individual voters. In such cases, we may reach a tentative conclusion, recognizing and noting the risk of committing the ecological fallacy.

Don’t let these warnings against the ecological fallacy lead you into committing what we might call an individualistic fallacy. Some students approaching social research for the first time have trouble reconciling general patterns of attitudes and actions with individual exceptions they know of. If you know a rich Democrat, for example, that doesn’t deny the fact that most rich people vote Republican—as a general pattern. Similarly, if you know someone who has gotten rich without any formal education, that doesn’t deny the general pattern of higher education relating to higher income.

The ecological fallacy deals with something else altogether—drawing conclusions about individuals based solely on the observation of groups. Although the patterns observed among variables may be genuine, the danger here lies in drawing unwarranted assumptions about the cause of those patterns—assumptions about the individuals making up the groups.

Reductionism

A second concept related to units of analysis is reductionism. Basically, reductionism refers to an overly strict limitation on the kinds of concepts and variables to be considered as causes in explaining a broad range of human behavior. Sociologists may tend to consider only sociological variables (values, norms, roles); economists may consider only economic variables (supply and demand, marginal value); psychologists may consider only psychological variables (personality types, trauma). For example, what caused the American Revolution? A shared commitment to the value of individual liberty? The economic plight of the colonies in relation to Britain? The megalomania of the Founding Fathers? Scientists from different disciplines tend to look at different types of answers and ignore the others. Explaining all or most human behavior in terms of economic factors is called economic reductionism; explaining all or most human behavior in terms of psychological factors is called psychological reductionism; and so forth. Note how this issue relates to the Chapter 2 discussion of theoretical paradigms.

Reductionism of any type tends to suggest that particular units of analysis or variables are
able to identify what your unit of analysis is. You must decide whether you are studying marriages or marriage partners, crimes or criminals, corporations or corporate executives. Unless you keep this point in mind constantly, you run the risk of making assertions about one unit of analysis based on the examination of another.

To test your grasp of the concept of units of analysis, here are some examples of real research topics. See if you can determine the unit of analysis in each. (The answers are at the end of this chapter.)

[1] Women watch TV more than men because they are likely to work fewer hours outside the home than men... Black people watch an average of approximately three-quarters of an hour more television per day than white people. (Hughes, 1980: 390)

[2] Of the 120 incorporated U.S. cities with more than 100,000 inhabitants in 1960, 126 had at least two short-term nonproprietary general hospitals accredited by the American Hospital Association. (Turk, 1980: 317)

[3] The early TM (Transcendental Meditation) organizations were small and informal. The Los Angeles group, begun in June 1930, met at a member's house where, incidentally, Maharishi was living. (Johnston, 1980: 297)

[4] However, it appears that the nursing staffs exercise strong influence here... a decision to change the nursing care system... Conversely, among those decisions dominated by the administration and the medical staffs... (Comstock, 1980: 77)

[5] In 1958, there were 13 establishments with 1,000 employees or more, accounting for 60 percent of the industry's value added. In 1977, the number of this type of establishment dropped to 11, but their share of industry value added had fallen to about 48 percent. (Yerkes and Priem, 1981: 41)

[6] Though 667,000 out of 2 million farmers in the United States are women, women historically have not been viewed as farmers, but rather, as the farmer's wife. (Votav, 1979: 8)

[7] The analysis of community opposition to group homes for the mentally handicapped... indicates that deteriorating neighborhoods are most likely to organize in opposition, but that upper-middle class neighborhoods are most likely to enjoy private access to local officials... (Graham and Hagon, 1980: 313)

[8] Some analyses during the 1960s predicted that the rise of economic ambition and political militancy among blacks would foster discontent with the 'otherworldly' black mainline churches. (Ellison and Sherkat, 1990: 551)

[9] This analysis explores whether propositions and empirical findings of contemporary theories of organizations directly apply to both private product producing organizations (PPPOs) and public human service organizations (PHSOs). (Schulze and Zey, 1980: 249)

[10] This paper examines variations in job title structures across work rules. Analyzing 3,172 job titles in the California civil service system in 1985, we investigate how and why lines of work vary in the proliferation of job categories that differentiate ranks, functions, or particular organizational locations. (Seng and Baran, 1980: 479)

Figure 4-1 gives you a graphic illustration of some different units of analysis and the statements that might be made about them.

The Ecological Fallacy

At this point it is appropriate to introduce briefly two important concepts related to units of analysis: the ecological fallacy and reductionism. The first of these concepts, the ecological fallacy, means the danger, just mentioned, of making assertions about individuals as the unit of analysis based on the examination of groups or other aggregations. Let's consider a hypothetical illustration of this fallacy.

Suppose we are interested in learning something about the nature of electoral support
problem: panel attrition. Some of the respondents studied in the first wave of the survey may not participate in later waves. This is comparable to the problem of experimental mortality discussed in Chapter 5. The danger is that those who drop out of the study may not be typical, thereby distorting the results of the study. Thus, when Carol S. Aneshensel et al. conducted a panel study of adolescent girls (comparing Hispanics and non-Hispanics), they looked for and found differences in characteristics of survey dropouts among Hispanics born in America and those born in Mexico. Those differences needed to be taken into account to avoid misleading conclusions about differences between Hispanics and non-Hispanics (Aneshensel et al., 1989).

Approximating Longitudinal Studies

Often it is possible to draw approximate conclusions about processes that take place over time, even when only cross-sectional data are available. It is worth noting some of the ways to do that.

Sometimes, cross-sectional data imply processes over time or the basis of simple logic. For example, a study of student drug use was conducted at the University of Hawaii (mentioned in Chapter 2). Students were asked to report whether they had ever tried each of a number of illegal drugs. With regard to marijuana and LSD, it was found that some students had tried both drugs, some had tried only one, and others had not tried either. Because these data were collected at one time, and because some students presumably would experiment with drugs later on, it would appear that such a study could not tell the order in which students were likely to experiment with marijuana and LSD. Were students more likely to try marijuana or LSD first?

A closer examination of the data showed, however, that although some students reported having tried marijuana but not LSD, there were no students in the study who had tried only LSD. From this finding it was inferred—as common wisdom suggested—that marijuana use preceded LSD use. If the process of drug experimentation occurred in the opposite time order, then a study at a given time should have found some students who had tried LSD but not marijuana, and it should have found no students who had tried only marijuana.

Logical inferences may also be made whenever the time order of variables is clear. If we discover in a cross-sectional study of college students that those educated in private high schools received better college grades than those educated in public high schools, we would conclude that the type of high school attended affected college grades, not the other way around. Thus, even though our observations were made at only one time, we would feel justified in drawing conclusions about processes taking place across time.

Very often, age differences discovered in a cross-sectional study form the basis for inferring processes across time. Suppose you are interested in the pattern of worsening health over the course of the typical life cycle. You might examine that by studying the results of annual checkups in a large hospital. You could group health records according to the ages of those examined and rate each age group in terms of several health conditions—sight, hearing, blood pressure, and so forth. By reading across the age groups ratings for each health condition, you would have something approximating the health history of individuals. Thus, you might conclude that the average person develops vision problems earlier in life than hearing problems, for example. You would need to be cautious in this assumption, however, since the differences might reflect society-wide trends. Perhaps improved hearing examinations were instituted in the schools, but only the young people in your study had had the benefit of them.

Asking people to recall their pasts is another common way of approximating observations over time. We use this method when we ask people where they were born or when they graduated from high school or whom they voted for in 1988. The danger in this technique is evi-
The Time Dimension and Aging

by Joseph J. Leon
Behavioral Science Department, California State Polytechnic University, Pomona

One way to identify the type of time dimension used in a study is to imagine a number of different research projects on growing older in the American society. If we studied a sample of individuals in 1990 and compared the different age groups, the design would be termed cross-sectional. If we drew another sample of individuals using the same study instrument in the year 2000 and compared the new data with the 1990 data, the design would be termed trend.

Suppose we wished to study only those individuals who were 51-60 in the year 2000 and compare them with the 1990 sample of 41-50-year-old persons (the 41-50 age cohort); this study design would be termed cohort. The comparison could be made for the 51-60 and 61-70 age cohorts as well. Now, if we desired to do a panel study on growing older in America, we would draw a sample in the year 1990 and, using the same sampled individuals in the year 2000, do the study again. Remember, there would be fewer people in the year 2000 study because all the 41-50-year-old people in 1990 are 51-60 and there would be no 41-50-year-old individuals in the year 2000 study. Furthermore, some of the sampled individuals in 1990 would no longer be alive in the year 2000.

<table>
<thead>
<tr>
<th>CROSS-SECTIONAL STUDY</th>
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<th>TREND STUDY</th>
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<tr>
<th>PANEL STUDY</th>
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<td>51-60*</td>
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<td></td>
</tr>
<tr>
<td>71-80*</td>
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Denotes comparison
*Denotes some individuals

dent. Sometimes people have faulty memories; sometimes they lie. When people are asked in postelection polls whom they voted for, the results inevitably show more people voting for the winner than did so on election day. Thus, although recall may be the only way of approximating observations across time, it must be used with caution.

These, then, are some of the ways in which time figures into social research and some of the ways social scientists have learned to cope with it. In designing any study, you need to think at
research methods to test the same finding is sometimes called triangulation, and you should always keep it in mind as a valuable research strategy. Because each research method has particular strengths and weaknesses, there is always a danger that research findings will reflect, at least in part, the method of inquiry. In the best of all worlds, your own research design should bring more than one research method to bear on the topic.

The Research Proposal

The purpose of this chapter has been to let you see the whole research process in overview. That’s useful in terms of learning, of course, but this chapter can serve you in another way as well. If you were to undertake a research project—an assignment for this course, perhaps, or even a major study you would have to have funded by the government or a large corporation—you might very well have to provide a research proposal describing what you intend to accomplish and how. We’ll conclude this chapter with a discussion of how you might prepare such a proposal.

Elements of a Research Proposal

Although some funding agencies (or your instructor, for that matter) may have specific requirements for the elements and/or structure of a research proposal, here are some basic elements that you should discuss.

Problem or Objective What exactly do you want to study? Why is it worth studying? Does the proposed study have practical significance? Does it contribute to our general understanding of things, to the construction of social theories, for example?

Literature Review What have others said about this topic? What theories address it and what do they say? What research has been done previously? Are there consistent findings or do past studies disagree? Are there flaws in the body of existing research that you feel you can remedy?

Subjects for Study Who or what will you study in order to collect data? Identify the subjects in general, theoretical terms, and in specific, more concrete terms, identify who is available for study and how you will reach them. Will it be appropriate to select a sample? If so, how will you do that? If there is any possibility that your research will have an impact on those you study, how will you ensure that they are not harmed by the research?

Measurement What are the key variables in your study? How will you define and measure them? Do your definitions and measurement methods duplicate (that’s okay, incidentally) or differ from those of previous research on this topic? If you have already developed your measurement device (for example, questionnaire) or will be using something previously developed by others, it might be appropriate to include a copy in an appendix to your proposal.

Data-Collection Methods How will you actually collect the data for your study? Will you conduct an experiment or a survey? Will you undertake field research, or are you going to focus on the reanalysis of statistics already created by others?

Analysis Indicate the kind of analysis you plan to conduct. If you anticipate the use of specific analytical techniques—stepwise regression, factor analysis, and so on—you might say that. More important, however, spell out the purpose and logic of your analysis. Are you interested in precise description? Do you intend to explain why things are the way they are? Do you plan to account for variations in some quality? For example, why are some students more liberal than others? What possible explanatory variables will your analysis consider, and how?
will you know if you’ve explained variations adequately?

Schedule  It is often appropriate to provide a schedule for the various stages of research. Even if you don’t do this for the proposal, do it for yourself. Unless you have a time-line for accomplishing the several stages of research and keeping in touch with how you’re doing, you may end up in trouble.

Budget  If you are asking someone to give you money to pay the costs of your research, you will need to provide a budget, specifying where the money will go. Large, expensive projects include budgetary categories such as personnel, equipment, supplies, and expenses such as telephones and postage. Even for a more modest project, which you will pay for yourself, it’s a good idea to spend some time anticipating any expenses involved: office supplies, photocopying, computer disks, telephone calls, transportation, and so on.

As you can see, if you were interested in conducting a social science research project, it would be a good idea to prepare a research proposal for your own purposes, even if you weren’t required to do so by your instructor or a funding agency. If you are going to invest your time and energy in such a project, you should do what you can to ensure a return on that investment.

Now that you’ve had a broad overview of social research, let’s move on to the remaining chapters in this book and learn exactly how to design and execute each specific step. If you have found a research topic that really interests you, it would be useful to keep that topic in mind as you see how you might go about studying it.

Main Points

- Description is the precise measurement and reporting of the characteristics of some population or phenomenon under study.
- Explanation is the discovery and reporting of relationships among different aspects of the phenomenon under study. Whereas descriptive studies answer the question “What’s so?” explanatory ones tend to answer the question “Why?”
- Units of analysis are the people or things whose characteristics social researchers observe, describe, and explain. Typically, the unit of analysis in social research is the individual person, but it may also be a group or a social artifact.
- Whatever the units of analysis in research, they offer numerous points of focus that might be subjected to research: characteristics, orientations, and actions, for example.
- Cross-sectional studies are those based on observations made at one time. Although such studies are limited by this characteristic, inferences can be made about processes that occur over time.
- Longitudinal studies are those in which observations are made at many times. Such observations may be made of samples drawn from general populations (trend studies), samples drawn from more specific subpopulations (cohort studies), or the same sample of people each time (panel studies).
- Conceptualization is the process clarifying what is meant by the concepts being used in a study.
- Operationalization is the specification of precisely how variables are to be measured—an extension of the process begun with conceptualization.
- A research proposal provides a preview of why a study will be undertaken and how it will be conducted. It is a useful device for planning and may be required in some circumstances.
Review Questions and Exercises

1. Make up a research example—different from those discussed in the text—that would illustrate a researcher falling into the trap of the ecological fallacy. Then describe a modified research project that would avoid that trap.

2. Look through an academic research journal and find examples of at least three different units of analysis. Identify each unit of analysis, and present a quotation from the journal in which that unit of analysis is reported.

Additional Readings


Casely, D. J. and D. A. Lury, Data Collection in Developing Countries (Oxford: Clarendon Press, 1987). Mostly we’ve talked about designing social research in the United States or similar countries. This book discusses the special problems of research in the developing world.


Hunt, Morton, Profiles of Social Research: The Scientific Study of Human Interactions (New York: Basic Books, 1985). An engaging and informative series of project biographies: James Coleman’s study of segregated schools is presented, as well as several other major projects that illustrate the elements of social research in actual practice.


Menard, Scott, Longitudinal Research (Newbury Park, CA: Sage, 1991). Beginning with an explanation of the purposes for conducting longitudinal research, the author goes on to detail a variety of study designs, as well as suggestions for the analysis of longitudinal data.


Answers to Units of Analysis Exercise (page 92)

1. individuals (men and women, black and white people)
2. groups (incorporated U.S. cities)
3. groups (Transcendental Meditation organizations)
4. groups (nursing staffs)
5. groups (establishments)
6. individuals (women and men farmers)
7. groups (neighborhoods)
8. individuals (black-Americans)
9. organizations (service and production organizations)
10. artifacts (job titles)
Research Methods in the Social Sciences
SECOND EDITION

DAVID NACHMIAS
CHAVA NACHMIAS

St. Martin's Press
New York
CHAPTER 9
Questionnaire Construction

INTRODUCTION
The last chapter focused on survey research as a method of data collection. In this chapter we discuss the questionnaire as the main instrument in survey research. We start by discussing the foundation of all questionnaires—the question. We then look at the content of questions and differentiate between open-ended, closed-ended, and contingency type questions. We follow by analyzing the format and sequence of questions. The next section introduces possible biases in the wording of questions. In this context we discuss leading, double-barreled, and threatening questions. Finally, in the last two sections, the cover letter accompanying the questionnaire and the instructions included in it are described.

THE QUESTION
The foundation of all questionnaires is the question. The questionnaire must translate the research objectives into specific questions; answers to such questions will provide the data for hypothesis testing. The question must also motivate the respondent so that the necessary information is obtained. It is to these two ends that the question becomes the focus around which the questionnaire is constructed. The major considerations involved in formulating the question are its content, structure, format, and sequence. These issues are examined in the following sections.

CONTENT OF QUESTIONS
Survey questions may be concerned with facts, opinions, attitudes, respondents' motivation, and their level of familiarity with a certain sub-
Opinion Questions

The concept "attitude" refers to the sum total of a person's inclinations, prejudices, ideas, fears, and convictions about any specific topic. Opinions, on the other hand, are the verbal expression of attitudes. Thus, a statement such as "The United States should fight communism in the Middle East" would reflect an opinion that is against communism, but an attitude about communism would mean a more general orientation of what a person feels and thinks about communism.

An attitude can lead to a tendency to act or react in a certain manner when confronted with certain stimuli. The individual's attitudes are expressed in speech or behavior, only when the object of the attitude is perceived. A person may have strong attitudes for or against communism, but these are aroused and conveyed only when that person encounters some issue connected with Communists or when he or she is confronted with a stimulus such as a question in an interview.

Attitudes can be described by their content (what the attitude is about), by their direction (positive, neutral, or negative feelings about the object or issue in question), and by their intensity (an attitude may be held with greater or lesser vehemence). To one person, communism may be of passing interest; to another, it may be of great significance and lead that person to join anti-Communist organizations. One would expect the latter to agree or disagree more strongly than the former to questions dealing with, say, trade with the Soviet Union.

In general, we are interested in measuring attitudes because they account for the respondent's general inclination. The study of opinion is of interest only in so far as it is a symbol of an attitude. The main difference between asking for opinions and measuring attitudes is that an opinion is generally measured by estimating what proportion of the surveyed population say they agree with a single opinion statement. Attitudes are measured by attitude scales consisting of five to twenty or more attitude statements, with which the respondent is asked to agree or disagree. An essential requirement of attitude measurement is that such attitude statements be scaled; that is, that the statements be selected and put together from a much larger number of attitude statements according to certain techniques. These techniques, called attitude scaling, will be discussed in Chapter 10.

Survey questions about opinions and attitudes present more problems in construction than questions about facts. It is relatively simple to obtain accurate information on, for example, whether or not a person


is married or single. One may reasonably assume that the respondent knows whether he or she is married or not. With opinions or attitudes, the assumption that the respondents know cannot always be made. For example, respondents may not have an attitude towards communism, or if they do, it might be largely latent. Moreover, given that many attitudes have various aspects or dimensions, the respondent may agree with one aspect and disagree with another. This is why attitudes cannot be measured by a single question. For example, if a respondent strongly disagrees with the statement "Trade with the Soviet Union should be encouraged," this does not imply a broad anti-Communist attitude. This person's disagreement may be due to personal circumstances; for instance, the person may think that trade with the Soviet Union would harm his or her business. By using several attitude statements, one can reduce the effects of one-sided responses.

Finally, answers to opinion and attitude questions are more sensitive to changes in wording, emphasis, and sequence than are those to factual questions. This reflects, in part, the multidimensionality of many attitudes. Questions presented in different ways sometimes reflect different aspects of the attitude and thus result in different answers.

TYPES OF QUESTIONS

The content of the question is only one important aspect in the construction of survey questionnaires. The researcher must also consider the structure of the question and the format of the response categories accompanying the question. Three types of question structures can be distinguished and will be discussed in the following sections: (1) open-ended questions, (2) closed-ended questions, and (3) contingency questions.

Open-Ended and Closed-Ended Questions

Questions in a questionnaire can be either open-ended or closed-ended. In a closed-ended question, respondents are offered a set of answers from which they are asked to choose the one that most closely represents their views. For example, to measure political conservatism in the United States, Angus Campbell and coauthors used, among other questions, the following closed-ended question:


"All groups can live in harmony in this country without changing the system in any way."

<table>
<thead>
<tr>
<th>Strongly agree</th>
<th>Disagree</th>
</tr>
</thead>
<tbody>
<tr>
<td>Agree</td>
<td>Strongly disagree</td>
</tr>
</tbody>
</table>

Agreement with the question indicated conservatism. Answers to closed-ended questions can be more elaborate. To measure group cohesiveness, Stanley Seashore asked,

"Do you feel that you are really part of your work group?"

<table>
<thead>
<tr>
<th>Really a part of my work group</th>
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</thead>
<tbody>
<tr>
<td>Included in most ways</td>
</tr>
<tr>
<td>Included in some ways, but not in others</td>
</tr>
<tr>
<td>Don't feel I really belong</td>
</tr>
<tr>
<td>Don't work with any one group of people</td>
</tr>
<tr>
<td>Not ascertained</td>
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</tbody>
</table>

Closed-ended questions are easy to ask and quick to be answered; they require no writing by either respondent or interviewer, and their analysis is straightforward. Their major drawback is that they may introduce bias, either by forcing the respondent to choose from given alternatives or by making the respondent select alternatives that might not have otherwise occurred.

Open-ended questions are not followed by any kind of specified choice, and the respondents' answers are recorded in full. For instance, the question "What do you personally feel are the most important problems the government in Washington should try to take care of?" is an open-ended question used frequently in questionnaires designed to study public opinion. The virtue of the open-ended question is that it does not force the respondent to adapt to preconceived answers; having understood the intent of the question, one can express one's thoughts freely, spontaneously, and in one's own language. If the answers to open-ended questions are unclear, the interviewer may probe, that is, ask the respondent to explain further or to give a rationale for something stated earlier. Open-ended questions, then, are flexible; they have possibilities of depth, they enable the interviewer to clear up misunderstandings, and they encourage rapport. However, open-ended questions are difficult to answer and still more difficult to analyze. The researcher has to design a coding frame in order to classify the various answers; in this process, the details of the information provided by the respondent might get lost (see Chapter 11).

The appropriateness of either open-ended or closed-ended questions depends upon a number of factors. Some years ago, Paul Lazarsfeld suggested the use of the following considerations to determine appropriateness:

1. **The objectives of the questionnaire.** Closed-ended questions are suitable when the researcher's objective is to lead the respondent to express agreement or disagreement with an explicit point of view. When the researcher wishes to learn about the process by which the respondent arrived at a particular point of view, an open-ended question is likely to be more appropriate.

2. **The respondent's level of information about the topic in question.** Open-ended questions provide opportunities for the interviewer to ascertain lack of information on the part of the respondent, whereas closed-ended questions do not. Obviously, it is futile to raise questions that are beyond the experiences of respondents.

3. **The extent to which the topic has been thought through by the respondent.** The open-ended question is preferable in situations where the respondents have not yet crystallized their opinions. The use of a closed-ended question in such situations involves a risk that in accepting one of the alternatives offered, the respondent may make a choice that is quite different from an opinion that would have otherwise been expressed had he or she gone through the process of recall and evaluation of past experience.

4. **The ease with which the content of the answer can be communicated by the respondent or the extent to which the respondent is motivated to communicate on the topic.** The closed-ended question requires less motivation to communicate on the part of the respondent, and the response itself is usually less revealing to the respondent (and hence less threatening) than in the case of the open-ended question. The researcher who uses closed-ended questions tends to encounter less frequent refusals to respond.

Sometimes there may be good reasons for asking the same question in both open-ended and closed-ended form. For example, an open-ended answer to the question “Who rules America?” will provide a clear idea of the respondent’s perception of the political system and the significance that the person attaches to different power groups. Although this datum is most valuable, it might not allow comparison of one group of respondents with another. Furthermore, one cannot be sure that all information of importance to the respondent has been mentioned; factors such as the inability to articulate thoughts or a momentary lapse of memory may cause omission of significant points. Therefore, the researcher can ask the same question again, later in the interview, but this time in closed-ended form.

### Contingency Questions

Frequently questions that are relevant to some respondents may be irrelevant to others. For example, the question “Check the most important reasons why you are not going to college” obviously applies only to those high school students who are planning to go to college at all. It is often necessary to include questions that might apply only to some respondents and not to others. Some questions may be relevant only to females and not to males; others will only apply to respondents who are self-employed, and so on.

A **contingency question**—a special case of a closed-ended question—is one that applies only to a subgroup of respondents. The relevance of the question to this subgroup is determined by the answer of all respondents to a preceding **filter question**. For example, in a news media survey, the filter question might read, “Do you regularly follow the news in the papers?” The contingency question could be, “What recent event do you remember reading about? (Give a brief description.)” The relevancy of the second question to the respondent is contingent upon his or her response to the filter question. Only respondents who responded “Yes” to the filter question will find the contingency question relevant. Therefore, the response categories of the filter questions will be 1. Yes (answer the following question); 2. No (skip to question 3).

The formats for filter and contingency questions vary. One alternative, as in the preceding example, is to write directions next to each response category of the filter question. Another common format is to use arrows to direct the respondent either to skip to another question or to answer the contingency question, as in the following example:

"Is this the first full-time job you have held since you graduated from college?"
1. Yes
2. No

*What happened to the job you had before—were you promoted, laid-off, or what? (Check one.)*
1. Company folded.
2. Laid off or fired.
3. Job stopped; was seasonal.
4. Voluntarily quit.
5. Promoted; relocated.
6. Oil
Another format is to box the contingency question and to set it apart from the ordinary questions to be answered by everyone. An example of such a format, taken out of a questionnaire used in a study of high school social climate is shown in Box 9.1.  

BOX 9.1.

ANSWER QUESTIONS BELOW IF YOU ARE A SENIOR PLANNING TO GO TO COLLEGE NEXT FALL. NONSENIORS SKIP TO QUESTION 144.

137. Did you take the College Entrance Board Exams?
   — yes
   — no

138. Do you definitely know yet which college you will attend?
   — yes
   — no

139. If "yes," how does this school compare to the others you were considering, in each of the following ways?

1. □ 2. □ 3. □ 4. □ Offering the course
   5. □
1. □ 2. □ 3. □ 4. □ Of study you want
   5. □ General reputation
   6. □ of the school

SKIP TO QUESTION 151 ON THE NEXT PAGE.

When there are several subgroups to which the questionnaire is addressed and when several contingency questions apply to each subgroup, it is useful to indicate by number which questions the respondent should answer. The instructions are written next to the appropriate response categories in the filter question. This is demonstrated in the following example.

Are you looking for another job at this time?

— yes
— no
— don't know
— inappropriate

Go to Question 25.


QUESTION FORMAT

In this section we will discuss some of the common techniques of structuring the response categories of closed-ended questions. The general format is to present all possible answers and have the respondent check the appropriate categories. The respondent can either circle his or her answer or check a box or a blank as in the following examples:

"What is your marital status?"

- Married □ Married 1. Married
- Single □ Single 2. Single
- Divorced □ Divorced 3. Divorced
- Widowed □ Widowed 4. Widowed

Of course, specific directions should be provided as to whether the respondent is to circle a number or check a blank or a box. Among these three methods the least recommended is the blank method because often the respondent will check between the blanks and it will be difficult to tell which category was intended. The method of circling a code number is preferable to the box method because the circled code number can later be punched on cards, and this facilitates the data processing (see, Chapter 11).

Rating

One of the most common formats for questions asked in social science surveys is the rating scale. The rating scale is used whenever respondents are asked to make a judgment in terms of sets of ordered categories, such as "strongly agree," "favorable," or "very often." For example:

"Police should be allowed to conduct a full search of any motorist arrested for an offense such as speeding:"

1. Agree strongly
2. Agree
3. Disagree
4. Disagree strongly
5. No opinion

The response categories of such questions are termed "quantifiers"; they reflect the intensity of the particular judgment involved. The following sets of response categories are quite common:

2. Agree 2. About right 2. Same
3. Depends 3. Too much 3. Less
4. Disagree
5. *Dougly disagree
The numerical codes that accompany these categories are usually interpreted to represent the intensity of the response categories, so that the higher the number, the more intense the response. Yet it should be emphasized that though we assume that the quantifiers involved are ordered by their intensity, it does not imply that the distance between them is equal. Indeed rating scales such as these are most often measured on ordinal levels of measurement, as discussed in Chapter 6.

Despite the difficulty in estimating intensities, we cannot typically ask respondents for exact estimates because most would have a great deal of difficulty with the task. Although it would seem relatively easy to report how many hours in the past week a person watched television, most people have greater difficulty in estimating precisely events of relatively low salience, such as attitudes about foreign policy.10

Matrix Questions

The matrix question is a method for organizing a large set of rating questions that have the same response categories. The following is an example of such a device.

- Which of the following statements do you (1) strongly agree to, (2) agree with, (3) find that it depends, (4) disagree with, or (5) strongly disagree with:

<table>
<thead>
<tr>
<th>Strongly Agree</th>
<th>Agree</th>
<th>Depends</th>
<th>Disagree</th>
<th>Strongly Disagree</th>
</tr>
</thead>
<tbody>
<tr>
<td>My vote gives me all the power I want in governmental affairs</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>If I complained to a city agency, they would fix up whatever was wrong</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>I've sometimes wished that government officials paid more attention to what I thought</td>
<td></td>
<td></td>
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<td></td>
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</tbody>
</table>


The Card Sort

Another way to measure intensities of judgments is the card sort, where the respondent is handed a set of cards with a statement on each card and is asked to sort them into one of seven boxes, depending on his or her degree of agreement with the statement. The following is an example of such a device:

<table>
<thead>
<tr>
<th>How strongly do you agree or disagree with the following statement: People who are capable of working but don't are a drain on society.</th>
</tr>
</thead>
<tbody>
<tr>
<td>Strongly Agree</td>
</tr>
<tr>
<td>+ + +</td>
</tr>
</tbody>
</table>

The Semantic Differential

The semantic differential is another type of a rating scale. It measures the respondent's reaction to some object or concept in terms of rating on bipolar scales defined with contrasting adjectives at each end:11

<table>
<thead>
<tr>
<th>Good</th>
<th>3</th>
<th>2</th>
<th>1</th>
<th>0</th>
<th>1</th>
<th>2</th>
<th>3</th>
<th>Bad</th>
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</thead>
</table>

The "0" marks the neutral position on the scale, and the positions 1–3 measure the intensities in either direction, with 1 being the slightest reaction and 3 the most intense.

An example of an application of the semantic differential is presented as follows:12

Here is a list of pairs of words you might use to describe civil servants. Between each pair is a measuring stick of seven lines. Taking the first pair of words—i.e., "good/bad"—as an example, the line on the extreme left would mean that the civil servant is very good, the next line would mean be or she is fairly good, and so on. The words at the top of your card will help you choose the line you think is appropriate.


Now will you tell me which line you would use to describe civil servants?

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<tr>
<th>Good</th>
<th>Fairly</th>
<th>Slightly</th>
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**Ranking**

Ranking is used in questionnaires whenever we want to obtain information regarding the degree of importance or the set priorities that people give to a set of attitudes or objects. For instance, in a survey on the quality of life, respondents were asked to rank order various dimensions they consider important in life.

"I would like you to tell me what you have found important in life. Would you please look at this card and tell me which of these is most important to you as a goal in your life, which comes next in importance, which is third, and so forth?"

- A prosperous life (having a good income and being able to afford the "good" things in life)
  - 1st rank
  - 2nd rank
  - 3rd rank
  - 4th rank
- A family life (a life completely centered on my family)
  - 1st rank
  - 2nd rank
  - 3rd rank
  - 4th rank
- An important life (a life of achievement that brings me respect and recognition)
  - 1st rank
  - 2nd rank
  - 3rd rank
  - 4th rank
- A secure life (making certain that all basic needs and expenses are provided)
  - 1st rank
  - 2nd rank
  - 3rd rank
  - 4th rank

Ranking is a useful device in providing some sense of relative order among objects or judgments. This is particularly important given that many properties measured in the social science (for example, "quality of life," "status") cannot be given any precise numerical value. However, with the use of ranking we can at least obtain information regarding their relative order. It should be emphasized, however, that ranking does not provide any information about the distance between the ranks. The difference between, say, rank 1 and rank 2 may not be the same as the difference between rank 2 and rank 3.

**SEQUENCE OF QUESTIONS**

After the format of questions is determined, consideration should be given to the order in which they are placed in the questionnaire. Two general patterns of question sequence have been found to be most appropriate for motivating respondents to cooperate: the funnel sequence and the inverted funnel sequence.

**The Funnel Sequence**

In the funnel sequence, each successive question is related to the previous question and has a progressively narrower scope. For example, if one were interested in finding out how respondents' views of political, economic, and social problems were related to the newspapers they read, one might want to know what sorts of things the respondents think of as problems, what the perceived relative significance of each problem is, how much information they have on the topic, what their sources of information are, and whether certain newspapers have influenced their thinking on the problem. The following questions form a funnel sequence: (1) "What do you think are some of the most important problems facing the nation?" (2) "Of all the problems you have just mentioned, which do you think is the most important one?" (3) "Where have you obtained most of the information about this problem?" (4) "Do you read the Washington Post?"

When the objective of the survey is to obtain detailed information and when the respondent is motivated to supply the information, the funnel approach helps the respondent recall details more efficiently. Furthermore, by asking the broadest questions first, the interviewer can avoid imposing a frame of reference before obtaining the respondent's perspective. When the objective of the survey is to discover unanticipated responses, broader questions should be pursued first.

---

The Inverted Funnel Sequence

In the inverted funnel sequence, narrower questions are followed by broader ones. When the topic of the survey does not strongly motivate the respondents to communicate—either because the topic is not important to them or because their experiences are not recent enough to be vivid in their memory—it may be helpful to begin with the narrow questions, which are easier to answer, and reserve the broader (and more difficult) ones until later. If the purpose is to obtain a generalization in the form of a judgment regarding a concrete situation and if the interviewer is unfamiliar with the facts but the respondent knows them, then narrower questions aimed at establishing specific facts should precede questions requiring an overall judgment. 14

In the following example, an attempt was made to obtain the respondents’ judgment regarding the effectiveness of rescue operations during a disaster. To help people make an unbiased judgment, the researcher felt that it was better to deal with the specifics first, later asking for the generalization. 15

1. How many people were killed in the tornado?
2. How many do you suppose were injured so seriously that they had to go to the hospital?
3. How long was it before most of the injured got to the hospital?
4. Did you see anyone administer first aid by giving artificial respiration or stopping bleeding? Who was it?
5. In general, how well do you think the first aid and rescue operations were carried out?

The order in which the questions are presented has been shown to affect the degree to which the respondent is willing to cooperate with the researcher. 16 In addition, question order influences the reliability of the response. For example, there is evidence showing that the position of an item in a list has a significant impact on its being chosen, with items appearing first being endorsed more often. 17 It has been also shown that when respondents are asked to assign numerical values to a set of items (for example, according to their degree of importance), the items appearing first tend to receive a higher rank. In the following question, respondents are more likely to assign the first rank to the first category than to the last one simply because it is listed first.

"Among the items below, what does it take to be important and looked up to by the other fellows here at school?" (Rank from 1 to 6.)
- coming from the right family
- leader in activities
- having a nice car
- high grades, honor roll
- being an athletic star
- being in the leading crowd

This problem may arise especially in situations where the questions are subjective statements like attitudes, which are not central or salient to the respondent. In such situations the item appearing first tends to form a point of reference for all items that follow. This problem can be overcome by acquainting respondents with the list of items before evaluations are to be made. Alternatively, the order of presentation could be randomized so that the order effects will be randomized, too, and will not result in any systematic bias. 16

Finally, it should be pointed out that questions that are presented first in the questionnaire should put the respondent at ease, and if an interviewer is present, they should help in creating rapport between the interviewer and the respondent. Thus, the opening question should be easy to answer, preferably interesting, and not deal with sensitive issues. For example, questions about the respondent’s drinking habits or sex life, if placed at the beginning, in all likelihood will increase the refusal rate. It is also recommended that open-ended questions be placed later, for they usually require more time and thought and thus may reduce the respondent’s initial motivation to cooperate.

AVOIDING BIAS: PITFALLS IN QUESTIONNAIRE CONSTRUCTION

Wording of the Question

The question must be worded so that it is comprehended by the respondent. For example, the researcher’s vocabulary might include a word such as charismatic, which would not be understood by the proverbial man in the street. If the respondents are individuals from all walks of life, then the interviewer’s vocabulary should be understandable by

15. Ibid., p. 270.
the average eighth-grader. Furthermore, words that are subject to a wide variety of interpretation should either be avoided or qualified by specifying their frame of reference. Asking whether one is a liberal might, according to one’s interpretation of the term, refer to one’s education, one’s politics, one’s profession, or one’s sex life. On the other hand, a question such as “Do you consider yourself liberal? Politically, I mean,” instructs the respondent to use the political frame of reference in answering the question. Questions should be worded so that the respondent understands the question and so that the question has one and the same meaning for each respondent unless the researcher desires to assess differentials in meaning.

Response Set
A response set is the tendency to answer all questions in a specific direction regardless of the questions’ content. This may be a problem when a set of questions is presented together with the same response format, as in the case of the matrix question and especially when the questions all refer to the same topic. For example, when a set of questions reflects a proabortion attitude, respondents who are against abortion may check all the right-hand response categories simply because they assume that these categories all express objection to abortion. A response set can be avoided by changing the question format, either by varying the response categories for each question or by avoiding the lumping together of questions referring to the same topic.

Leading Questions
The term leading question refers to a question phrased in such a manner that it appears to the respondent that the researcher expects a certain answer. A question designed to elicit general attitudes toward social protest might read, “How do you feel about student protest?” The same question phrased in a leading form might read, “You wouldn’t say that you were in favor of student protest, would you?” A more subtle form of a leading question might be, “Would you say that you are not in favor of student protest?” This last question makes it easier for respondents to answer yes than no. In answering yes, they are agreeing with the language of the question and are not contradicting the interviewer.

The term social desirability refers to the tendency of respondents to agree with questions that support accepted norms or that are perceived as socially desirable. Questions that reflect a socially undesirable behavior or attitude are endorsed less frequently than those high on the scale of social desirability. For example, Derek Phillips reported that people’s scores on a mental health test are directly related to their assessment of the desirability reflected in the items.

Another kind of leading question makes use of words that have become emotionally loaded, either favorably or unfavorably. Terms such as socialist or starvation make respondents react not so much to the issue posed by the question as to the loaded phrase itself. Consider the following two questions: “The President has made several public statements advocating school integration. Do you think we should integrate our schools?” and “Socialists have always advocated school integration. Do you think we should integrate our schools?” These two questions are loaded, but in different directions; more respondents will tend to agree with the first.

Leading questions are to be avoided if one is looking for undistorted responses. Under certain circumstances, however, leading questions may serve the research objective. The question “Would you favor sending food overseas to feed the starving people of India?” was used to determine the number of people who were so strongly opposed to shipping food to other countries that they rejected the idea even within the strong emotional context of “starving people.”

Threatening Questions
Often it is necessary to include questions on topics that the respondent may find embarrassing and thus difficult to answer. These types of questions, denoted as threatening questions, are, according to Norman Bradburn and coauthors, “anxiety-arousing questions about, for example, behaviors that are illegal or contra-normative or about behaviors that, though not socially deviant, are not usually discussed in public without some tension.” Threatening questions may inquire, for example, about the respondents’ gambling habits, about their drinking, whether or not they smoke marijuana or abuse their children, or about their sexual behavior.

There is considerable empirical evidence that threatening questions lead to response bias, that is, to denial of the behavior in question or to underreporting. In general, the reporting of certain behaviors decreases as questions increase in their degree of threat. When presented with


DATA COLLECTION

As threatening questions may produce biased responses, it is important that researchers first identify whether or not certain questions are threatening. Norman Bradburn and Seymour Sudman suggest that the best method to determine the relative threat of questions is to ask respondents to rate question topics as to how uneasy they thought most people would feel in talking about them. One could also ask about the respondent's own reactions to the questions or rate the degree of difficulty the topics caused in the interview.

Once it is determined which are threatening questions, what should we do about them? In a comprehensive study dealing with response effects to threatening questions in survey research, Bradburn and Sudman propose that the construction of questions makes a great deal of difference. Perhaps the most significant finding in their study was the discovery that the amount of reporting behavior is considerably increased by using a long introduction to the question rather than asking short questions; by an open-ended rather than a closed-ended format; and, to a lesser extent, by letting the respondents pick their own words to talk about the sensitive topics. Their questionnaire contained an item to talk about the sensitive topics. Their questionnaire contained an item about the number of times in the past year the respondent had become intoxicated. In the short closed form, the item read: “In the past year, how often did you become intoxicated while drinking any kind of beverage?” Respondents were asked to classify their response into one of the following categories:

- Never
- Once a year or less
- Every few months
- Once a month
- Every few weeks
- Once a week
- Several times a week
- Daily

In the open-ended, long form, the respondents were first asked to provide their own word for intoxication: “Sometimes people drink a little too much beer, wine, or whiskey so that they act different from usual. What word do you think we should use to describe people when they get that way, so that you will know what we mean and feel comfortable talking about it?” The intoxication item then read: “Somehow people talking about it?” The intoxication item then read: “Occasionally people drinking any kind of alcoholic beverage?” No response categories were provided for these questions.

**Double-Barreled Questions**

Double-barreled questions include two or more questions in one. The following item, included in an opinion poll, during the 1979 Iranian crisis is an example:

“The United States should reduce its dependence on foreign oil and stop selling grain to Iran.”

- Agree
- Depends
- Disagree
- Strongly Disagree

The problem with such a question is that it might confuse respondents who agree with one aspect of the question—reducing dependence on foreign oil—but disagree with the other—selling grain to Iran. Many questions that include and are very likely doubled-barreled, as in the following statement:

“The United States should take a harder line at the SALT negotiating table and bolster NATO forces in Europe.”

or

“Would you say that most people are like you and can be trusted?”

Both statements include two separate questions that are identified by the use of and. Questions with and can be used, however, if the dimensions separated by and are mutually exclusive and the respondent is asked to select one or to rank them according to some criterion. For instance:

“At the present time, the country is faced with two major problems—

1. Inflation
2. Energy shortage

too much beer, wine, or whiskey so that they act different from usual. What word do you think we should use to describe people when they get that way, so that you will know what we mean and feel comfortable talking about it?” The intoxication item then read: “Occasionally people drinking any kind of alcoholic beverage?” No response categories were provided for these questions.

24. Ibid.
COVER LETTER

After the questionnaire has been constructed, the next step is to write an introductory statement for a personal telephone interview or a cover letter for a mail questionnaire in order to explain the purpose of the survey to the respondents and to assure a high response rate. This is of particular importance in mail questionnaires, where the difficulty of securing a high response rate, especially when one needs to ask more than a few simple questions, is well documented (see Chapter 8).

A cover letter must succeed in overcoming any resistance or prejudice the respondent may have against the survey. As such it should (1) identify the sponsoring organization or the persons conducting the study, (2) explain the purpose of the study, (3) tell why it is important...

To Program Operators:

The Office of Manpower Planning, Department of Community Affairs, in conjunction with the State Manpower Services Council, has funded a special evaluation of public service employment projects authorized under Title VI of the Comprehensive Employment and Training Act. This evaluation is being conducted by Dr. M. L. Burstein in the Institute for Social Research at Florida State University. The purpose of the evaluation is to determine the impact of public service employment projects on unem-ployed persons in Florida and to measure the benefit of these projects to the communities in which they are conducted.

As you know, public service employment is a major part of the federal, state, and local strategy to overcome the employment and income problems of economically disadvantaged, unemployed people. There is no question that the program is needed throughout the country to create jobs and training opportunities for the large numbers of people who remain unemployed. You are probably also aware, however, that public service employment programs are quite controversial and their future may be in jeopardy. Part of the reason that these programs are so controversial is that no systematic evaluation of the benefits of these programs for the individuals employed and the communities served has been conducted.

Because this specific evaluation has significant national policy impli-cation, I strongly urge you to assist the research team in compiling the necessary data. It is very important that you complete the survey questionnaire transmitted to you as soon as possible.

Thank you for your cooperation.

Sincerely,

Edward A. Weaver, Director
Office of Manpower Planning

BOX 8.3.

Dear Friend:

We are conducting a survey sponsored by the University of Wisconsin-Milwaukee and assisted by the American Civil Liberties Union (ACLU). Our purpose is to learn more about how people like yourself feel about certain aspects of civil liberties and how beliefs are related to behavior. You have been selected at random to participate in this survey—thus your opinions will represent the opinions of thousands of people much like yourself.

Enclosed find a copy of our questionnaire. While it is a bit lengthy and will require about 30 minutes to complete, we hope that you will take the time to complete it and return the questionnaire to us in the enclosed self-addressed envelope. The information you provide will contribute to an important study and may also be used to influence ACLU policy.

A bit about confidentiality. We promise you confidentiality under the academic ethics standards of the American Political Science Association. Your name will not be revealed or associated with your response nor will anyone outside of the project staff here at the University of Wisconsin-Milwaukee be allowed to see your response. Thus, while the ACLU may be interested in the policy implications of our study they will not be furnished with any information which in any way identifies you as an individual. Please note the number in the upper right-hand corner of the questionnaire. This number allows us to temporarily identify you. By referring to this number we will know that you responded to the questionnaire and will not send you the follow-up mailing we will have to send to nonrespondents.

We appreciate your willingness to help us in our research effort. If you would like a copy of our completed study please indicate this on the last page of the questionnaire. We will make certain that you receive a copy of our results. We believe that you will find the questionnaire both interesting and provocative and look forward to receiving your reply.

Sincerely yours,

Richard D. Bingham
Associate Professor

James L. Gibson
Assistant Professor

Enclosures NOTE: If by some chance you recently received and responded to this questionnaire please return the blank questionnaire to us indicating “duplicate” on the first page.
that the respondent answer the questionnaire, and (4) assure the respondent that the information provided by him or her will be held in strict confidence.

In general, the cover letter for a mail questionnaire needs to be more detailed than the introductory statement in a personal interview. In an interview, the interviewer is always there to explain or persuade the respondent should that become necessary. With a mail questionnaire, the cover letter is all there is, and thus its function is very significant.

Two examples of cover letters used in various mail surveys are shown here. The first, reported in Box 9.3 on p. 298, was used in a mail questionnaire designed and conducted by the Institute of Social Research in Florida State University under the auspices of the State Department of Manpower Planning of Florida to evaluate the Public Service Employment and Training Act, Title VI (CETA). The second example, reported in Box 9.3, is taken from a study on commitment to civil liberties, conducted by investigators at the University of Wisconsin-Milwaukee. The letter emphasizes the confidentiality of the study and explains in detail how the individual responses will be used (see Box 9.3).

Finally, an important issue is the style used in the cover letter, that is, whether it is a formal or a semipersonal letter. In the two examples given, a form letter was sent out to all respondents included in the sample. Alternatively, rather than addressing the letter to “Dear Friend” or “Dear Respondent,” the addressee’s name is individually typed at the top of the letter, which also contains an individually typed personalized salutation and is individually signed by the investigator. It has been shown that the semipersonal letter generated a slightly higher response rate than the form letter.

INSTRUCTIONS

Another element to be considered when constructing a questionnaire is the instructions that go with each question or with a set of questions. Instructions should be included with questions that are not self-explanatory; they may range from very simple ones such as “circle the appropriate category” to more complex instructions that explain how to rank a set of priorities. When the questionnaire is administered by an interviewer, the instructions are usually written for the interviewer and thus are often short and concise, instructing the interviewer what to do when the respondent provides a certain answer, when to probe for a more detailed answer, or how to clarify a certain question. The following is an example of instructions written for the interviewer:

Who was your employer on your last job? (PROBE FOR CORRECT CATEGORY)

Private
City
County
State
Federal
Self-employed
Public, Nonprofit
Other ______ (specify)

DK

While in an interview study the interviewer is available to answer any questions that may be raised by the respondent, this is not the case with mail questionnaires. There, any questions that remain vague or unclear are likely to result in no response or incorrect answers. Therefore, providing clear instructions is extremely important. The type of instructions vary from general ones introducing the questionnaire or its subsections to specific ones preceding individual questions.

The following is an example of general instructions given at the beginning of a questionnaire on attitudes towards civil liberties:

INSTRUCTIONS: For each of the following questions please mark the answer that comes closest to the way you feel about the issue. There are no “right” or “wrong” answers—please answer the questions as honestly as possible. Answer each of the questions in the order in which they appear. If you wish to make additional comments on any of the specific questions or on the issues in general, use the space at the end of the questionnaire. Your opinions are extremely important for understanding these complex civil liberty issues—we greatly appreciate your cooperation!

The next example, from the same questionnaire, introduces a subsection, presented in a matrix format:

As you know, there are many groups in America that try to get the government or the American people to see things more their way. We

31. Bingham and Ulbro, “Conditions of Commitment to Civil Liberties.”
would like to get your opinions toward what you perceive to be the
aims, objectives, or ideas advocated by these groups. In particular, we
would like your opinion on how significant the change in the American
system of government would be if the ideas of the group were put into
practice. Please rate each of the following groups in terms of the nature
of the change in our system of government that would follow the im-
plementation of their ideas.

Check only one answer in each column

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<thead>
<tr>
<th>Communists</th>
<th>Nazis</th>
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Finally, the last example is of a specific instruction in replying to
a single question.

*About how many states have you lived in during your life? (Count
only those states that you lived in for at least one year.)*

**CONSTRUCTING A QUESTIONNAIRE: A CASE STUDY**

There are many stages involved in the construction of a question-
naire, beginning with the research problem and going through the process of
formulating the questions and considering the format and the type of
questions to be used. To illustrate these, we have included in this section
a complete questionnaire used in an actual study conducted in 1968 by
the Institute for Social Research at the University of Michigan. 32

The study's objective was to explore the attitudes and perceptions
related to urban problems and race relations in fifteen northern cities
in the United States. It sought to define the social and psychological
characteristics as well as the aspirations of the black and white urban
populations. A black sample and a white sample were selected in each of
the fifteen cities in the study. Approximately 173 black and 175 white
respondents were interviewed in each city. In addition, 366 whites were
interviewed in two suburban areas. Altogether, 2,000 black respondents
and 3,050 white respondents were interviewed. Individuals interviewed
were between the ages of sixteen and sixty-nine and lived in private
households.

The study used two questionnaire forms—one for whites and one
for blacks. Questions about background characteristics were almost identi-
cal in both forms. The attitudinal questions were also identical in both
interview forms, but there was a greater number of questions ad-
dressed exclusively to one racial group or to the other. The question-
naires contained attitudinal questions probing the respondent's satis-
faction with neighborhood services, their feelings about the effective-
ness of the government in dealing with urban problems, the respondents'
inter-racial relationships, their attitude toward integration, and their per-
ception of the hostility between the races. Following in Box 9.4 is a
shortened version of the original questionnaire addressed to blacks.

You will notice that the questionnaire starts off with identification
numbers for the person being interviewed as well as his or her location.
There is also room to provide information on when the interviewer
began. Question 1 is an example of an attitude question on degree of
satisfaction with services provided by the city. The question was put in
a matrix format. Note also that instructions are provided both for the
interviewer (Code A below) and the respondent.

Question 1 has a closed-ended and open-ended component (A). Item
A is also a contingency question. Questions 3, 5, 6, and 7 are also ex-
amples of contingency type questions. The first part is the filter question,
and the second is the contingency question, which applies only to those
who have checked specific categories in the first part. All questions use
a numerical code, which is checked off by the interviewer.

Finally, the last section of the questionnaire is an example of the
relative advantage of an interview over other modes of filling out ques-
tionnaires (mail, telephone). The interviewer can provide detailed in-
f ormation on the general appearance and attitude of the respondents,
which can help in interpreting their response pattern.

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Box 9.4 Urban Problems Study, January, 1968

<table>
<thead>
<tr>
<th>City Number</th>
<th>v. 3</th>
<th>FOR OFFICE USE ONLY</th>
<th>v. 2</th>
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<td>v. 9</td>
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<td>DULS</td>
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<tr>
<td>Person</td>
<td>v. 19</td>
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1. First, let's talk about how satisfied you are with some of the main services the city is supposed to provide for your neighborhood. What about the quality of public schools in your neighborhood—are you generally satisfied, somewhat satisfied, or not at all satisfied?

   1. Quality of public schools
   2. Parks and playgrounds for children in this neighborhood
   3. Sports and recreation centers for teenagers in this neighborhood
   4. Police protection in this neighborhood
   5. Garbage collection in this neighborhood

2. Thinking about city services like schools, parks, and garbage collection, do you think your neighborhood gets better, about the same, or worse services than most other parts of the city?

   1. Better...
   2. About same...
   3. Worse...
   4. Don't know...

   A. IF BETTER OR WORSE: What is the reason this neighborhood gets (better/worse) services?

3. If you have a serious complaint about poor service by the city, do you think you can get city officials to do something about it if you call them?

   1. Yes...
   2. No...
   3. Don't know...

   A. Have you ever called a city official with a complaint about poor service?

4. In general, do you think (_CITY_) city officials pay more, less, or the same attention to a request or complaint from a Negro as they do from a white person?

   1. More...
   2. Less...
   3. Same...
   4. Don't know...

   A. IF DON'T KNOW: What would you guess the effect would be—to make things better, worse, or won't there be much change?

   1. Better...
   2. Worse...
   3. Not much change...

   A. IF DON'T KNOW: What would you expect the effect would be—to make things better, worse, or won't there be much change?

   1. Better...
   2. Worse...
   3. Not much change...
9. Have you heard about federal antipoverty programs such as Head Start, the Job Corps, Community Action Centers, and others?  
Yes, heard of one or more (ASK A & B).  
No.  

IF YES, HEARD OF ONE OR MORE:  
A. In general, do you think the antipoverty program is doing a good job, a  
fair job, or a poor job? Why would you say the antipoverty program is  
doing a (good/fair/poor) job?  
Good job.  
Fair.  
Poor.  
Don't know.  

B. Has anyone in your family taken part in any of these programs in any  
way?  
Yes (ASK C).  
No.  

C. IF YES TO B: What program(s) and in what way?  
Name of Program(s):  
Kind of Participation:  

Now I want to talk about some complaints people have made about the CITY police.  

10. First, some people say the police don't come quickly when you call them  
for help. Do you think this happens to people in this neighborhood?  
Yes. (ASK A).  
No. (GO TO Q. 11).  
Don't know. (ASK A).  

A. IF YES OR DON'T KNOW: Has it ever happened to you?  
Yes. (ASK B & C).  
No. (ASK C).  

B. IF YES TO A: How long ago was that (the last time)?  
years ago.  

C. IF YES OR NO TO A: Has it happened to anyone you know?  
Yes.  
No.  

11. Some people say the police don't show respect for people or they use  
insulting language. Do you think this happens to people in this neighborhood?  
Yes. (ASK A).  
No. (GO TO Q. 12).  
Don't know. (ASK A).  

A. IF YES OR DON'T KNOW: Has it ever happened to you?  
Yes. (ASK B & C).  
No. (ASK C).  

B. IF YES TO A: How long ago was that (the last time)?  
years ago.  

C. IF YES OR NO TO A: Has it happened to anyone you know?  
Yes.  
No.  

12. Some people say the police frisk or search people without good reason. Do  
you think this happens often to people in this neighborhood?  
Yes. (ASK A).  
No. (GO TO Q. 13).  
Don't know. (ASK A).  

A. IF YES OR DON'T KNOW: Has it ever happened to you?  
Yes. (ASK B & C).  
No. (ASK C).  

B. IF YES TO A: How long ago was that (the last time)?  
years ago.  

C. IF YES OR NO TO A: Has it happened to anyone you know?  
Yes.  
No.  

13. Some people say the police rough up people unnecessarily when they are  
arresting them or afterwards. Do you think this happens to people in this  
neighborhood?  
Yes. (ASK A).  
No. (GO TO Q. 14).  
Don't know. (ASK A).  

A. IF YES OR DON'T KNOW: Has it ever happened to you?  
Yes. (ASK B & C).  
No. (ASK C).  

B. IF YES TO A: How long ago was that (the last time)?  
years ago.  

C. IF YES OR NO TO A: Has it happened to anyone you know?  
Yes.  
No.  

14. Do you think Negro citizens are generally given better treatment by Negro  
policemen, by white policemen, or that it doesn't make much  

Negro policemen (ASK A):  
White policemen (ASK A):  
Not much different:  
Don't know.  

A. IF NEGRO OR WHITE POLICEMEN: Why do you think this is?  

RECODED VALUES

Yes.  
No.  

15. In general, do you think judges in (city) are usually harder on Negroes, harder on whites, or that there is not much difference? **RECODED VALUES**

<table>
<thead>
<tr>
<th>Harder on Negroes</th>
<th>1</th>
</tr>
</thead>
<tbody>
<tr>
<td>Harder on whites</td>
<td>2</td>
</tr>
<tr>
<td>Not much difference</td>
<td>3</td>
</tr>
<tr>
<td>Don't know</td>
<td>8</td>
</tr>
</tbody>
</table>

16. Do you personally feel safer from crime now than you did two or three years ago, or is there no change, or do you feel less safe? **NOT ASKED OF R**

| Safer today       | 1 |
| No change         | 2 |
| Less safe         | 3 |

17. Do you think a man can safely walk alone in this neighborhood after dark, or would he be wiser not to? **NOT ASKED OF R**

| Can safely walk   | 1 |
| Wiser not to      | 3 |
| Don't know        | 6 |

18. Here are some complaints you hear sometimes about store and merchant. Would you tell me if these things ever happen to you when you shop in stores in or near this neighborhood?

<table>
<thead>
<tr>
<th>Other (Specify)</th>
<th>Rarely</th>
<th>Sometimes</th>
<th>Often</th>
<th>Occasionally</th>
<th>Never</th>
<th>Don't apply</th>
<th>(GO TO B)</th>
</tr>
</thead>
<tbody>
<tr>
<td>A. Do you think you are unfairly overcharged for goods 1 2 3 4 5</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>B. Do you think you are sold spoiled or inferior goods 1 2 3 4</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>C. In such stores, are you treated disrespectfully 1 2 3 4</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

D. IF NEVER SHOP IN NEIGHBORHOOD: Why don't you shop around here?

---

**FILL IN ITEMS BELOW IMMEDIATELY AFTER LEAVING RESPONDENT**

A. Total length of interview: **Minutes**

B. Cooperativeness of respondent:

| Very cooperative | 1 |
| Somewhat cooperative | 2 |
| Not cooperative | 3 |

C. Interest of respondent in racial issues:

| Great interest | 1 |
| Ordinary interest | 2 |
| Little interest | 3 |

D. Respondent's skin shade:

| Dark | 1 |
| Medium dark | 2 |
| Medium light | 3 |
| Light | 4 |

E. Respondent's understanding of questions:

| Good understanding | 1 |
| Fair understanding | 2 |
| Poor understanding | 3 |

G. Neatness of home interior:

| Very neat and clean | 1 |
| Fairly neat and clean | 2 |
| Fairly messy | 3 |
| Very messy | 4 |

H. Does respondent dress to show "black identity" in any way? CIRCLE ALL THAT APPLY.

| Other signs of "black" | 4 |
| "black" | 1 |
| "natural (Afro) hair" style | 1 |
| "rears "black power button" | 2 |

---

**SUMMARY**

The foundation of all questionnaires is the question. The questionnaire must translate the research objectives into specific questions. Answers to these questions will provide the necessary data for hypothesis testing.

Most questions can be classified as either factual or opinion and attitude questions. Factual questions are designed to elicit objective information from the respondent. Opinion and attitude questions, on the other hand, are concerned with inclinations, preferences, prejudices, ideas, fears, and convictions. In general, survey questions about opinions and attitudes are much more complex to construct than questions about personal facts. Vers to opinion and attitude questions are more sen-
Data Collection

Slight to changes in wording, emphasis, and sequence than are those to factual questions.

Four types of question structure can be distinguished: (1) open-ended questions, (2) closed-ended questions, (3) contingency questions, and (4) matrix questions. In closed-ended questions, respondents are offered a set of response categories from which they must choose the one that most closely represents their view. Open-ended questions are not followed by any kind of choice and the respondents' answers are recorded in full. A contingency question is one that applies only to a subgroup of respondents. The relevance of the question to this subgroup is determined by the answer of all respondents to a preceding filter question. The matrix question is a method for organizing a large set of items that have the same response categories.

One of the most common formats for questions asked in surveys is the rating scale. It is a judgment made by the respondent in terms of sets of ordered categories. There are several types of rating scales, including the card sort and the semantic differential. Ranking is used in questionnaires whenever the objective is to obtain information regarding the degree of importance or the priorities that people give to a set of attitudes or objects.

Questions must be worded so that they are comprehended by all respondents. A leading question is a question phrased in such a manner that it appears to the respondent that the researcher expects a certain answer. Threatening questions are those that raise the anxiety level of the respondents. Both types of questions may lead to response bias. Leading questions should be avoided, and threatening questions need to be constructed with great sensitivity, using special techniques, such as a long introduction to the question and open-ended rather than closed-ended questions.

**KEY TERMS FOR REVIEW**

<table>
<thead>
<tr>
<th>Question</th>
<th>Contingency question</th>
<th>Ranking</th>
</tr>
</thead>
<tbody>
<tr>
<td>Factual question</td>
<td>Filler question</td>
<td>Leading questions</td>
</tr>
<tr>
<td>Opinion</td>
<td>Rating</td>
<td>Threatening questions</td>
</tr>
<tr>
<td>Attitude</td>
<td>Matrix question</td>
<td>questions</td>
</tr>
<tr>
<td>Open-ended question</td>
<td>Quantifier</td>
<td>Double-barreled questions</td>
</tr>
<tr>
<td>Closed-ended question</td>
<td>Semantic differential</td>
<td></td>
</tr>
</tbody>
</table>

**ADDITIONAL READINGS**


A METHOD OF CRITIQUING EDUCATIONAL RESEARCH

(Use for article critiques. Answer item-by-item; not in prose form. Do not need to rewrite the questions.)

Answer the following questions yes or no and explain your answer.

I. What type of research most accurately describes this study?

II. THE PROBLEM
1. Was the problem clearly defined?
2. Were verifiable (or null) hypotheses, research questions, or objectives formulated?
3. Was the problem logically deduced from some theory?
4. What is (are) the independent variable(s)?
5. What is (are) the dependent variable(s)?

III. THE DESIGN
1. Was an appropriate research design utilized to answer the problem?
2. Was the population studied clearly specified?
3. Were the sampling methods clearly outlined?
4. Was a control or comparison group chosen in the same manner and from the same population as the sample?
5. Were the treatments randomly assigned to the groups?
6. Did the study include a replication?
7. Was the alpha level specified a priori?

IV. THE PROCEDURE
1. Were treatments and/or data collecting methods described so that you could replicate the study?
2. Were the size and characteristics of the sample adequately described?
3. Were the treatments administered so that extraneous sources of error were either held constant for all treatments and control groups or randomized among subjects within all groups?

V. THE MEASUREMENT
1. Was any evidence of the reliability of the instrumentation given?
2. Was any evidence of the validity of the instrumentation given?

(continued)

Miller, L. E. (Undated). AGR. EDU 885: Research methods. The Ohio State University.
VI. THE INTERPRETATION

1. Were the conclusions consistent with the obtained results?
2. Were the generalizations confined to the population from which the sample was drawn?

VII. GENERAL

1. Was this a significant study? Why? (Your opinion).

Adapted from:
Research Methods and Design
(Reading Materials)

DCE 5900

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Taman Puchong Intan,
47100 Puchong,
Selangor Darul Ehsan
ELEMENTS OF RESEARCH PROPOSAL

Cover Page

Follow the style prescribed by the style manual suggested by the university, department or advisor.

Title - Should contain key words or phrases to give a clear and concise description of the scope and nature of the report, and key words should allow bibliographers to index the study in proper categories (Van Daleen, 1979:406).
   - Indicate major variables
   - Indicate nature of research
     * descriptive
     * correlational
     * experimental
   - Indicate target population
   - Avoid words like:
     "A Study of ..."
     "An Investigation of ..."
     "A Survey of ..."
   - Example dissertation title:
   - Journal article title for the above:
     "What Does It Take To Sell Feed?"

Table of Contents

Follow appropriate style.
Gives bird's-eye view of dissertation or thesis.
Not "generally" provided in reports, papers or articles.

Chapter 1 - Introduction

Background and Setting
   - Provide reader with necessary background and setting to put the problem in proper context.
   - Lets the reader see the basis for the study.
   - Justifies and convinces the reader that the study is needed.
   - Be factual—statements, opinions and points-of-view should be documented.
   - Provide a logical lead-in to a clear and concise statement of the problem.
   - Your "sales pitch"
   - In a proposal for funding, address capabilities and capacity of individuals and agency/institution in this section.
Statement of the Problem

Characteristics of properly stated problems will be discussed; see notes. Clearly describe the problem to be researched.

Objectives of the Study

- See notes on "Objectives and Hypothesis" for details
- Best located after the statement of the problem in descriptive research
- Indicates the data to be collected
- Make clear the direct connection between specific objectives and hypotheses and related literature and theory
- Controversial as to whether or not null hypotheses go here or in Chapter 4. Rely upon wishes of adviser and committee, if a thesis or dissertation.
- If a study is descriptive, objectives or research questions can be used here.
- If the study is ex post facto or experimental, hypotheses must be used.

Definition of Terms

- Define terms in the context where they will be used - provide operational definitions as well as constitutive definitions.
- Include a list of definitions for terms and concepts that have significant meaning for the study.
- Constructed in listing form - like a dictionary, not prose form
- Do not define generally understood concepts, principles and concerns, e.g., vocational education, secondary education, adult education.
- Much of the specific information about the terms will be presented in other appropriate sections of the proposal.

Limitations of the Study

- Summarize limitations brought about by the procedures of the study
- Describe the procedural limitations in detail in the appropriate section; just summarize here

Basic Assumptions

- Do not make assumptions about procedures (or hypotheses)
- Accepted without thought of immediate proof
- Propositions for which no information can be made available within the scope of the study
- Are axiomatic in that they are propositions that virtually every responsible person is ready to adopt but which cannot be proven.
- Type of assumption most commonly stated explicitly is one that is limited in its nature and serves to hold the size or scope of an investigation within its prescribed boundaries (puts parameters around the study), e.g., study will deal with secondary students not post-secondary
- Usually made when the argument rests on a priori reasoning, but can be made on basis of present knowledge on research which is as yet incomplete (Specific qualifications must be made in the conclusions of the research report in which assumptions are made.)
- Ought to be clearly stated
- Protects researcher, e.g., keeps someone from saying, "Oh, I thought you were studying XYZ, too."
- Assumptions are not hypotheses
- Hypotheses are propositions to be investigated and are the very subject of the problem; so, do not make assumptions about them.

Significance of the Problem
- These arguments can be presented in the "Background and Setting" section. This does not need to be a special section.
- Knowledge relating to the theory that ....
- New products, e.g., instrument, instructional material, etc.
- Who (what individuals or groups) can use this new knowledge or information yielded by the research to change or improve the present situation? How will the study contribute to the improvement of the profession?
- Indicate how the results can be generalized beyond the bounds of study
- Can use the arguments of others (expert opinion) who call for an investigation of the problem (properly documented, of course).
- Can use conflict in findings of related research as justification for the study. Be sure it is documented in Review of Literature.
- Use if, then (hypothetical-deductive) logic

Chapter 2 - Review of Literature

A. Provides tentative solutions to the problem or tentative answers to the questions. (Could be publishable)

B. Indicates the theory on which the study is based; critique and weigh studies as theory is built. (Teeter-totter example)

C. Provides the rationale for the hypotheses and variables therein

D. Organized and written in reference to the specific objectives of the study

E. Some would say the review prepared for a proposal is not as complete as the final report (thesis/dissertation) — make as complete as possible!

F. Consists of two phases
   1. Problem exploration — definition stage
      * Conducted before proposal preparation to identify problem
      * Provides dimensions and limits of the problem area
      * Defines extent to which solution or answer is already known
      * Helps discern "What do we know the least about?"
      * Identifies possible procedures (design, instruments; analyses) for conducting the study
   2. Proposal Writing — See A-E above

G. Reporting Related Literature will follow in the course
Chapter 3 - Procedures

(Some writers call this chapter "Methodology")

REPLICATION is the key word to keep in mind when writing this chapter. Researchers must provide accurate, detailed descriptions of how the research was done so it could be replicated (redone) by others. You should provide explanations that will enable the reader to reproduce the exact conditions of the original study. A rather extensive explanation should be provided so that readers understand why and how you are going to do the research (in a final report). Your procedures should answer questions or test hypotheses as efficiently, economically and validly as possible.

SECTIONS

The sections of research design, subject selection, outcome measures, conditions of testing, treatments and data analyses will encompass most methodological activities that need to be described. Each section will be described separately.

Research Design

Describe the type of research to be conducted, i.e., survey, ex post facto, quasi-experimental, etc. This section is utilized to describe how you will set up your study to observe the hypothesized relationship. Describe the steps you will take to address the hypotheses in operational terms.

Describe what intervening variables might affect the dependent variable(s) other than the independent variable, i.e.:
- Analyze the internal validity of the study (discussed later in the course)
- Also, discuss threats to external validity (discussed later in the course)
- Describe how your study will measure or control these threats given the "Limitations of the Study."

The description of the design for descriptive studies is generally easy to describe, while the validity is not. Describe non-respondent follow-up procedures and procedures to compare respondents with non-respondents.

A study may involve more than one purpose. Clearly indicate which design is to address each objective.

The description of the research design for correlational or ex post facto research is easy to describe, but particular attention must be directed to alternative or rival explanations (intervening variables).

The research design for experimental and quasi-experimental research is often quoted directly from Campbell and Stanley (or others) and analyzed by their threats to validity.
What experimental controls were utilized?

Schematic (graphic) diagrams often aid in understanding the design. Define the symbols you use.

Subject Selection

The population to be studied is first identified and how a sampling frame (list of elements in the population) will be developed. Is there frame error? Explain why this population is appropriate for this study. Note any discrepancies between the experimentally accessible population and the target population.

The sampling procedure is described. Relate how the sample was selected and your reasons for selecting any stratifying variables, if they were employed. Describe the sampling plan.

Describe the size of the sample, and how it was determined and the rationale for the size. Sampling units should be identified.

Data describing the characteristics of the subjects that are relevant to the study should be provided; and, if available, data from the population to enable the reader to judge the representativeness of the sample.

Describe what will be done with subjects that decline to participate, drop out, or do not participate in all parts of the study. What will be done about non-respondents? What will be done about incomplete questionnaires or ones with obvious response sets, lying, cheating or unanswered items? All affect the population to whom one can generalize the results, i.e., the external validity of the study.

Outcome Measures

Measurement of the dependent variable(s) is one key to your study. Instruments are operational definitive for variables. Techniques or instruments used to measure the dependent variable(s), outcome, must be carefully described in terms of:

1. Validity - Does the instrument or technique measure what it purports to measure with this group?
2. Reliability - Whatever the instrument or technique measures does it do so consistently with this group?
3. Suitability - Utility must be high for subjects to whom administered.

If well-known instruments are used, one can generally briefly describe them, and their reliability and validity, and refer the reader through citation to references where more thorough detailed discussions can be found.
If the researcher is developing the instrumentation, then validity and reliability must be established. The instrument should be pilot and/or field tested. The researcher should describe how this was done. A field test can locate potential suitability problems easily. Appendix copies of the instruments to the proposal.

The Review of Literature can be utilized to verify the concepts/theory under study and the scope of the measurement methods to assess the concepts. This section should establish the operational link between these concepts/theory and the measurement.

If you use interviewers or observers, how were they trained? What were their inter-rater and intra-rater reliabilities?

**Conditions of Testing**

Describe where, when and under what conditions the data were gathered, the number of times and order in which instruments were used, and the time allotted for the data collection.

Describe the verbal and written directions provided to the subjects. Were incentives used to encourage response?

Be specific! When you describe when, taking a test after lunch, after another test, etc., may explain variance more than the quarter or date.

During the actual data gathering, testing, monitor events so they can be explained to the reader.

If instruments are potentially reactive, what precautions will be taken to minimize this threat.

**Treatments**

How were the independent variables administered? What was done to the subjects? Describe all levels so that they are replicable. Were any methods employed and abandoned because they were valueless?

Kerlinger describes maximizing the differences between the levels of the independent variable. A typical shortcoming is comparing a "new" method with a "traditional" or "conventional" method of doing something, and the researcher describes at length the "new" method but not the "traditional" method. How, really, are they different?

If attribute variables are used in the design, identify them and the number of levels of each and briefly describe the rationale for the selection of the attribute variables (more thorough explanation should be in the "Review").
Data Analysis

Statistical techniques are tools selected because of your design, not vice versa.

Descriptive and inferential analyses are provided to address each facet of the hypothesis, null hypothesis, objective or problem. Have foresight! What is the easiest way to collect, code and analyze your data?

Why were these methods of analysis employed? Why was this level of significance selected?

For each statistical method used, present evidence indicating that the basic assumption underlying its use have been met. For example, a Pearson Product Moment Correlation (r) assumes both linearity and homoscedasticity, so you would always need to construct a scatterplot whenever you use r to show these assumptions are met. Statistics courses provide you with these skills and understandings.

Remember, select statistics that answer the question(s) involved with the study. They serve research, not dominate it. Nothing is gained in using complicated statistics that happen to be in "vogue" if simple ones will do just as well. Specify what analysis will be used for each objective.

The proposer may find it beneficial to provide, as an appendix, sample skeletons of the tables and figures that will appear in Chapter 4 as a result of the analysis. Proposal readers, committee members, etc., often find this beneficial in conceptuallyizing what will be produced by these analysis techniques.

Proposals submitted for Agr Educ 885 do not have to have the Data Analysis section complete. Agr Educ 887 will approach this topic in more detail.
Selecting a problem for a doctoral dissertation... has the tow needs contributing something original to the knowledge and performing research that will lead to improvements in... It seems to me that doctoral research must always meet the test of contributing to the knowledge, and if it can also point to, or take a step towards, improvements in the technology practices, that adds to the value of the university's educational and research mission. I believe that advanced graduates student research represents very high value in relation to the cost of the work, especially when compared with research done by a consulting firm or a large research agency.
EXCEPTIONAL EXCERPTS: FROM EXAMINERS' FILES

- The thesis title does reveal adequately the subject matter of the study and clearly identifies the problem for investigation. The objectives are clear and the depth and breadth of the work is certainly sufficient for a doctoral degree.

- The thesis suffers from a lack of problem definition. There is too much material on general issues of (the subject), but it is not clearly tied to any problem or issue being addressed.

- Although the problem is eventually identified, the section entitled The Research Problem is extremely long and there is NO question or problem in succinct form. ... retitle the section to indicate that it really provides background support for the problem and then STATE THE PROBLEM BRIEFLY in statement or question form. ... A reader expects to find the problem in one or two statements or in a brief paragraph. This short form is also needed for publication in professional journals.

- While a narrow focus enables a researcher to dig deeply into all aspects of the research problem, this study has yielded data which could be perceived as being of marginal utility from the practical point of view.

- The Statement of the Problem has very clearly argued the need for this study citing past and current interests on the subject of ... and its effects on ... What has made the research more interesting and relevant is not only the actual phenomena under study but also that it was done with to test some models developed and studied in Western countries to a non-Western country, Malaysia.
PROBLEM STATEMENT — A PROBLEMATIC AREA INDEED!

A thesis, be it in the natural or social since, is written in order to solve a certain problem identified by the graduate student. The student probably knows thoroughly the nature of the problem, but often he fails to demonstrate its existence convincingly to the independent examiners (external). For example, one examiner wrote: “The (problem statement) is too long and wordy . . . Normally (it) is one or two short paragraphs . . .” Another examiner says: “Kenyataan masalah perlu diperbaiki supaya lebih tepat kepada maksud sebenar. Penyelidik diminta mendapatkan maklumat dari pemeriksa. (The problem statement needs to be improved to capture the real problem. Candidate is requested to obtain guide from examiner.)

Existence of a problem may be demonstrated by the candidate stating some desired goals, situations or conditions and giving relevant facts that would show the ‘gap’ between those goals and the present state. The ‘gap’ may be the lack of some information vital to decision-making, or it may be the failure to achieve some set target or expectation.

A problem may exist as paradoxes or ironies that need to be resolved. It may exist because past solutions have failed to work. The solutions may have failed because the “wrong” ones were used. Thus, despite repeated efforts and high expenditure, the problem continues to persist.

A problem is therefore the gap between the desired state (goal or expectation) and the prevailing state of affairs, Ignorance itself can be the problem. The desired goal, in this case, is “complete information.” But what is the information for? Who will use it? For what purpose? What is the consequence of not having the information? How can the candidate’s study contribute towards narrowing the gap? This last question is actually addressing the candidate’s research objectives which should follow the problem statement.

A problem, therefore, manifest itself in some kind of dissatisfaction or frustration on the part of the researcher. He cannot sleep until he finds some answers! It is the strongest motivating factor in seeing the research through and earning the degree.
Educational Research
An Introduction
Fifth Edition

Walter R. Borg
Utah State University

Meredith Damien Gall
University of Oregon
Part II

PLANNING EDUCATIONAL RESEARCH

Planning is the most important step in any research project. The most polished procedures and sophisticated statistical analyses cannot salvage a study that is poorly planned. The first step in planning is to identify a significant problem to attack. In this section you learn how to locate a research problem and how to develop a research plan that will permit you to collect rigorous evidence related to your problem.

In planning your study you must pay careful attention to the ethics and legal rules of research. Most educational research involves the use of human subjects. Failure to follow ethical guidelines not only can cause the researcher legal problems but may do serious harm to the subjects who participate in educational research.

Research evidence is cumulative. Many researchers contribute small pieces to a puzzle until, finally, a comprehensible “picture” emerges. In order for you to plan a research project that will contribute a new piece to the “picture,” you must carefully study and interpret the pieces other researchers have contributed. This process is called “reviewing the literature” and is an essential part of planning your research. Researchers who attempt to sidestep a thorough review of previous research often end up following a path that others have found to be a dead end or repeating a study that someone else has done better.

Perhaps your most difficult task in reviewing the research of others is evaluating their work and deciding, in view of its limitations, how the findings fit into the overall picture of research related to the problem you are trying to investigate. How well you can carry out this critical review is determined to a large extent by how much you know about educational research methods. Thus, although you will be able to identify a research problem, start your literature search, and develop a tentative research plan after you have read the four chapters in this part, your critical evaluation of the key studies related to your problem and your final research plan should be delayed until you have finished studying this book.
OVERVIEW

Chapter 2 introduces you to several important skills that are needed to write an educational research plan and to conduct the project itself. First, we suggest several approaches to help you identify possible research problems and select an appropriate problem for your own research project. Next, you are given an outline to use in developing your research proposal systematically. This section deals briefly with each major part of the research plan: the problem, hypotheses, measures, subjects, research design, and data analysis.

The advantages of developing a chronological list of procedures for your research project are also discussed. Many students prepare their research plan section by section and do not give enough attention to the problem of fitting the sections together. We discuss this problem and illustrate a method for developing a related plan. If your research plan is fairly complex, the use of a procedure such as PERT (Program Evaluation and Review Technique) helps you better understand your research and avoid many of the errors and miscalculations often made by inexperienced researchers. We introduce you to the PERT technique and ask you to consider the advantages of conducting a pilot study prior to the main investigation in order to test and revise the research plan.

OBJECTIVES

After studying this chapter you should be able to:

1. Describe your areas of interest in education and current research problems that are under investigation in these areas.
2. Explain the advantages and disadvantages of working on a team project.
3. Discuss the reasons for replicating significant studies.
4. Use a variety of procedures to locate unsolved research problems in a given area of education.
5. List and describe the topics that need to be included in a sound research plan.
6. Describe the advantages of a research plan.
7. Write directional hypotheses, null hypotheses, and questions that relate to a given research problem.
8. Apply four criteria to the development and evaluation of hypotheses.
9. Demonstrate the relationship among the hypotheses, measures, and analysis procedures in a research plan.
10. Describe PERT and how it can be used in research planning.
11. State at least three reasons for including a pilot study in a research project.
INTRODUCTION

In this chapter we will give you an overall introduction to the task of locating a suitable research problem and building a proposal designed to address your problem. Although you are not yet ready to prepare a proposal, we believe that this overview will help you see how each step in the research process is related, thus helping you learn and understand the process.

The list below provides a very brief outline of the steps you will follow in developing a research proposal. The remainder of this chapter helps you carry out the initial step, and the remainder of the text takes you through the entire research process.

Selecting and Defining the Research Problem

1. Identify problem area. What area relates best to your current interests and future professional goals? (chapter 2)
2. Build preliminary knowledge base. Read secondary sources to get an overview of what is known and what questions in your problem area need further exploration. (chapter 4)
3. Identify specific problem and write your problem statement. What question will you address? What variables will you measure? Why is this problem important? (chapter 2)
4. Review previous research. Locate, evaluate, and synthesize previous research and theory and relate your findings to your problem. (chapters 4,5)

Outlining the Research Plan

5. Formulate hypotheses or objectives. What specific questions will you address in order to shed light on your problem? (chapter 2)
6. Select possible measures. Locate and evaluate measures of the variables to be studied and select the most appropriate. (chapters 8,9)
7. Select research subjects. Identify the population to which your research will apply; decide on the size of your sample and how subjects will be selected. (chapter 6)
8. Specify the research design. Study the types of research and decide which is most appropriate for your problem. (chapters 11–19)
9. Select analysis procedures. Review statistical tools and decide which will best test your hypotheses, given your subjects, measures, and research design. (chapters 10, 13, 14, 15, or 16 depending on research design)
10. Specify research activities. Describe in chronological order and in as much detail as you can the specific steps you must take to carry out the proposed research. Check the entire proposal for ethical and legal compliance. (chapter 3)
As you progress through this text you will master the concepts and skills needed to develop the research proposal that you will submit to your thesis or dissertation committee and that will subsequently guide your research. The text is organized in about the same order that one follows in developing a research plan and subsequently conducting your study. Thus, many students develop each section of their proposal as they complete the relevant section of the text, ending the course with a well-thought-out plan.

SELECTING AND DEFINING A RESEARCH PROBLEM

The graduate students' research problem for their thesis or dissertation usually focuses on an educational phenomenon that they wish to describe, an event that they have observed and will attempt to explain, or a problem for which they will try to develop a solution. The research problem often is phrased as a question such as:

1. What changes can I make in reading instruction to increase the interest of Chicano children in my class?
2. What mistakes do students make most often in solving long-division problems?
3. Some children never volunteer answers during recitation even when I am sure they know the correct answer. Why is this?

The ultimate value of your research project is probably determined more by the imagination and insight that goes into the research problem than by any other factor. Therefore, the selection of a research problem for the master's thesis or doctoral dissertation is a very important step. Often, eager to get started on research work, the student seizes upon the first research idea that comes along. A student who begins a research problem before giving the choice much careful study and thought is likely to lose many important advantages.

The very process of seeking a research problem is an important step in your professional maturation. At the outset, you may see no problems, or from first explorations into the research literature conclude that research has already solved all the problems in education. Your first ideas for research may be naïve; a closer check will reveal that they have already been thoroughly explored. As you continue to search, however, insight into the literature becomes sufficiently broad so that you can see research problems in everything you read. This point is not reached without a considerable amount of scholarly work in the research literature, but once achieved, you have taken a significant step.

One reason that students seize upon the first idea they encounter is that very often they go too far in their graduate program before starting to search for
a suitable research problem. You have had years of experience in taking courses and thus the classwork involved in your graduate program is a familiar experience. One that you are reasonably confident you can complete successfully. In contrast, the research aspect of the graduate program is new and different and something that you may be strongly tempted to put off. Every university has a lengthy list of "alibuts" among its graduate students—those who have completed all work for an advanced degree but the thesis or dissertation. A great many such students never obtain their advanced degree. It is usually desirable for graduate students to gain some insight into research and to commence the search for a suitable problem as soon as possible after entering the graduate work, even if they do not plan to carry out a project until they near the end of their work.

In looking for a research problem, bear in mind some of the possible outcomes of your research effort in preparing you for your profession. The review of the literature provides you with an understanding of the work that has already been done relating to your problem area and prepares you to carry out a project that will add to the facts and information that have been accumulated by previous research workers. Because of the extensive reading you must do in your problem area, you will usually build up a sizable fund of knowledge. Thus, in order that this knowledge may be of significant future value, you should attempt to develop a research problem in an area that is closely related to your professional goals. For example, a student who plans to teach elementary school will profit much more from a research project in some area such as child development or the learning of elementary school subjects than in an area involving secondary education, adolescent development, or school administration.

Another reason for the selection of a topic closely allied to your interest is that the research project provides an opportunity to do significant independent work in a problem area that will better prepare you for professional work and will incidentally make you a more desirable prospect for employment. Although most of them do not produce research findings of major significance, many master's theses do produce worthwhile information that makes a small but definite contribution to the field of knowledge. Because there are many significant problems in education for which we require further knowledge, you should resist the temptation to do research that is essentially trivial or that can contribute nothing to educational knowledge. Students often rationalize carrying out a trivial study by saying that the real purpose of the master's thesis is to provide practice in independent work, and the results cannot be expected to be of any scientific value. Generally, once a significant project has been identified, it requires no more time and effort to carry out than a trivial project or one that repeats work that has already been adequately done. The difference between the trivial project and the significant project is not the amount of work required to carry it out, but the amount of thought that the student applies in selection and definition of the problem.
Another factor that you should consider in selecting a problem is that you will not only gain valuable knowledge and experience in the problem area you select, but if you carry out a worthwhile piece of research, it may be possible to publish the results in a professional journal. Publishing an article based on your thesis adds significantly to your professional status.

In defining a research problem, do not hesitate to entertain ideas and approaches that represent a departure from conventional educational practice. Researchers often overlook or reject promising ideas because they are strange or conflict with some of the individual's biases. B. F. Skinner provides us with an excellent example of the degree to which narrow thinking can stifle unusual ideas. During World War II, Skinner worked with a group of psychologists on a project aimed at conditioning pigeons to operate a guidance system for missiles. The pigeons were conditioned to peck at a particular type of target that they viewed on a screen, such as a ship or length of coastline. If the target was not at the center of the screen, the pigeons' pecking provided a guiding signal to change the course of the missile. The device was developed to a high level of efficiency and became nearly foolproof even under unfavorable conditions. It required no materials in short supply, and once the pigeons had been conditioned the behavior persisted for long periods without reinforcement. In several demonstrations before scientific committees the conditioned pigeons performed perfectly, yet the project was abandoned because it was impossible to convince the dozen or so distinguished physical scientists on the evaluation committee that the behavior of a pigeon could be adequately controlled. To these men, who were accustomed to thinking in terms of servomotors, rheostats, and electrical circuits, the idea of using a live organism to carry out the task of missile guidance was too fantastic to be taken seriously, even when they were confronted with evidence that the pigeons could do the assigned task. Although none of us can be completely freed from the shackles of our environment, preconceptions, and prejudices, the researcher seeking a research problem should remain aware of the existence of these impediments and should make a conscious effort to avoid their influence. As Skinner points out, "One virtue in crackpot ideas is that they breed rapidly and their progeny show extraordinary mutations." Thus, even the wildest idea may, if pursued, lead eventually to a unique and often practical approach to a scientific problem.

The First Step

The first step in locating a specific problem for the dissertation or thesis is to identify the broad problem areas that are most closely related to your interests and professional goals. You will find it a profitable experience to write down in as much detail as possible the type of work you wish to do upon completion of

graduate training and the specific aspects of this work that most interest you. The process of writing down this information will help you clarify your goals and interests. Very often you will find that these goals are somewhat less clear in your mind than you may have supposed. Typical broad areas of interest that might be listed are high school counseling, teaching art to children in the primary grades, social problems of adolescents, remedial reading in the elementary school, relationships between teachers and principals, and intramural programs in physical education.

After one or more such areas of professional interest have been identified, you are ready to seek out specific problems in these areas that could form the basis for your thesis.

Working on a Team Project

Thirty years ago almost no money was available for the support of educational research. Most research projects were small-scale studies carried out by university faculty members, and in many instances the faculty member did all the research including such tasks as administering and scoring tests used in the project. Since that time, however, money available for educational research has increased tremendously. Now most universities are receiving financial support for educational research in the form of contracts and grants from federal agencies and private foundations, and the projects being carried out are much wider in scope and often involve a team of research workers rather than a single scientist. The graduate student often has an opportunity to participate in one of these extensive research projects as a member of a team. As a rule, such projects are developed by faculty members, and portions of the project are given to graduate students to complete. Completion of the allotted portion of the project then constitutes the research for the master's thesis or doctoral dissertation.

Working on team projects has both advantages and disadvantages. Perhaps the most important advantage is that financial support is usually available for working on such a project. This support may cover as little as paying for test administration or providing needed materials or clerical assistance, but in many cases it also involves a scholarship or research assistantship that is sufficient to meet expenses while you are completing your graduate work. The team project also offers you an opportunity to participate in a bigger and more sophisticated study than would be the case if you were working independently. These studies usually involve more complex research designs and more advanced statistical procedures, and thus you learn more about these than you would otherwise. You also have a chance to learn something about the workings of team research, and because most major projects are now carried out by teams, this insight may prove valuable in future work. You can also learn much from other members of the research team. Each team member brings a different background of training.
and experience to the project, and therefore the team can often produce a more polished research effort than is the case with a single investigator.

Participation in a team research project also has disadvantages, however. Perhaps the most important of these is the loss of the opportunity to find and develop an individual problem. In team research, the project is usually created and designed by the faculty member who is directing it. At worst, graduate students involved in team projects are little more than clerks who carry out various tasks without fully understanding what they are doing or why it is being done. Even in team projects where you are asked to do significant independent work—and this is usually the case—you may not get firsthand experience in all aspects of developing and carrying out a research plan. Second, the problem being studied by a research team may not be closely allied with your interests, nor may it contribute directly to your future professional work, as would be the case if you designed and carried out an independent project.

Whether you carry out a small independent project or participate in a larger team project, the experience you gain through independent scholarship and research is perhaps the most important aspect of your graduate program. A significant piece of work done at this level can add materially to your professional maturity, may improve your employment opportunities, and start you on the path to recognition and high professional status in your chosen field.

A Reading Program

Perhaps the most satisfactory method of locating specific problems within the scope of your broad interests is through a systematic program of reading. Let us say, for example, that you plan to teach in the elementary schools and are particularly interested in problems related to working with bright children at that level. First, you would check the library card catalogue to locate current textbooks in this field. If you have selected a field in which no complete textbooks have been written, you will usually find chapters dealing with your interest area in some of the introductory texts used in general education and psychology courses. Select two or three textbooks and review pertinent chapters in each. This will give you some background information about your area of interest and also some insight into various subtopics in the field, a knowledge of current practices, and a brief summary of recent research. This preliminary reading will help you narrow your focus to one or more specific subtopics. If your broad interest is in working with bright, elementary-level children, you may decide to develop a research problem dealing with the creative abilities of bright children, or you may decide to study the development of bright children in the primary grades. These topics are of course still much too broad for a specific research problem, but this initial narrowing permits you to explore the areas you have selected in somewhat greater depth by reading additional
materials that deal specifically with the narrower subject. You may also obtain valuable information by checking these topics in such sources as the *Review of Research in Education*, the *Review of Educational Research*, and the *Handbook of Research on Teaching*. This additional reading will usually result in the identification of a number of tentative research problems that are sufficiently limited and specific to form a possible basis for your work. In the example used here, you might develop specific research topics in the area of social development of bright students in the elementary schools such as the following: (1) relationships between intelligence and sociometric choice among sixth-grade children, (2) development of interest in the opposite sex in elementary children between grades four and six, (3) social activities of bright children as compared with those of average children in fifth-grade classrooms, and (4) social adjustment problems in extremely bright children in the intermediate grades.

**Research Based on Theory**

Perhaps the approach most likely to produce an outstanding thesis or dissertation is to formulate a research problem that will test a theory related to your area of interest.

In simple terms a theory is an explanation of behavioral or physical events. The more "powerful" a theory is, the more events can be explained by it. Psychoanalytic theory is considered by some researchers to be powerful because it provides an explanation for a vast range of behavior from infancy to old age, from the behavior of normal persons through the continuum of mental illnesses. Theories consist of generalizations (in the physical sciences, usually called laws) and constructs. A law or generalization is a statement of a relationship between two or more events; generalizations can be used to predict events. For example, the statement that individual tutoring results in increased school achievement is a generalization. Assuming it is true, we can predict that a particular student, given tutoring, will show a gain in achievement. A construct is a type of concept used in scientific research to describe events that share similar elements. Motivation, achievement, learning ability, intelligence, and value are all examples of constructs. Constructs are usually defined in operational terms, that is, in terms of the "operations" needed to measure them. For example, the construct "intelligence" is usually defined in terms of scores derived from administration of an intelligence test. Motivation may be defined in terms of changes in subjects' performance after they receive "motivating" instructions. These operational measures of constructs are usually called variables because the level or

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2. Bibliographic information for these references can be found in the Annotated References at the end of chapter 4.
degree to which different subjects display the construct varies and because values or numerals can be assigned to different levels. Theoretical research usually consists of testing a hypothesis (a speculation about the relationship between two or more variables) that is derived from a theory.

Many areas of education have virtually no theoretical foundation. In areas, however, where the problems of education cut across other behavioral sciences, such as psychology or sociology, an increasing amount of pertinent theoretical work can be found. Some of these areas of overlapping concern are learning, motivation, language development, behavioral management, attitude development, and social class. A good example of an educational research problem derived from theory in another behavioral science, psychology, is provided by a recent study of changes in school-related attitudes. In this study, Robert Steiner tested a hypothesis related to attitude change derived from the theory of cognitive dissonance developed by Leon Festinger. Simply stated, cognitive dissonance is a state of tension that occurs when an individual simultaneously holds two cognitions (i.e., attitudes, ideas, or beliefs) that are logically inconsistent or in conflict. According to Festinger’s theory, this dissonance is unpleasant, and the individual experiencing it is motivated to reduce it. With regard to attitude change, Festinger’s theory would indicate that if an individual has an attitude we want to change, such as racial prejudice, we can create cognitive dissonance by exposing the person to ideas that are incompatible with his or her attitude or inducing the person to behave in a manner contrary to his or her original attitude. This in turn will create dissonance, and in order to reduce this dissonance, the individual will shift his or her original attitude so that it will be more consistent with the behavior we have induced. The theory also suggests that the level of cognitive dissonance experienced by the individual is related to the degree of attitude change that is likely to occur. That is, a greater degree of dissonance will lead to greater attitude change in order to reduce the dissonance.

In Steiner’s study, a measure of attitude toward science was administered to a sample of ninth-grade science students. Steiner then divided his group into students having high (HS) versus low (LS) attitudes toward science. Students in these groups in turn were randomly assigned to experimental and control treatments. Each student in the experimental treatment prepared a short videotape extolling science and advocating that students enroll in science. According to Festinger’s theory, this behavior would cause substantial cognitive dissonance for the LS students, whose initial attitude toward science was low. The behavior could also cause some dissonance (presumably less) among

students in the HS group if their videotape behavior was more favorable to science than their initial attitude was. The control group was not exposed to any treatment, and so it would be expected that their attitudes would not change. After the treatment phase, an attitude scale was again administered to all subjects, and changes in attitudes between the pre- and post-measures were analyzed. It was found that the attitudes of the control group remained virtually the same on the two measures, as expected. The attitudes toward science of subjects in the experimental groups improved significantly between the pre- and post-measures. Contrary to expectation, however, gains made by the LS and HS groups were not significantly different. Therefore, the theory of cognitive dissonance was partially supported in that the cognitive dissonance generated by the treatment did result in higher scores. The theory was not fully supported because the LS group did not change their attitudes more than the HS group did.

This study is typical of research designed to test behavioral science theory in that it produced some relevant evidence but did not provide a definitive test of the theory. As research of this kind slowly accumulates, the scientist gains an increasingly better understanding of the theory, which in turn leads to changes in the theory and eventually to its general acceptance or rejection.

However, we should note that even though a number of studies might produce evidence confirming a theory while no disconfirming evidence is found, the theory is never fully accepted because the possibility of disconfirming evidence in the future always exists. On the other hand, one study that produces disconfirming evidence calls for revision or rejection of the theory.5

Several advantages accrue to conducting theory-based research in education. First, the theory tends to focus the direction of the research. Without some viable theory to serve as a guide, many studies address trivial questions or contribute nothing to the slow accumulation of knowledge needed for advancement of a science of education. Second, a theory can provide a rational basis for explaining or interpreting the results of research. Studies without a theoretical foundation often produce results that the investigator is at a loss to explain. Eventually such studies can help in the development of a theory, but their impact on our understanding of the phenomena being studied is much less clear and immediate than for theory-based research. Still another advantage of good theories is that they enable the researcher to make predictions about a wide range of situations. For example, cognitive dissonance could be employed to attempt to change a wide range of attitudes.

In summary, a valuable technique for defining a research problem is to derive a hypothesis from a theory and test the hypothesis in a relevant educational context.

5. See David R. Krathwohl, Social and Behavioral Science Research (San Francisco: Jossey-Bass, 1985), for a discussion of how scientific theory is developed and confirmed.
Replication

Another strategy that can be used to locate a research problem is to select a previous study for replication. In the behavioral sciences, where we are usually unable to maintain the level of experimental control that is possible in the physical sciences, important studies should always be replicated before their findings are accepted by the scientific community. Therefore, you can often make a valuable contribution by repeating an important research project that someone else has carried out. In order to make a significant contribution, however, you must carefully search the literature to find a study that is appropriate for replication. There is no point in replicating a trivial study or one that is so poorly designed that the results cannot be accepted with any confidence. There are, however, several valid reasons for carrying out replications, and you should locate a study for which one of these reasons is relevant. Among the reasons for carrying out a replication are the following:

1. To check the findings of a major or milestone study. Occasionally a study is reported that either produces new and surprising evidence, reports findings that conflict strongly with previous research, or challenges a generally accepted theory. The replication of studies of this kind is very useful because these studies help confirm or disconfirm the validity of the new evidence. If supported by replication, such studies often open up a new area of investigation or have a major impact upon educational practice. Studies of this sort are often discussed in graduate seminars, as well as in literature reviews such as those that appear in editions of the Handbook of Research on Teaching or in issues of the Review of Educational Research. An example of a study that has had a major impact in the educational community is the work of David E. Wiley and Annegrét Harmschlegler. Based on their reanalysis of data obtained from Coleman's sixth-grade sample in Detroit, these researchers concluded that lengthening the school year by 10 days, increasing the school day to six hours, and raising the average daily attendance to 95 percent would bring about major achievement gains, including a 65 percent gain in reading comprehension and a 34 percent gain in mathematics achievement. This study dramatically illustrated the importance of time as a factor in school learning and stimulated many studies that further explored the influence of time in the schools. Considerable controversy also developed over the validity of Wiley and Harmschlegler's findings. This creates an ideal situation for replication, since their findings were both important and controversial.

2. To check the validity of research findings across different populations. The typical research study in education is carried out with a small sample of

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individuals representing a single population. Without replication we are unable to determine the degree to which findings that emerge from such research apply to other populations. For example, Charles Fisher and his colleagues studied the relationship between specific teacher behaviors and the achievement of second-grade pupils in mathematics and reading. The researchers found that teachers’ use of academic monitoring was negatively related to reading achievement. They also found several teaching behaviors that were positively related to mathematics achievement. Clearly, it is unsafe to generalize research findings on effective teaching techniques across grade levels or subject areas without first doing replication studies. Similarly, findings for male populations may or may not apply to females, and findings valid for one racial or ethnic group may or may not be valid for other groups. Thus, replications provide us with a very valuable tool for determining the degree to which research findings can be generalized across populations.

3. To check trends or change over time. Many research results in the behavioral sciences depend in part on the environment in which the individual functions. Thus, research findings on racial attitudes that were valid 20 years ago may be invalid today. Replication is a useful tool for checking earlier findings and identifying trends. For example, a study of curricular trends in high schools surveyed 234 principals in 1979, replicating a 1974 survey. Comparisons of the 1974 and 1979 data revealed trends in 20 areas such as departmentalization, use of independent study, and moral education. These trend data give us interesting insights into where the secondary curriculum appears to be going.

If you can locate a survey conducted several years ago that covers topics of current interest, it is fairly easy to conduct a replication that will reveal interesting trends and that will increase our understanding of the questions addressed.

4. To check important findings using different methodology. In any research project there is a possibility that the observed relationships are an artifact of the methodology used by the researcher and are not due to a true relationship between the phenomena being studied. A true relationship should emerge regardless of the measures and methods used as long as they are reasonably


valid and appropriate. Thus, a very useful form of replication is to repeat important studies using different methodology. For example, a study by Wayne Piersel, Gene Brody, and Thomas Kratochwill found that disadvantaged minority-group children shown a videotape designed to give them a favorable experience with the test situation before being given an intelligence test earned significantly better scores than did similar children not shown the videotape.\(^\text{11}\) This is an important finding because its application would reduce the likelihood of disadvantaged minority children being given spuriously low test scores, which psychologists suspect often happens. Leslie Raskind and Richard Nagel replicated this study but improved the research methodology by using examiners who did not know which children were in the experimental and control groups and by showing an unrelated videotape to the control group.\(^\text{12}\) These features of experimental design, which were not present in the earlier study, reduced the likelihood of obtaining spurious results. Using the same intelligence measure (WISC-R), Raskind and Nagel found no significant IQ differences between the experimental and control groups. This suggests the results of the earlier study could have been due to deficiencies in research methodology. Because the children in the two studies were drawn from different populations, however, additional replications would be desirable before drawing any firm conclusions.

In conclusion, we have seen that replication gives us a much sounder basis for judging the validity of a research finding than is possible when only a single study is available. Moreover, replications that study individuals drawn from different populations, during different times, and using different methods contribute greatly to the confidence we may have in generalizing the research findings. Clearly, the more broadly we can apply a research finding to educational practice, the more valuable that finding will be.\(^\text{13}\) There has been a trend in recent years to conduct more replications of educational research. You should give this option careful thought because it offers significant advantages for thesis and dissertation studies.

Other Methods of Identifying Research Problems

If you still have not located a problem after using the approaches just presented, a number of other approaches may be tried. One of these is to observe carefully the existing practices in your area of interest. For example, a student interested


\(^{13}\) The degree to which research findings can be generalized across people, settings, and times is called external validity. This construct will be discussed at length in later chapters.
in human relations problems in the public schools may observe faculty meet-
ings, committee activities, and other situations where such problems may arise.
These observations will often provide ideas and insights that can lead to a
worthwhile research project. The student may observe that in faculty meetings
some principals are much more effective than others in enlisting cooperation
and developing enthusiasm among teachers. This observation might lead to a
comparison of the methods of principals who are successful with those who are
unsuccessful in obtaining teacher cooperation.

Another valuable source of research ideas is found in the advanced courses
that you take in your graduate program. In graduate seminars, important
research articles are often critically reviewed in class and important research
questions are raised. In many textbooks, questions are also brought up for which
we have no answers. Some textbooks even go so far as to list problems that
require additional research. The brief reviews of research published in the
Review of Educational Research almost always list specific areas in which further
study is needed.

When searching for a problem, keep a notebook of research ideas.
Whenever an interesting idea comes up in reading or class discussions, make a
brief note of the idea and its source. The source will be useful if you decide to
probe more deeply into the idea. This approach not only produces many
potential thesis and dissertation problems but also makes you increasingly
perceptive to possible problems, so that you see many you would previously
have overlooked.

Do not hesitate to consult with professors at your college or researchers at
other institutions who are working in areas related to your interests. Because
they may have carried out research on a particular problem over a period of
years, these people are likely to have developed a sensitivity to important
unsolved problems in their field. For example, the authors have worked over the
last several years on the development of training programs to improve the
classroom skills of inservice teachers. As a result of this experience, we have
identified a number of research problems concerning the teacher’s role in the
classroom. Little is known, for example, about the effect of many teacher
behaviors on student performance. Does the teacher’s use of higher cognitive
questions in classroom discussions relate to student behavior and achievement?
What is the effect of individual or small-group tutoring on student achievement?
Also, little is known concerning the frequency with which certain teacher
behaviors occur in the classroom, for example, how frequently teachers use
tutoring, role-playing, or discussion of controversial issues, and at what grade
levels these techniques are most used. Another type of research problem
concerns identification of variables affecting development of teaching skills. We
know, for example, that the use of models facilitates skill development.
However, certain variables, such as sex and status of the model, may enhance or
lessen the effectiveness of modeling. By consulting with researchers in your own
area of interest, you may be able to identify problems of similar importance to
the advancement of a particular field of study.

Graduate students in education have the advantage of working in an area
where they have gained much experience during their years as students. Very
often graduate students can recall problems encountered in their own educa-
tional experiences and from one of these problems develop a worthwhile
research plan. Newspapers and popular magazines are sometimes valuable
sources of research ideas. These periodicals often report at length on educational
problems that are currently considered of major importance and usually report
the opinions of educators and others in public life concerning these problems.
These reports usually contain assertions, suggestions, and criticisms, the merits
of which can be checked by research. For example, public debate in recent years
concerning the need for changes in the methods of teaching reading has
stimulated many research projects aimed at trying and evaluating some of the
ideas and proposals that have been put forth.

OUTLINING A RESEARCH PROPOSAL

Purpose of the Research Plan

After having identified a specific research problem that appears to be satisfac-
tory, you should outline a research plan in as much detail as possible. The
project is still tentative at this point because your review of the literature has yet
to be completed, and this review almost always leads to some changes in the
research plan. The tentative outline, however, can do much to clarify your
thinking and will also give direction to your review of the literature and your
study of educational research. In order to plan a research project, you must have
tentatively identified a problem, read a substantial amount of the research and
theoretical literature relevant to your problem, and have a good basic knowledge
of the educational research process. As this is only the second chapter of this
text, you may wonder how you can be expected to be ready to prepare a research
plan at this point. The fact is that you are probably not ready to develop a
finished plan, but you should still start a preliminary plan, following the outline
presented earlier in this chapter and based on the information described in the
next few pages. Your preliminary plan will surely contain many blank spaces
and many ideas that you will later change. The deficiencies of your plan will
become apparent to you as you progress through this book. As you learn more
about such topics as reviewing the literature, sampling, educational measure-
ment and research design you can immediately apply this knowledge to the
gradual refinement of your preliminary plan.

Most graduate students have two major goals in their study of the process
of educational research. First, they want to develop the skills and knowledge they will need to plan and carry out their own research. Second, they must be able to apply their knowledge of the research process to the critical evaluation and interpretation of the research of others. Only by understanding the work of previous researchers can you build upon this work and move ahead, if only by a small amount, the frontiers of educational knowledge. If you keep these two broad goals in mind as you progress through this book, ideas and information presented will have much more meaning.

The tentative research plan should contain the following sections: introduction and problem description, statement of the objectives or hypotheses, listing of possible tests or measures to be used in the study, description of the proposed sample, research design, a chronological description of the procedures to be used in carrying out the project, and plans for carrying out analysis of data to be collected.

An important advantage of a research plan is that it compels students to state all their ideas in written form so that they can be evaluated and improved upon by the researcher and others. Even a simple research project contains many elements, and it is easy to overlook some of them unless they are all written down in a systematic manner. The authors recall an instance in which a written plan helped to stop a student from making a serious error in his research project. In discussing the proposed project with the student, we found the research design satisfactory. When the research plan was read later, however, we discovered that the student planned to have teachers try a new teaching technique with unfamiliar pupils rather than with pupils from their own classes. This procedure would confound the effect of the new teaching technique with the effect of working with unfamiliar pupils. Subsequently the student was advised to change the research design to avoid this error.

Another advantage of a detailed research proposal in written form is that it can easily be submitted to several professors and consultants for their comments and suggestions. Furthermore, the final plan can be used as a guide for conducting the research project. Otherwise you will need to rely on memory and may forget important details of the project when carrying it out.

Introduction and Problem Statement

Research proposals usually start with an introductory section that states the research problem, briefly reviews the most relevant research and theoretical literature, and states why you believe the problem to be important and what contribution you expect to make to educational knowledge and practice. This section typically covers the first four activities listed in the outline in the Introduction of this chapter.
By the time you start writing your research plan, you should be well along in your efforts to convert your initial research idea into a clear, specific, and manageable research problem. You will recall that the development and clarification of the research problem usually progresses as you build a stronger foundation of knowledge through a reading program. This program should start with books that pull together much information in a few pages, but by the time you have selected a specific problem, it should also include a review of the most relevant research articles that have appeared in recent journal issues.

Knowledge and understanding should be demonstrated through a brief review of the most important research and theoretical work relating to your problem. Usually a discussion of 10 to 20 key references is sufficient to help the members of the thesis committee fit your problem into the context of other work in this area. These few references, however, should be selected carefully from an extensive review of previous research and the findings fitted together to provide an integrated picture of the field of knowledge. If this brief review appears to be a disjointed recitation of the studies cited, as is often the case, the reader may well question your understanding of the problem you propose to study.

You are also expected to describe how your proposed study will contribute to educational knowledge. You should try in this section of your introduction to build a bridge between your expected outcomes and major educational problems and needs. If you have found any survey data that establish or document the importance of your problem, it should be presented.

For example, if your problem is concerned with remedial reading, surveys that report a large number of poor readers could be cited to demonstrate the need for additional research. Quotations from experts in the field that emphasize the importance of your problem area or the need for further research can also be used to help build a justification for your proposed research topic.

Briefly, the introduction and problem statement should have the following characteristics:

1. It should be written in clear, non-technical language, avoiding jargon. Try to stimulate the reader's interest.
2. The problem should be sufficiently limited in scope to be a manageable thesis or dissertation problem.
3. The problem should be carefully fitted into the broader context of current theory and relevant research. Avoid making assumptions or unsupported claims or statements.
4. The significance of the problem should be addressed; that is, does it explore an important question, meet a recognized need, or make a useful contribution to knowledge?
5. The problem should be clearly and logically related to the hypotheses that follow.
In preparing the introductory section of the research proposal, you should bear in mind that the impression this section makes upon the members of the thesis committee will do much toward shaping their attitudes about you and the remainder of your plan.

Formulating Hypotheses or Objectives

In our day-to-day activities we are often faced with problems for which we must gather information and seek answers. In order to focus our information gathering we try to identify possible solutions or explanations to our problem and then gather the information needed to see if a given explanation is correct. These "educated guesses" about possible differences, relationships, or causes are called hypotheses.

For example, suppose that your car will not start. You know that there is a cause-and-effect relationship between availability of gasoline and running of the engine. Therefore, your first hypothesis may be that you are out of gas. When you note that the gauge indicates half full, you tentatively reject this hypothesis. Next, you hypothesize that you have gasoline but it is not reaching the carburetor. To test this hypothesis, you disconnect the gasoline line from the carburetor and operate the starter to see if gasoline is pumped out of the line. If so, you reject this hypothesis. Your next hypothesis may be that no electricity is reaching the spark plugs. This can be tested by removing a spark plug wire, operating the starter, and checking to see if a spark jumps from the wire to the engine. You can continue to formulate and test new hypotheses until the problem is solved.

This simple process that we use to attack our day-to-day problems is similar to the approach an investigator may use to attack a problem in educational research. First, the investigator hypothesizes a relationship between two or more variables, or a difference between two or more treatments. The investigator then collects evidence related to the hypothesis and examines the evidence to decide whether or not to reject the hypothesis. For example, a first-grade teacher may have noted that one of the pupils in class appears to be making no progress in reading. Careful observation of this child plus a review of previous research in this area may suggest several possible causes for this problem. These possible causes may be stated as hypotheses. The teacher may then design and carry out a program aimed at testing each hypothesis by manipulating the possible cause and then checking the child’s progress in reading.

Educational research problems tend to be more complex than “troubleshooting” your car. The first-grade pupil is infinitely more complex than an automobile engine, and consequently most educational problems are likely to have multiple causes that may interact in unexpected ways and are likely to
differ from child to child. Nevertheless, formulation of an hypothesis, and gathering of relevant evidence to test the hypothesis, is usually the most productive approach to throwing light on educational problems.

Before we leave our car and take the bus, let us look a bit more closely at the process we went through in attacking the "won't start" problem. First, it is important to state our problem as precisely as possible. For example, "the car won't go" is not as good a problem statement as "the starter will turn over the engine but the engine will not start." Once we have stated our problem clearly we can formulate hypotheses, that is, possible explanations or solutions to the problem. Note, however, that you must know something about the process you are studying in order to formulate good hypotheses. For example, if you did not know that gasoline must reach the carburetor in order for the engine to run, you would not be likely to formulate the hypothesis that gasoline is not reaching the carburetor. Similarly, in educational research you will be unable to formulate good hypotheses unless you know something about the phenomenon you propose to study. Furthermore, the more you know about your topic before you conduct your research, the better will be your hypotheses and the greater will be your chances of producing useful new knowledge related to your problem. This is one reason why a careful review of relevant literature is essential to the development of a sound research plan.

Although knowledge is a crucial ingredient to the formulation of good hypotheses, imagination is equally important. Investigators who make a real effort to look at their problem in new ways or organize relevant previous knowledge into new configurations are likely to gain perspectives and insights that other investigators have missed. When generating hypotheses, researchers must allow time to think through all the alternatives they can identify. Graduate students, who are typically in a great hurry to finish their research, often settle for the first promising approach or hypothesis they think of. It is almost a serious mistake to hurry the planning phase of research. This is a time for careful thought, reading, and discussions with professors and fellow students. Research planning, even when done with care, requires only a small percentage of the total effort required to carry out a research project. In many cases a hastily planned project that produces nothing of value takes longer to carry out than a carefully planned project because of the mistakes, false starts, and need to repeat or replan that are an inevitable consequence of poor planning.

Because our society is highly evaluative, students often reject unique ideas that with further development would form the basis for promising hypotheses. In the initial stages of generating hypotheses, you should be noncritical. That is, you should first generate as many ideas as possible and only then should you start examining the ideas critically.

Educational researchers can often generate more imaginative hypotheses and procedures if they look at the knowledge, ways of attacking problems and methods for gathering data that have been developed in other disciplines such
as sociology, psychology, economics, history, and anthropology. For example, a number of recent studies of classrooms and school systems have generated interesting new knowledge by using procedures borrowed from anthropology.  

The graduate student who has formulated a well-thought-out set of hypotheses has taken a major step on the road to an effective study. Such hypotheses place clear and specific goals before the researcher and provide a basis for selecting relevant samples, dependent variables, and research procedures to meet these goals. Many studies in education fail to produce useful knowledge because the researcher plunges ahead before developing a clear and specific set of hypotheses.

Directional and Null Hypotheses

Hypotheses may be stated in two forms, directional and null. The directional hypothesis states a relationship between the variables being studied or a difference between experimental treatments that the researcher expects to emerge. For example, the following are directional hypotheses:

1. Pupils of low ability in ability-grouped classrooms will receive significantly higher scores on a measure of inferiority feelings than pupils of low ability in random-grouped classrooms.
2. There is a positive relationship between the number of older siblings and the social maturity scores of six-year-old children.
3. Children who attend preschool will make greater gains in first-grade reading achievement than comparable children who do not attend preschool.

In contrast to the directional hypothesis, the null hypothesis states that no relationship exists between the variables studied or no difference will be found between the experimental treatments. For example, in null form, the aforementioned hypothesis could be stated thus: "There will be no significant difference between the scores on a measure of inferiority feelings of low ability pupils in ability-grouped classrooms and low-ability pupils in random-grouped classrooms." The null hypothesis does not necessarily reflect the scientist's expectations, but is used principally because it is better fitted to our statistical techniques, many of which are aimed at measuring the likelihood that a difference found is truly greater than zero.

Note that regardless of whether directional or null hypotheses are stated, the differences or relationships hypothesized refer to population differences, not

sample differences. Stated another way, the null hypothesis, in the form usually used in education, states that no difference exists, and the statistical tools test this hypothesis by determining the probability that whatever difference is found in the research subjects is a true difference that also is present in the population from which the research samples have been drawn. You may be confused by the null hypothesis because it appears senseless to hypothesize the exact opposite of one’s expectations. This is a disadvantage of the null form, because the researcher’s expectations, based as they are upon considerable insight into other research and theory, often make the study clearer to the person reading the research report. Some researchers overcome this problem by using both a working hypothesis that reflects their expectations based on theory or previous research and a statistical hypothesis that is usually in the null form and is set up to make testing of the working hypothesis statistically more precise.

Directional hypotheses can also be tested as statistical hypotheses. However, your statistical hypothesis should be stated in the directional form only when there is little or no possibility that the findings will yield a difference or relationship in the opposite direction. This is because the null hypothesis and the directional hypothesis call for different statistical treatment, the first requiring what is called the two-tailed test of significance and the second requiring a one-tailed test. The two-tailed test assumes that the difference could occur in either direction—that is, either the ability-grouped or random-grouped children could have significantly greater inferiority feelings. The one-tailed test on the other hand assumes that, if a difference occurs, it can occur in only one direction. See chapter 13 for a discussion of one-tailed and two-tailed tests.

Some investigators state their problem in the form of a question instead of stating a working hypothesis. The aforementioned hypothesis stated as a question might read: “Is there a significant difference between the scores on a measure of inferiority feelings of a group of low-ability pupils in ability-grouped classrooms as compared with low-ability pupils in random-group classrooms?” The question form is often the easiest for the inexperienced research worker to use because it states specifically the question that the research will attempt to answer. In writing the research results, you may organize your report so as to answer the questions that you have posed.

In some research carried out in education, especially descriptive studies, it is appropriate to list objectives rather than hypotheses. A survey, for example, aimed at determining the extent of differences in the salaries of university professors in different fields of learning could test a hypothesis such as “There will be no significant differences between the mean salaries of faculty members of comparable ranks in different areas of learning.” In a study of this sort, however, it is probably more desirable merely to state the objectives of the study as follows: “The objectives of this research are (1) to study the salaries paid professors of comparable academic ranks in different fields of learning and (2) if differences are found to exist, to attempt to identify the factors that appear to contribute to the observed differences.”
Criteria for Good Hypotheses

If hypotheses are to be of maximum value to the researcher, they should satisfy the following four criteria:

1. The hypothesis should state an expected relationship between two or more variables. In correlational studies, that is, those in which data on two or more variables are collected on the same individuals and correlations are computed, a direct relationship is usually stated in the hypothesis. For example, a directional hypothesis for a correlational study might state: “There is a significant positive relationship between peer-group acceptance and attitude toward school of sixth-grade boys.”

In experimental studies, where an experimental treatment such as a new reading program is administered to one group of subjects but not to another group, differences between the treatments are usually hypothesized. For example, a null hypothesis for an experimental study might state: “There will be no significant difference in the reading achievement of first-grade pupils trained with Experimental Program A and comparable pupils trained with Conventional Program B.” Although this hypothesis deals with an expected difference, it also indirectly suggests a relationship. Namely, it implies a relationship between characteristics of the two reading programs and reading achievement. Thus, either directly or indirectly, a good hypothesis is concerned with an expected relationship between two or more variables.

In addition to stating a relationship, the hypothesis may also briefly identify the variables and the population from which the researcher plans to select his sample. Some researchers provide a good deal of specific information about subjects and variables in their hypotheses as in this example: “Success in engineering as measured by a composite score based on income, patents held, and scholarly publications is positively related to freshmen scores on the Garnett College Test in Engineering Science for a random sample of 100 engineers who graduated from the University of Minnesota during 1976.” As a rule, however, do not include such information because it lengthens the hypothesis statement and tends to make it less clear.

2. The researcher should have definite reasons based on either theory or evidence for considering the hypothesis worthy of testing. After completing the review of the literature, you will have detailed knowledge of previous work relating to your research project. In many cases you will find conflicting research results so that your hypothesis cannot agree with all available information. In general, however, your hypothesis should not conflict with the preponderance of previously reported information.

In addition to being in agreement with knowledge already established within the field, hypotheses should be formulated in accordance with theories in education or psychology. When this is possible, the results of the research will contribute to the testing of the theory in question. In many areas of education so little research has been done that reasonably conclusive information is not
available. In this case educational theory may form the only basis for developing the hypothesis. You must always have some basis in theory or fact for your hypotheses. Occasionally, we find a study in education that has used the "shotgun approach." In this approach the research worker tries all the measures one can in the hope that something will yield useful results. This approach should be avoided because it uses measures for which no hypotheses have been developed. Many dangers are involved in applying such research results to educational practice. When we do not have some understanding of why a particular relationship exists, there is always a danger that factors are operating that may be detrimental to the educational program.  

3. A hypothesis should be testable. Hypotheses are generally stated so as to indicate an expected difference or an expected relationship between the variables studied in the research. The relationship or differences that are stated in the hypotheses should be such that measurement of the variables involved can be made and necessary statistical comparisons carried out in order to determine whether the hypothesis as stated is or is not supported by the research. Do not state any hypothesis that you do not have reason to believe can be tested or evaluated by some objective means. For example, the authors recall a "hypothesis" prepared by a teacher who wished to evaluate a high school course in civics. It was "to determine whether this course will make the student a better adult citizen." Such an objective would be very difficult to test because it would require (1) waiting until pupils taking the course had become adult citizens, (2) setting up criteria to determine how good a citizen each pupil had become, (3) evaluating each adult in terms of the criteria established, and then, perhaps most difficult of all, (4) determining what aspects of the adult citizenship of the former pupils could be directly attributed to the civics course. We can see from this example that such hypotheses are much easier to state than they are to evaluate by objective means. The hypotheses of inexperienced research workers in education often fail to meet the criterion of testability because relationships are stated that cannot be measured using today's tests. A similar mistake made frequently by graduate students is to state hypotheses in terms that would require many years to test.

4. The hypothesis should be as brief as possible consistent with clarity. In stating hypotheses the simplest and most concise statement of the relationship expected is generally the best. Brief, clear hypotheses are easier for the reader to understand and also easier to test. The question "Is a student counseling program desirable and economically feasible at the elementary school level?" reflects the sort of fuzzy thinking that handicaps many studies in education. A program can be "desirable" or "undesirable" from a very large number of different viewpoints. No specific guides are given about what aspect of the guidance program is to be studied. The second part of the question dealing with

15. A discussion of the "shotgun approach" can be found in chapter 14.
the economic feasibility is determined largely by the individual school district's financial resources. In order to develop a meaningful hypothesis from this question we would need to determine first the specific aspects of the elementary school counseling program that the research worker plans to study. Let us say he wished to provide counseling for three classes of sixth-grade pupils and not provide counseling for three other classes in a large elementary school and then compare his two groups on such variables as the number of behavior problems reported by the classroom teachers, the incidence of truancy, and the pupils' stated attitudes toward school. In this case perhaps three specific hypotheses would be the best approach. Stated in the null form these might be:

1. Sixth-grade pupils receiving counseling will not be significantly different in the number of behavior problems reported by the teacher from sixth-grade pupils not receiving counseling.
2. Sixth-grade pupils receiving counseling will not be significantly different in incidence of truancy from sixth-grade pupils not receiving counseling.
3. Sixth-grade pupils receiving counseling will not be significantly different in their stated attitudes toward school from sixth-grade pupils not receiving counseling.

In the aforementioned example the broad general question has been changed to three specific null hypotheses, each stating a specific relationship between two variables. It is usually desirable to state your hypotheses in this more precise form. The advantage of stating a hypothesis for each relationship to be studied is that this procedure is simple and clear. The testing of multiple hypotheses involving several relationships leads to some confusion because portions of the hypothesis may be supported by the research evidence and other portions may not be supported. In writing the results of the experiment, you will find it possible to present a more easily understood picture of your findings if each hypothesis has stated only a single relationship.

Considering Alternate Hypotheses

Once you have formulated your hypotheses, carefully consider the following question: "If my research results support the relationship that I have stated in my working hypothesis, what factors, other than the variables manipulated in my research, could have brought about this result?" For example, suppose you plan a study designed to compare the effectiveness of two reading programs in improving the reading comprehension of first-graders. Your working hypothesis is that children who study Program A will obtain higher reading comprehension test scores at the end of first grade than will children who study Program B. You select 10 first-grade teachers in School 1 to teach Program A, a new program. Program B, which is already in use in your district, will be used by 10
teachers in School 2. What are some of the reasons, other than the superiority of Program A, that could result in children in Program A classrooms obtaining higher scores on the reading comprehension test? Let us consider a few possibilities:

1. School 1 has a more extensive prereading program in kindergarten than does School 2. Thus, the children in School 1 are better prepared for first-grade reading and do better for that reason.

2. Teachers who try Program A in School 1 are more enthusiastic and highly motivated than those who continue to use Program B in School 2. Often a new program tends to generate teacher enthusiasm.

3. School 1 serves a neighborhood of higher socioeconomic status than that served by School 2.

4. The items on the Reading Comprehension Test fit the content of Program A better than the content of Program B and therefore are biased in favor of Program A.

We could list many more alternate hypotheses, but these few should be enough to illustrate that many factors other than the effectiveness of Program A could account for the research results. In effect, each alternate hypothesis constitutes a flaw in your research design that will cast doubt on your research findings.

The reason for stating alternate hypotheses when planning your research is that once you have identified these alternatives, the research design can often be changed in ways that eliminate each alternate hypothesis. For example, consider alternate hypothesis 4 as stated above. The Reading Comprehension Test bias could be eliminated by selecting another test that fit the content of Programs A and B equally well, or by analyzing the content of the two programs and omitting test items that were covered in one program but not the other.

As you learn more about research design you will become increasingly capable of identifying alternate hypotheses and adjusting your research proposal to eliminate them.

Selecting Possible Measures

The next step in preparing the tentative research plan is to make a listing of possible measures. You probably have had courses in educational measurement that have provided some background in the types of measures available and sources of information about educational measures. This topic is covered briefly in chapters 8 and 9. Very often the process of identifying possible measures will require you to clarify your objectives and eliminate hypotheses for which no measures are available or can be developed. After measures have been identified, evaluate them and select the most appropriate.
Selecting Research Subjects

You should then describe the subjects you will require for your study. At this point, consider carefully the chance of obtaining the type and number of subjects you need. If your study is concerned with individuals who occur only rarely in the general population, be particularly careful to determine whether or not subjects are actually available to do the work you have planned. For example, studies of highly gifted children, say those with IQs above 160, are extremely difficult to carry out unless you have a very large population to draw from because children at this IQ level occur very rarely in the general population. Your method of selecting your sample should also be considered and tentatively decided upon. Careless selection of subjects is an error often found in educational studies. Considerations involved in selecting a sample of subjects are discussed in chapter 6.

Specifying the Research Design

Next, describe your tentative research design. Become familiar with the various types of research designs in chapters 10 to 19, and be sure that the design you plan to use will permit testing the hypotheses. Students often give little thought to the design of their projects until too late.

Selecting Analysis Procedures

A tentative plan for analysis of the research results is very important because this plan may have a considerable bearing upon the number of subjects needed, the measures and scoring procedures used, and the methods of recording the data. Yet many students give no thought to analysis until the data are collected. Then they find that no analysis procedures fit their data very well, and often they discover that the only procedures that can be used to salvage the study are complex ones that they must then learn to use.

In no area is lack of foresight so costly and disastrous as in doing research. Careful planning saves time in the long run and results in much better research. Students should complete their course in research methods prior to starting the work on their research problem, because much of the knowledge needed to carry out even the first steps in a research problem requires an understanding of the overall field of educational research.

Specifying Research Activities

After you have spelled out your measures, subjects, design, and analysis, add to your research plan a chronological list of procedures that you will follow in carrying out your study. This list should be as detailed as possible. In addition to
describing each activity, give the approximate date when the activity will be completed, and also estimate how many working hours will be required to carry out the activity. Compiling this chronological list forces you to think through the entire research process and may alert you to problems that you might otherwise overlook. The following types of problems are often identified as a result of compiling a chronological list of procedures:

1. In order to start the research in October, school officials must be contacted during the summer.
2. The collection of pretest data must be speeded up or the experimental treatments will extend into the Christmas holiday.
3. Standardized tests to be administered must be ordered as soon as possible to assure their arrival by the time needed.
4. The posttests cannot be given by one person in the number of days available.
5. The research cannot be completed during the time remaining in the current school year.
6. At least three observers will be needed to collect the classroom observation data in the time allotted.
7. Some of the activities to be done by the researcher during the first month of the project must be rescheduled because they will require 200 hours and only 80 hours are available.

Fitting the Proposal Together

In their initial attempts to develop a research plan, students often focus on each section of the plan in turn, and give too little attention to relationships among the various sections. As a result, it is not uncommon to find research plans in which errors such as the following occur:

1. An hypothesis is listed that cannot be tested by the measures described later in the plan.
2. The “Measures” section of the plan includes measures that are not related to any of the hypotheses or objectives. This happens frequently in correlational studies in which the careless researcher adds a few extra measures in the hopes that something interesting will emerge, or because the schools from which he has sampled already use the measures, or for some other reason.
3. Inappropriate analysis procedures are stated. Students who do not think through their analysis often list several analysis techniques and hope that one or the other will be accepted by the thesis committee.

One way to avoid errors such as those mentioned above is to construct a table in which the hypotheses are listed in the left-hand column, the measures to be used to test each given hypothesis are described in the center column, and
### TABLE 2.1

**Procedure for Checking Relationships among Hypotheses, Measures, and Analysis**

<table>
<thead>
<tr>
<th>Hypothesis</th>
<th>Measures</th>
<th>Analysis</th>
</tr>
</thead>
</table>
| 1. There is no relationship between overall achievement and popularity for sixth-grade boys. | 1a. Achievement: total battery score on the California Achievement Test.  
1b. Popularity: a sociometric choice instrument in which each student lists names of his or her five best friends. | 1. Product moment correlation between 1a and 1b.                           |
| 2. When the effects of achievement differences are controlled, there is no relationship between popularity and self-concept of sixth-grade boys. | 2a. Achievement: as in 1a.  
2b. Popularity: as in 1b.  
2c. Self-concept: Tennessee Self-Concept Scale. | 2. Partial correlation between 2b and 2c, partialing out 2a. |

**Note:** The problem of this study is to determine relationships between peer-group popularity and characteristics of sixth-grade boys.

The method of analysis is given in the right-hand column. An example of such a table for a correlational study is given in Table 2.1. This procedure is especially useful in helping the student think through studies that have a large number of objectives or hypotheses. For example, in descriptive questionnaire surveys, items are often included in the questionnaire that do not relate to any research objective and are often stated in a form that makes analysis difficult. By matching test items with hypotheses in a table, you are assured that all objectives are covered in your questionnaire and that no items are included that do not relate to an objective.

**Using PERT in Research Planning**

In the planning of research several procedures have been developed over the past 20 years. Many of these techniques were developed to improve planning for the development of complex weapons systems. They can be employed in any research or development activity, however, and are especially useful in planning
large-scale projects. In educational research, PERT (Program Evaluation and Review Technique) is the most widely used of these planning systems. In effect, PERT is an extension of the chronological list of procedures typically included in an educational research plan. 16 By using PERT, the researcher can (1) clearly see the relationships among the various activities making up the research, (2) check one's progress and identify activities that must be changed or speeded up in order to keep the project on schedule, and (3) focus on potential or actual problems involved in carrying out the project.

The first step involved in using PERT is to identify all goals that must be reached in the process of carrying out the project. Broad goals are first identified, and these are subsequently broken down into as many specific activities and subgoals as possible. For example, one broad goal in a study of the relationship between student attitudes and achievement could be to develop a scale to measure student attitudes toward school. This could be broken down into the activities and subgoals as shown in figure 2.1.

Having made a breakdown such as this for the entire project, you can now draw a network in which the various events or subgoals are arranged in order, beginning with the first day of the project and ending with the last day. Figure 2.1 shows a PERT network for the development of the attitude scale mentioned earlier. Each circle represents one subgoal or event. The initial event, in figure 2.1, is to “start scale development.” The circles are connected by lines, which represent the activities that must be carried out to achieve the following subgoals. Activities that can be carried out simultaneously are drawn parallel to each other, while those that must be done in sequence are drawn end-to-end. A dashed line is called a “dummy activity” and is used mainly to connect the completion of one broad goal or event and the start of the next. In drawing the PERT network, make decisions about the sequence of events and how you will allocate time to accomplish them. Note that each of these activities is highly specific and deals with only one small aspect of the process of developing the needed attitude scale. It is much easier to estimate accurately how much time will be involved in achieving each specific subgoal than to estimate the work involved in achieving the broad goal without making this detailed breakdown of activities.

The next step in PERT is to make time estimates. For each subgoal make three time estimates: optimistic (a), the time that will be needed to achieve the subgoal if everything goes well; most likely (m), best estimate of time needed; and pessimistic (b), the time needed if everything goes wrong that can go wrong. These estimates are usually expressed in weeks and made to the nearest tenth of a week. Figuring a five-day week, each half day equals one-tenth of a week (.1).

16. Flowcharts can also be used in research planning. See K. M. Evans, Planning Small-Scale Research, 3rd ed. (Windsor, Berkshire, England: NFER-Nelson, 1984) for a research planning flowchart.
Researchers who have made the three estimates for a given subgoal use the following formula to compute the expected elapsed time (\(t\)) to be spent in work planning:

\[
t_e = \frac{a + 4m + b}{6}
\]

For example, for activity 6, “arrange field test of prototype scale,” the researcher may estimate that if all goes well (\(a\)) one can make the arrangements in one-half day. However, it will probably (\(m\)) take a full day by the time telephone contacts are made, appointments are set up, and necessary meetings are held. If the necessary persons are difficult to contact, if appointments cannot be made on the same day, and if meetings take longer than anticipated, the researcher estimates that four and one-half days (\(b\)) will be needed to complete this task. Using the formula...
the researcher arrives at .3 weeks or 1.5 days as the time estimate.\textsuperscript{17}

Figure 2.1 represents the PERT network for only one major step in a research project. In developing a network for the entire project, each major goal would be broken down; the resulting network would combine many networks such as figure 2.1 in chronological order to produce the network for the entire project. Since this final network will be quite complex even for a typical thesis or dissertation plan, you may want to begin by constructing a PERT network that shows only the major goals or events. Then this network can be expanded by breaking down each broad goal, as was done in figure 2.1.

THE PILOT STUDY

A preliminary trial of research measures and techniques is essential to the development of a sound research plan. Whenever possible this preliminary trial should be enlarged into a pilot study. In a pilot study the entire research procedure is carried out, including analysis of the data collected, following closely the procedures planned for the main study. Pilot studies are carried out with fewer subjects than will be employed in the main study. For some pilot studies two or three subjects are sufficient, and you rarely need to include more than 20 subjects.

In addition to serving all the purposes of the usual tryout, such as improving data-collecting routines, trying scoring techniques, revising locally developed measures, and checking the appropriateness of standard measures, the pilot study provides additional knowledge that leads to improved research:

1. It permits a preliminary testing of the hypotheses that leads to testing more precise hypotheses in the main study. It may lead to changing some hypotheses, dropping some, and developing new hypotheses when called for.
2. It often provides ideas, approaches, and clues not foreseen prior to the pilot study. Such ideas and clues greatly increase the chances of obtaining clear-cut findings in the main study.
3. It permits a thorough check of the planned statistical and analytical procedures, thus allowing an appraisal of their adequacy in treating the data.

\textsuperscript{17} Note that the formula arbitrarily gives the greatest weight to the researcher’s best estimate.
Needed alterations also may be made in the data-collecting methods, so that data in the main study may be analyzed more efficiently.

4. It greatly reduces the number of treatment errors because unforeseen problems revealed in the pilot study may be overcome in redesigning the main study.

5. It may save a major expenditure of time and money on a research project that will yield nothing. Unfortunately, many research ideas that seem to show great promise are unproductive when carried out in the field or laboratory. The pilot study almost always provides enough data for the research worker to make a sound decision on the advisability of going ahead with the main study.

6. In many pilot studies it is possible to get feedback from research subjects and other persons involved that leads to important improvements in the main study. Although the pilot study should follow the main study procedures for the most part, variations such as trying alternate instruments and procedures and seeking feedback from subjects on the treatment, measures, and other aspects of the research are usually desirable. In deciding what variations are appropriate, you should remember that the pilot study is not an end in itself but is only a means by which the main study can be improved.

7. In the pilot study, the research worker may try out a number of alternative measures, and then select those that produce the best results for the main study with some tentative evidence that they would be productive. If you plan to continue beyond the master's degree, the master's research may sometimes serve as a pilot study for later research to be carried out as part of a doctoral program. The less research experience you have, the more likely you are to profit from the pilot study. Because of this, you should attempt a pilot study whenever possible.

MISTAKES SOMETIMES MADE IN PLANNING RESEARCH

1. The researcher puts off selection of a problem until completing all or most of the courses.

2. Uncritically accepts the first research idea thought of or that is suggested.

3. Prepares fuzzy or untestable hypotheses.

4. Hurries the planning of the research and, as a result, ends up with a poorly designed study that contributes nothing to educational knowledge.

5. Fails to carry out a preliminary trial of the measures and, as a result, makes serious mistakes when collecting data for the study.

6. Fails to conduct a pilot study and, as a result, encounters many unforeseen problems that weaken the research.

7. Overlooks important steps in preparing a chronological list of procedures.
ANNOTATED REFERENCES


Aimed both at the graduate student who wants to develop a thesis proposal and the professional educator who wants to prepare a grant proposal, *Guidelines for Preparing the Research Proposal* provides a detailed, step-by-step description of the process. The section on methodology is much too brief to be of any value to those who are not already familiar with this topic. It can, however, help remind the writer of the bases that must be covered in a proposal.


Describes how the learning theories of Ausubel and the motivation theories of White and Berlyne were used as guides in the development of an elementary school mathematics curriculum. The author demonstrates how the theoretical constructs were directly applied, modified, and combined in developing the curriculum. This paper provides a good example of how theory can be applied to the development of curriculum materials, which in turn could be used in research to test the theories involved.


Provides a description of PERT and gives examples of PERT charts for all of the major kinds of educational research. Much useful information is also provided on implementation of PERT on educational research and development projects. Students who intend to use PERT in planning their thesis or dissertation studies should read this book.


Contains clear and simple guidelines that a student can use to evaluate a research plan. The authors pose questions that focus the student's attention on important aspects of the research plan, discuss each question briefly, and provide a reference to which the student may go for further information. There is also a chapter on the language of research that contains definitions of many terms the student will encounter in reviewing research literature.


Provides a useful model for those who want to use PERT on the planning of their research. A 34-event PERT chart was developed for a three-year curriculum development project. When the PERT projections were compared with actual
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Educational Research
An Introduction
Fifth Edition

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Longman
New York & London
OVERVIEW

An educational researcher who would advance scientific knowledge must first identify and understand the research that has already been done in the field of interest. This chapter is designed to help you acquire the skills needed to conduct a thorough and systematic review of the research literature in your area of interest. Several reasons for conducting a review of literature are given, such as seeking to delimit the research problem and to identify new approaches. A systematic method of reviewing the educational research literature is described. Also discussed are the most important reference books and services that provide reviews, indexes, and abstracts of completed research studies.

OBJECTIVES

After studying this chapter you should be able to:

1. Describe the difference between primary and secondary sources and locate examples of each. How is each typically used in the educational research process?
2. State and explain briefly six reasons for conducting a review of literature before starting a research project.
3. Conduct a review of the research literature on a given topic, following the three steps presented in this text.
4. Locate relevant articles in Education Index, Psychological Abstracts, Current Index to Journals in Education, and Resources in Education on a given research topic.
5. Describe at least four major preliminary sources specifically intended for use in educational research.
6. Plan a computer search of Resources in Education, Current Index to Journals in Education, or Psychological Abstracts on a given topic in educational research.
7. Read a research article and prepare a bibliographic citation and a note card that follows the models given.
8. Develop a system for coding research literature on a given topic.
9. Describe ways to obtain references not available in your university library.

INTRODUCTION

The review of the literature involves locating, reading, and evaluating reports of research as well as reports of casual observation and opinion that are related to the individual’s planned research project. This review differs in a number of
ways from the reading program often used to locate a tentative research project. First, such a review is much more extensive and thorough because it is aimed at obtaining a detailed knowledge of the topic being studied, while the reading program is aimed at obtaining enough general knowledge and insight to recognize problems in the selected area.

Secondary Sources

The reading program generally uses textbooks, encyclopedias, and other secondary source materials. Secondary source materials in education include any publications written by an author who was not a direct observer or participant in the events described. For example, most of the material found in textbooks of Roman history are secondary source materials because the author has merely compiled the reports of others and rearranged these reports into a textbook. Most of the content of textbooks in education and psychology is also secondary source material.

Let us suppose that an individual wishes to write a textbook on methods of teaching remedial reading. The prospective author does an exhaustive review of the literature in this field, noting the results of all experiments and weighing and evaluating these results in terms of various approaches to remedial reading instruction. Then, on the basis of the interpretation of the various research reports and articles one has read, the author prepares the textbook. If, in the textbook, the author also reports the results of experiments that the author has carried out, then this portion of the textbook would be considered a primary source. That portion, however, is based on interpretations of the work of others would be classified as a secondary source. Secondary sources are useful because they combine knowledge from many primary sources into a single publication. A good textbook, for example, combines the work of many other persons and simplifies or eliminates much of the technical material that is not of interest to the general reader, thus providing a quick and relatively easy method of obtaining a good overall understanding of the field.

Primary Sources

The primary source differs from the secondary source in that it is a direct description of an occurrence by an individual who actually observed or witnessed the occurrence. In educational research this generally means the description of the study by the individual who carried it out.

The principal disadvantage to the research scholar of using secondary sources is that it is never possible to be sure what changes have been made by the secondary source author. In the process of simplifying and combining the results of many studies, the author of a textbook or other secondary source report may slant his or her interpretation of the primary source to agree with
his or her own views and will omit material that the person reviewing the literature needs to know. Thus, a review of the literature should be based, whenever possible, upon primary sources. Most secondary sources, such as textbooks, contain a bibliography listing the sources from which the material was obtained so that the student can usually locate the primary source.

Importance of the Review

The review of the literature is an important part of the scientific approach and is carried out in all areas of scientific research, whether in the physical, natural, or social sciences. Such reviews are also the basis of most research in the humanities. In fields such as history, the review of literature not only gives the scholar an understanding of previous work that has been done, but the results of the review actually provide the data used in the research. Historical studies in education, which we will discuss in a later chapter, are based almost entirely upon a careful study of existing printed knowledge in the field.

The review of the literature in educational research provides you with the means of getting to the frontier in your particular field of knowledge. Until you have learned what others have done and what remains still to be done in your area, you cannot develop a research project that will contribute to furthering knowledge in your field. Thus the literature in any field forms the foundation upon which all future work must be built. If you fail to build this foundation of knowledge provided by the review of the literature, your work is likely to be shallow and naive, and will often duplicate work that has already been done better by someone else. Although the importance of a thorough review of the literature is obvious to everyone, this task is more frequently slighted than any other phase of research. Research workers are always tempted to let a sketchy review of the literature suffice so that they can get started sooner on their own research project. However, you should make every effort to complete a thorough review before starting your research because the insights and knowledge gained by the review almost inevitably lead to a better-designed project and greatly improve the chances of obtaining important and significant results. Often the insights gained through the review will save as much time in conducting the project as the review itself required.

PURPOSES OF THE REVIEW

Although the general purpose of the review is to help you develop a thorough understanding and insight into previous work and the trends that have emerged, the review can also help you in reaching a number of important specific goals.
Delimiting the Research Problem

The review of literature can help in both limiting and more clearly defining your research problem. Many studies attempted by graduate students are doomed to failure because the researcher has not limited the problem to an area small enough and sufficiently specific to work with satisfactorily. Selecting a limited problem and treating it well is far better than attempting the study of a broad general problem and doing it poorly. Many graduate students also commit themselves to research problems before they have adequately thought them out. A fuzzy or poorly defined problem can sometimes result in the student collecting data and then learning that the data cannot be applied to the problem one wishes to attack. Before starting your review of the literature, do sufficient background reading from secondary sources to permit a tentative outline of your research problem. The review of the literature will then provide you with the knowledge you need to convert your tentative problem into a detailed and concise plan of action.

Seeking New Approaches

In the process of reviewing the literature, you not only should learn what work has been done but should also be alert to research possibilities that have been overlooked. The unique experience and background of a given individual may make it possible for that person to see a facet of the problem that other research workers have not seen. Such new viewpoints are likely to occur most frequently in areas where little research has been done, but even in well-researched areas someone occasionally thinks of an approach that is unique and creative. A good example is C. E. Thompson’s classic study of administration of the Thematic Apperception Test (TAT) to black subjects. Prior to this study, many clinicians were administering the standard TAT cards to clients regardless of racial background. Persons pictured on the standard TAT cards are white, and Thompson saw that the use of these cards with black subjects might well lead to different responses because of perceptual differences. In his research he developed a comparable set of cards in which blacks were substituted for whites in the TAT pictures and found that his hypothesis was correct. Although hundreds of research projects had been carried out using the TAT prior to Thompson’s work, his special insight led to a unique and valuable contribution to our knowledge of this important instrument.

Avoiding Sterile Approaches

In reviewing the literature, be on the lookout for research approaches in your area that have proved to be sterile. Not uncommonly, literature reviews will produce several very similar studies done over a period of years, all of which employ approximately the same approach and all of which failed to produce significant results. One or two repetitions of an unproductive approach can be justified on the grounds that these confirm the previous finding that the area is unproductive. Repetitions beyond that, however, serve no useful purpose and generally suggest only that the persons repeating the study have not done an adequate review of the literature.

Insight into Methods

The review of the literature can also provide insight into the methods, measures, subjects, and approaches used by other research workers and can thus lead to significant improvement of your design. A mistake many graduate students make when reading research reports is to give scant attention to anything but the results reported. Very often a study that has little to contribute in the way of results can help a great deal by suggesting methods and useful approaches. For example, discussions of the various measures used can help you decide which of these measures would be best suited for your own research. A sampling pattern discussed by one research worker can help other research workers in the field avoid the same difficulties, and insights into research methods gained in one study can help subsequent investigators design studies leading to more significant research findings.

For example, a study concerned with training in-service teachers to use specific classroom management skills found that although the teachers could be taught to use a set of three specific skills in one week of instruction and practice, their use of the skills was awkward and unnatural. The training program was revised and four weeks were added during which teachers did nothing but practice the skills they had learned earlier. This change resulted in much more effective teacher performance. The methodological insights gained in these studies would be useful to any researchers concerned with training teachers in classroom skills.

Recommendations for Further Research

The authors of research articles often include specific suggestions and recommendations for persons planning further research in the field. These suggestions should be considered very carefully because they represent the insights gained by the research worker after experience in the problem area. Specific research topics are often suggested that are particularly useful in helping you delimit the research problem.

Sampling Current Opinions

Although research reports make up the most important source of information that you should cover, you need also study newspaper accounts, nontechnical articles, and opinion articles related to your topic. Such articles occasionally contain unique ideas that can be tested through research and also help the research worker gain insight into those aspects of the problem area that are considered critical or controversial by educators. For example, a study of opinion articles in the field of ability grouping shows that most of the disputes among educators regard the possible effects of ability grouping on the child’s personality and social development. Yet nearly all the research reported in the field of ability grouping is concerned with the achievement of children in ability-grouped situations. These studies contribute valuable knowledge, but they have had little effect on the judgments of most educators. Only research that presents objective data concerning the variables that educators consider critical is likely to have any effect on their decisions to establish or support an ability-grouping program.

SCOPE OF THE REVIEW

Perhaps the greatest frustration encountered by graduate students carrying out their first review of literature is generated by their attempt to determine what they should and should not read. Unfortunately, no pat formulas exist that we can give to help you make this decision. Obviously you should read all those studies that are closely related to your research problem. The decisions that will cause you difficulty involve those studies that are only partially related to your problem, or that are related only to one phase of the problem.

Relatively new research areas usually lack an organized body of secondary-source information to provide general background and thus require a more stringent and broader review, in which even those studies that are only peripheral to the main area of your own problem should be read, to provide you with the foundation of knowledge you will require.
For example, suppose you are interested in the causes of "teacher burnout." Because widespread interest in this phenomenon is fairly new in education, you should probably read most of the studies in the broad area of "burnout" and occupational stress even if they are not closely related to your topic. An article that discusses ways to train teachers to cope with stress, for instance, although only peripheral to the causes of teacher burnout, should probably be checked. Studies that deal with the causes of burnout in other professional groups, such as nurses and social workers, should also be reviewed. In new research areas like this one, you may find no more than two or three studies that are very close to your topic. Your search must therefore be broader, to provide you with sufficient insight into your problem.

In more thoroughly explored areas, where research activity has extended over a longer period of time and where much of the early work is covered in secondary sources, you can usually develop adequate insight into your chosen field by reading only those studies that are closely related to your research topic. In such areas, much more information is available, and you can cover a narrower topic range in greater depth. A study in a more thoroughly explored area might, for instance, be concerned with the effectiveness of high school counseling in bringing about certain personality changes as measured by the Thematic Apperception Test (TAT). In this area, you would find studies that relate personality changes to counseling and involve the use of various personality instruments, and you should cover all of these. In addition, some studies using the TAT in other related research areas should be read; for example, studies involving changes in personality during psychotherapy. As the TAT is a well-established instrument that has been used in a great many research projects, you should not try to read all research involving its use, however. In fact, over 2,000 references dealing with the TAT have been listed in the Mental Measurement Yearbooks. Most of these would be of little value in carrying out the research described previously. Considerable background reading on the TAT in secondary sources, however, would be desirable.

CONDUCTING A REVIEW OF THE LITERATURE

Although a review of the literature is a preliminary step in all scientific research, the methods of conducting a review differ from field to field to some extent. The method that is described in detail in this section is one that works well in the field of education. This method has been developed over a number of years, and we advise you to follow it closely until you have built up sufficient experience to make intelligent adaptations.
Step One—Listing Key Words

In most sciences, abstracts or indexes are available that cover most material published in the science in question. In education, the most useful sources are Resources in Education, Current Index to Journals in Education, Psychological Abstracts, and Education Index. These sources are organized by subject. Therefore, you need to identify key words related to your topic, in order to look up these key words in the index to locate sources of information related to your topic. For example, let us say that you wish to search Education Index for studies related to the following question: What are student and teacher attitudes toward handicapped children in elementary mainstream classrooms? Your first step in reviewing the literature would be to make a list of key words that relate to this question. Your first list might include the following: Attitudes, Mainstream Classrooms, Mentally Handicapped Children, Emotionally Disturbed Children, and Learning-Disabled Children. This preliminary list of key words will almost certainly be incomplete and will be changed when the actual search of Education Index begins. It does, however, provide a starting point, and as many possible key words as you can think of should be listed in order to reduce the likelihood of important studies being overlooked. Key words for Resources in Education and Current Index to Journals in Education are contained in the Thesaurus of ERIC Descriptors, which is described later in this chapter. Key words for searching Psychological Abstracts are listed in the Thesaurus of Psychological Index Terms.

Step Two—Checking Preliminary Sources

References, such as indexes and abstracts, that are intended to help one identify and locate research articles and other primary sources of information are called preliminary sources. (See Annotated References for complete bibliographic data on preliminary sources described in this section.) Many of the preliminary sources that are likely to be of help to you in reviewing the literature in education and related fields are discussed in this section. We first discuss manual search procedures. However, some of these preliminary sources can be searched by computer. The procedure for conducting a computer search is described later in this chapter.

Education Index

Education Index provides an up-to-date listing of articles published in hundreds of education journals, books about education, and publications in related fields. Both an author and subject index are included, that is, each article is listed once.

4. Mainstream classrooms are those in which mildly handicapped children are placed in regular classrooms with nonhandicapped children for all or part of the school day.
under its subject and again under the name of the author. *Education Index* is published monthly, except for July and August. It lists only the bibliographical data concerning each article or book reference. The year for *Education Index* runs from September to the following June. For the current quarter each of the monthly issues must be searched, but these monthly issues are combined quarterly, and the quarterly issues in turn are combined in a yearly volume for the immediate past year. Most reviews of the literature in education cover a minimum of 10 years, but for some studies you may need to search a longer period. In this case, *Education Index*, which has been published since 1929, is especially valuable.

You should develop and follow a systematic method of searching *Education Index* for the period of the review. We have found that preparing a checklist of key words, such as that shown in Table 4.1, is an effective method for ensuring a systematic search. After preparing this checklist, start with the most recent issue of *Education Index* and look up each key word. In this process, be alert for other possible key words that you might want to add to your list to provide more complete coverage.

To check each key word in the Index, look up the word and read the titles of articles listed under it. If you find titles that indicate articles that deal with some phase of your topic, copy the bibliographical data (author, title, and source of publication) off a 3 x 5 index card. Use a separate card for each article or other reference. You may find it difficult to judge the contents of an article from its

**Table 4.1**

Sample of Checklist Used in Searching *Education Index*

<table>
<thead>
<tr>
<th>Key Words</th>
<th>Volume 12/86</th>
<th>9/86</th>
<th>Volume 36</th>
<th>Volume 35</th>
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</thead>
<tbody>
<tr>
<td>Attitudes, elementary school students</td>
<td>/</td>
<td></td>
<td>/</td>
<td>/</td>
</tr>
<tr>
<td>Attitudes, teachery</td>
<td>/</td>
<td></td>
<td>/</td>
<td>/</td>
</tr>
<tr>
<td>Attitudes toward the handicapped</td>
<td>/</td>
<td></td>
<td>/</td>
<td>/</td>
</tr>
<tr>
<td>Mainstreaming</td>
<td>/</td>
<td></td>
<td>/</td>
<td>/</td>
</tr>
<tr>
<td>Mentally handicapped children</td>
<td>N</td>
<td>N</td>
<td>N</td>
<td>N</td>
</tr>
<tr>
<td>Emotionally disturbed children</td>
<td>/</td>
<td></td>
<td>/</td>
<td>/</td>
</tr>
<tr>
<td>Learning-disabled children</td>
<td>N</td>
<td>N</td>
<td>N</td>
<td>N</td>
</tr>
<tr>
<td>Student opinion</td>
<td>N</td>
<td>N</td>
<td>N</td>
<td>Drop</td>
</tr>
</tbody>
</table>

* Indicates volume checked and bibliography cards made.
* Indicates volume contained no usable references under key word.
* This is a quarterly compilation covering October, November, December, 1986.
title, and many articles for which you prepare bibliography cards will later prove to contain nothing pertinent to your topic. In deciding whether or not to prepare a card and check a particular article, you should generally assume that it is better to check an article that proves useless than to overlook an article that may be important. Thus, when in doubt, prepare a card and check the article.

After checking titles under key words and making up bibliography cards, place a check on your checklist. If you have found nothing under a given key word after checking several volumes of Education Index, drop the word from your checklist.

In the above example, a review of several volumes of Education Index would suggest that some of the original key words are inappropriate, some are unproductive and can be eliminated, some do not fit the subject and must be changed, and some new ones must be added. Attitudes would be replaced by three more specific phrases: Attitudes, Elementary School Students; Attitudes, Teacher; and Attitudes Toward the Handicapped. Mainstream Classrooms would be changed to mainstreaming, and Mentally Handicapped to Mentally Handicapped Children.

'Student Opinion' would be added, as opinions are closely related to attitudes, and studies of student opinion may therefore prove relevant.

The revised list of key words is given in table 4.1.

**Psychological Abstracts**

Another valuable preliminary source in education is Psychological Abstracts. This reference, published monthly by the American Psychological Association, contains abstracts of articles appearing in over 1,000 journals and other sources in psychology and related areas. Every issue has 16 sections, each covering a different area of the field. The monthly issues also include brief subject and author indexes.

Sections that are most pertinent to research in education are Developmental Psychology, Psychometrics, and Experimental Psychology (Human). Coverage in these areas is very thorough, and many journals that are predominately educational, such as Elementary School Journal, Harvard Educational Review, and Journal of Reading Behavior, are covered. You should select key words for your Psychological Abstracts search from the Thesaurus of Psychological Index Terms, which you can find in the reference section of your library. Although this Thesaurus was not developed until 1973, the terms you select will, for the most part, be satisfactory for searching earlier volumes, for the Thesaurus includes most of the 800 index terms used before 1973. Always look up the index term bibliography in Psychological Abstracts; under this heading, you will find a listing of bibliographies on a wide variety of subjects. If you can locate a recent bibliography in your area of interest, it will be of great help to you in carrying out your review of the literature. We will discuss other sources for bibliographies later in this chapter.
11926. Pliner, Susan & Hannah, Mary E. (U Detroit) The role of achievement in teachers' attitudes toward handicapped children. Academic Psychology Bulletin, 1935(Win), Vol 7(3), 327-335. —Examined 83 elementary education teachers' attitudes toward 4 types of handicapped children (orthopedically impaired, visually handicapped, hard of hearing, and emotionally disturbed) as a function of the child's level of achievement. 83 were given descriptions of 2 children in each category, one achieving at grade level and one 2 yrs below grade level. 83 were asked to make placement decisions from a list of options. Unlike previous research that has reported negative attitudes on the part of teachers toward handicapped children, results indicate that teachers hold negative attitudes (as indicated by placements in more restrictive environments) toward this group only when the child's level of achievement is low. When achievement was at an acceptable level, teachers were positive (as indicated by placements in regular classroom with resource/consultant services) toward the handicapped. (19 ref) —Journal abstract.

Figure 4.1 Sample Entry

Two volumes of Psychological Abstracts are currently published each year, one covering the January to June issues and one covering the July to December issues. Separate volumes of subject and author indexes are published for each volume of abstracts. In using Psychological Abstracts, turn first to the subject index to check key words. The subject index volumes do not contain complete bibliographical data such as are found in Education Index but do provide 10 to 15 word descriptions of the subject. You will find a number after each of these brief descriptions. This number refers to the number assigned to the abstract. Write down the abstract numbers for all articles that appear to relate to your topic and then look these up in the abstract volume.

For example, in the April 1987 monthly issue (Vol. 74, No. 4) under "handicapped (attitudes toward)" we find six abstract numbers. A check of these abstracts produces the reference shown in figure 4.1.

Note that, in addition to the bibliographical data needed to locate the original article, the entry shown in figure 4.1 provides a brief but informative abstract. These abstracts are very helpful because they assist you in making a decision about whether or not a given article actually pertains to your research. This decision is much easier to make on the basis of an abstract than solely on the basis of the bibliographical data supplied in Education Index. After reading the abstract, decide whether the article is pertinent and, if it is, record the bibliographical data on your 3 X 5 card.

When the research topic is exclusively education, such as school lunch programs, little is gained from checking Psychological Abstracts. In areas relating to educational psychology, on the other hand, you may decide to check both

5. Note that the monthly issues for the current year are always searched first.
Psychological Abstracts and Education Index to be assured of getting full coverage in your field. When you use both these sources, check Psychological Abstracts first because of the advantage of an abstract over a bibliographical entry only. You may want to use a checklist like the one in table 4.1 in searching Psychological Abstracts as well.

The Cumulated Subject Index to Psychological Abstracts is also a helpful reference for the student who wishes to conduct an exhaustive long-term search. The initial volumes cover the years 1927 through 1960, which makes it possible for you to find all references on a given subject in one place, without searching 34 separate volumes. Two supplements cover the period from 1961 to 1969, and subsequent volumes cover three-year periods to the present. If you wish to search all references by a given author, a companion set of volumes, titled the Author Index to Psychological Index, 1894–1935 and Psychological Abstracts, 1927–1958, is also available. Supplements to the Cumulative Author Index are being published periodically to bring this reference up to date.

Educational Resources Information Center (ERIC)

ERIC, an acronym for the Educational Resources Information Center, was initiated in 1965 by the U.S. Office of Education to transmit the findings of current educational research to teachers, administrators, researchers, and the public. Two very useful preliminary sources are published by ERIC. These are Resources in Education (RIE) and Current Index to Journals in Education (CIJE). Although ERIC abstracts some of the same documents as Education Index and Psychological Abstracts, it includes many documents not abstracted by these services. For example, RIE provides abstracts of papers presented at education conferences, progress reports of ongoing research studies, studies sponsored by federal research programs, and final reports of projects conducted by local agencies such as school districts and Title III centers, which are not likely to appear in education journals. Thus, RIE will be valuable to the student in providing an overview of the most current research being done in education. In contrast, many of the studies currently referenced in Education Index and Psychological Abstracts were completed several years previously because of the time lag between completion of the study, publication in a journal, and abstracting by the service.

ERIC provides a variety of services to the researcher through its central office and 16 clearinghouses. Each clearinghouse is responsible for cataloguing, abstracting, and indexing relevant documents in its subject area. In addition, each clearinghouse publishes its own newsletters, bulletins, and bibliographies. We suggest that you write to the clearinghouse in your area of interest to obtain information that may help you in locating pertinent research literature and in planning your study. The addresses of the 16 clearinghouses can be found in Appendix A.
The abstracts prepared by each clearinghouse appear in the monthly ERIC publications RIE and CIJE. RIE includes approximately 1,000 document abstracts in each issue, classified by subject area, institution, and accession number. To use Resources in Education, first select key search terms in your area of interest. To assist the user in identifying search terms, ERIC has published a Thesaurus of ERIC Descriptors, which lists all terms used to classify ERIC documents by subject; for a given subject area, it provides synonyms, narrower terms, broader terms, and related terms. For example, the general search term "dropouts" is further analyzed into such terms as "high school dropouts," "potential dropouts," "dropout identification," and "dropping teaching."

After selecting the appropriate descriptors, search the subject index in the monthly issues of Resources in Education for the current year and in the semiannual index volumes for previous years. When you locate a reference in the subject index that relates to your topic, copy the ED number given at the end of the bibliographical data. Then look up each ED number in the Document Résumés section, where you will find a description of the reference such as the sample entry shown in figure 4.2. Notice in this figure that the Document Résumé contains a great deal of useful information in addition to the usual brief abstract.

If you wish to obtain the full document that is abstracted in the entry, you can order it through the ERIC Document Reproduction Service. A Reproduction Service price is listed in the Document Résumé for each entry. If you need an RIE document quickly, you can order it by computer using the ORBIT or DIALOG systems, which are available through most university libraries. See a current issue of RIE for detailed instructions. Whether you order by mail or by computer, the document can be ordered on microfiches, which are small sheets of microfilm, each containing up to 60 pages of text, or in hard copy form at about 70 percent of the document's original size. The advantages of microfiches are their low cost and small size; however, they require a special microfiche reader, which enlarges the image to normal page size. Most libraries now have these special readers. Most university libraries also maintain a collection of ERIC microfiches, so you needn't order them through the Reproduction Service unless you want a personal copy.

Since 1969 ERIC has also published CIJE, which indexes nearly 800 education journals and journals in related fields and includes more than 1,000 articles each month. Like RIE, CIJE is published monthly and cumulated semiannually. The monthly numbers contain a subject index, an author index, and a main entry section. First, select descriptors related to your topic from the Thesaurus of ERIC Descriptors and, then, search the subject index and note the relevant ED reference numbers. Then look up these numbers in the main entry section, which provides the same information as is given in the Document Résumés in RIE. Compared with Education Index, CIJE has the advantages of a more comprehensive index (based on the Thesaurus of ERIC Descriptors), multi-
disciplinary journal coverage, and abstracts of the articles indexed. *Education Index* covers a much longer time span of journal publication (1929 to date) than does *CJE* (1969 to date).

For most educational topics, the most productive strategy for conducting an exhaustive review would probably be to search RIE and *CJE* for the years 1969 to
date, search RIE and Education Index for the years 1966 to 1968, and then search Education Index from 1965 back as far as you plan to extend your review. The typical literature review for a thesis or dissertation, however, focuses primarily on the most recent 10 years.

Other Useful Preliminary Sources

Several preliminary sources are useful for locating certain kinds of information needed in some literature reviews or for searching specific subject areas. Those that are often useful to the researcher in education are described below.

The Citation Indexes

Let us suppose that in the course of your review of literature you have located two or three key references that were published several years ago. It is often very useful if you can trace the effects of these earlier works on subsequent research. Also, if your review has uncovered a controversial article, you can gain valuable insights by reading what later authors say in support or opposition. An easy way to locate later works that have cited such an article is to look up each key author in Science Citation Index (SCI) or Social Science Citation Index (SSCI), depending on the field of study: SCI covers the literature of Science, Medicine, Agriculture, Technology, and the Behavioral Sciences; SSCI covers literature of the Social, Behavioral, and Related Sciences. Articles in psychology are cited in both indexes, but work in education is most likely to be cited in SSCI.

You would start your search of SCI or SSCI with the year the key reference was published and check all volumes up to the current one. Under the name of the author of the key reference with which you are concerned you will find bibliographical data for all sources that have cited the key reference. For example, Arthur R. Jensen’s famous article from the 1969 Harvard Educational Review entitled “How Much Can We Boost I.Q. and Scholastic Achievement?” was cited in two articles in the 1986 volume of SCI. In checking SSCI for 1986 we find 20 articles listed that have cited the Jensen article, reflecting the heavier behavioral science coverage. A review of these articles would give you a clear picture about current thinking regarding this controversial topic.

In using these indexes you should check each author’s name with both given initials, only the first initial, and no initials; for example, Jensen, A. Jensen, as well as A. R. Jensen. If an author cites the article as by A. Jensen, that is the way it will be listed in the Index. In compiling the Indexes, the A. Jensen citations are not combined with the A. R. Jensen citations, even though, since the same article is cited, they are obviously the same man. In SSCI for 1986, the Harvard Educational Review article is cited once under “A. Jensen,” once under
"Jensen," and 18 times under "A. R. Jensen." If we wanted to check all articles that had cited Jensen's 1969 article, we would, of course, have to check SCI back to 1969, and SSCI back to its beginning in 1973.

National Technical Information Service (NTIS)

There is a considerable lag between the time a research project is completed and the time it is indexed in the preliminary sources, such as Psychological Abstracts. If a researcher wants information on recently completed and ongoing research projects in an area of interest, NTIS is the best preliminary source available. To use NTIS, see the section of this chapter dealing with computer searches.

Literature Related to Measures

Because all research involves measurement, you often need to obtain information on educational measures that are relevant to your own research, or are reported in the research of other investigators. Two widely used sources are described below:

Mental Measurements Yearbooks

The Mental Measurements Yearbooks are very valuable if you wish to locate articles related to published tests that you are considering for use in your own research. In addition to providing bibliographies, the yearbooks also print critical reviews of many of the measures listed.

Test Critiques

Test Critiques, in seven volumes, have attempted to provide information on the most widely used psychological, educational, and business tests. Over 700 tests are reviewed in these volumes and additional volumes are expected. Each test has been reviewed by a specialist knowledgeable about tests in the area. The reviews are quite detailed, averaging about six pages in length. A typical review starts with an Introduction, which contains a detailed description of the measure; a Practical Applications section, which includes information on appropriate subjects, administration, scoring, and interpretation; Technical Aspects such as validity and reliability are then covered and finally an overall critique is provided. There are four indexes: Test Titles, Test Publishers,

6. The most recent, The Ninth Mental Measurements Yearbook (1985), is published by the Buros Institute of Mental Measurements at the University of Nebraska. Many published measures have been in use for several years and are reviewed in earlier editions of the Mental Measurements Yearbook.
Authors-Reviewers, and Subject. The indexes in Volume 7 cover the tests reviewed in all seven volumes. These two sources as well as other references to educational and psychological measures will be discussed in greater detail in a later chapter.

Abstracts and Indexes in Content Areas Related to Education

Child Development Abstracts and Bibliography covers articles in this area that are drawn from over 170 publications in medicine, psychology, biology, sociology, and education. Each issue includes abstracts under six major subject headings, as well as an author index and subject index. These are combined into annual volumes.

Sociological Abstracts is published five times each year. Journals dealing mainly with sociology are fully abstracted, whereas those concerned with related areas such as anthropology, education, and political science are abstracted selectively. Each issue contains subject, author, and source indexes in addition to abstracts that are similar in format to Psychological Abstracts. The subject index is also similar to Psychological Abstracts, listing the abstract numbers for each citation after a brief description of about 10 to 15 words.

Exceptional Child Education Resources (ECER) have been published quarterly since 1969 by the Council for Exceptional Children. More than 200 journals are regularly searched for material concerning exceptional children. The format is similar to that used in Current Index to Journals in Education since the Council operates the ERIC Clearinghouse on Handicapped and Gifted Children. However, many journals searched for ECER are not covered by CJE. Each issue contains subject, author, and title indexes, and the final issue each year contains indexes for the entire volume.

State Education Journal Index has been published twice a year since 1963. This is a subject index that provides bibliographical data on articles published in over 100 state education journals, such as Alabama School Journal, California School Boards, and Oregon Education. This index focuses on periodicals not covered in other indexes such as Education Index. Very brief annotations are provided for articles with misleading titles. The journals indexed cover a wide range of educational subjects but are probably most useful for topics of state concern such as federal aid, collective bargaining, state education agencies, and teacher certification.

Business Education Index is a combined author-subject index of articles in the field of business education published annually since 1940. Articles from about 60 periodicals are indexed along with the books and some theses relevant to business education.

Educational Administration Abstracts have been published since 1966. There are four issues a year. Approximately 140 journals containing articles related to educational administration are reviewed and abstracted. Abstracts are classified into 42 content areas. An author index and journal index are included in each issue, but no subject index is provided. A listing of recently completed dissertations in educational administration is generally included in each issue.

Physical Education Index has been published quarterly since 1978. It is a subject index covering about 170 periodicals, both domestic and foreign, that deal with physical education and related topics.

Bibliographies and Reviews of Research Literature

Recently, the improved procedures developed by Gene Glass and others to pull together research evidence have stimulated interest in literature reviews. If you can locate a recent review of literature related to your research topic, you can get a useful overview with little effort. The quality of such reviews varies, however, and you should look at reviews critically before accepting the conclusions of the reviewer. J. T. Guthrie provides some useful guidelines for evaluating review articles. Gregg Jackson's analysis of 36 randomly selected review articles can also be a help to students who want to know more about this topic.

Bibliographic Index

An early step in searching preliminary sources is to consult Bibliographic Index, a subject list of bibliographies that have been published separately or as parts of books or journals. About 2,600 periodicals are regularly searched for bibliographic materials. The format is similar to the Education Index except that only references which contain a bibliography of 50 or more citations are listed. If the bibliography is annotated, the abbreviation "annot" is given. If you can locate a recent annotated bibliography on your topic, you will save much of the labor of searching the preliminary sources.

Review of Educational Research

Review of Educational Research is published quarterly by the American Educational Research Association. A typical issue contains five to seven critical, integrative reviews of research literature bearing on important topics and issues. Recent issues have reviewed research on such topics as educational objectives, teacher

8. See chapter 5 for a discussion of techniques for integrating research findings.
decisions, college teaching, and student ratings of instruction. Each article includes an extensive bibliography. Graduate students should check the most recent five years of this journal to see if a review has been published in their area of interest. If so, the relevant review and bibliography will give you an excellent start on your own search of the literature.

Review of Research in Education

The purpose of the Review of Research in Education is to present critical essays that survey and synthesize research in important problem areas. The first volume in this annual series was published in 1973 and contains nine essays in the areas of Learning and Instruction, School Organization, History of Education and Research Methodology. Subsequent volumes have covered such topics as Child Development and Educational Intervention, Economics of Education, Comparative Education, Teacher Effectiveness, and Application of Cognitive Psychology to Education. Essays are written by leading educational researchers and provide thorough and perceptive overviews of the areas covered.

Encyclopedia of Educational Research

The fifth edition of the Encyclopedia of Educational Research, a monumental work, became available late in 1982. This is perhaps the best single source of information on educational research currently available. The four volumes are organized into 19 major topics ranging from Agencies and Institutions Related to Education to Teachers and Teaching. The 317 contributors are among the nation’s leading educational researchers. The student planning a review of the literature should start by reading relevant entries in this encyclopedia.

The International Encyclopedia of Education: Research and Studies

The International Encyclopedia of Education: Research and Studies consists of nine volumes containing 1,448 articles in over 5,600 pages, plus a volume of indexes. In the first nine volumes entries are listed alphabetically by subject. A typical entry will contain about four pages including a brief bibliography. Students interested in a given topic should first consult the subject index. A check of the Classified List of Entries is also recommended. The index volume also contains a List of Contributors, that is, persons writing the entries, and an author index, that is, all authors cited in the articles.

This important work is truly international, with contributors from virtually every country in the world, and coverage of most of the world’s major educational journals. There is also an article for virtually every country, which describes its educational system. For example—a three-page article on Vanuatu and a four-page article on Trinidad and Tobago are included.
Educators' Handbook—A Research Perspective

Educators' Handbook—A Research Perspective is designed to provide teachers and administrators with a practical review of educational research in which the technical aspects of research methodology are deemphasized. Each of the 25 chapters is written by educational researchers with research experience in the chapter topic. An extensive bibliography is included in each chapter. The book is divided into five sections: What Should I Teach?, How Should I Teach It?, What Should I Know About My Students?, The School, and Professional Issues.

NSSE Yearbooks

The yearbooks of the National Society for the Study of Education (NSSE) contain major overviews of important educational topics. Recent yearbooks have been concerned with such topics as classroom management, adolescence, microcomputers in education, and social studies. Each yearly volume consists of two books dealing with different major areas of education. The typical book contains 10 to 12 chapters concerned with different aspects of the topic. Chapter authors, who are recognized authorities, attempt to give a clear picture of the state of knowledge in the field by focusing on a few major research, and theoretical articles. Exhaustive bibliographies, such as are found in the Review of Educational Research, are usually not included in the yearbooks. However, if your area of interest has been the focus of a recent yearbook, you may find an excellent overview of important research findings, current approaches to studying the topic, and the thinking of leaders in the field.

Handbook of Research on Teaching, Third Edition

The Handbook of Research on Teaching, Third Edition, contains excellent reviews of virtually every aspect of research on teaching. The 35 chapters are organized under five major areas that deal with Theory and Method of Research on Teaching, Research on Teaching and Teachers, The Social and Institutional Context of Teaching, Adapting Teaching to Differences Among Learners, and Research on the Teaching of Subjects and Grade Levels. The chapters are written by recognized authorities, and each includes a very comprehensive bibliography. Reading the chapters related to one’s topic provides an excellent introduction to the literature for any student who plans to do research on teaching.

Annual Reviews of Psychology

The Annual Reviews typically contain several chapters that deal with areas of psychology such as counseling psychology, attitudes, and human learning that are pertinent to many educational research topics. An annual volume usually
consists of approximately 20 chapters. Each chapter deals with recent research in one topic of psychology and includes an extensive bibliography covering important work in that area. An author index, subject index, and cumulative indexes are included in each volume. Students interested in problems related to some aspect of psychology should check the most recent five volumes for reviews pertinent to their work.

Preliminary Sources Covering Theses and Dissertations

Because many theses and dissertations are never published, a check of the following is necessary for a thorough coverage of the research literature.

Dissertation Abstracts International

_Dissertation Abstracts International (DAI)_ is a monthly compilation of abstracts of doctoral dissertations submitted by nearly 400 cooperating institutions, mostly in the United States and Canada but also including a few institutions from other countries. It has been published in various forms since 1938 when it first appeared as _Microfilm Abstracts_. At present there are three sections: Section A contains dissertations in the humanities and social sciences including education; Section B covers the sciences (including psychology) and engineering, and Section C publishes abstracts of doctoral and postdoctoral dissertations accepted at European institutions. The abstracts within each issue of Section A are organized into 32 major content areas, one of which is Education. There are 35 subtopics under the Education content area such as "adult," "art," "higher," and "teacher training." Students interested in checking dissertations in one of these subtopics of education should check the table of contents to locate pages containing relevant abstracts.

Each monthly issue also contains a keyword title index in which the bibliographic entries are classified and arranged alphabetically by important key words contained in the title. To search a specific topic check the key word title index to locate relevant abstracts. For example, a student who is interested in the social development of preschool children could check "social," "development," and "preschool" in the key word title index; read the titles listed under each key word; and copy the page numbers for abstracts related to her topic. The student would then read each of the selected abstracts. Abstracts in education vary in length up to a full page and usually give a good coverage of the essentials of the dissertation. Any dissertation covered in Dissertation Abstracts International may be purchased from University Microfilms International on either microfilm or Xerox, the order number being given at the end of the abstract.
Comprehensive Dissertation Index

The Comprehensive Dissertation Index provides a subject and author index covering virtually every doctoral dissertation accepted in U.S. and Canadian universities from 1861 through 1972, a total of nearly a half-million entries. More than 86,000 of the entries are in the area of education. Since 1972, yearly supplements have been published to keep the Index up to date. A 10-year cumulation for the years 1973–1982 has also been published, which is somewhat easier to use than the annual supplements. This reference source would normally be used in conjunction with Dissertation Abstracts International. First check the subject index and note the bibliographical data on any dissertations that appear related to your topic; as well as the volume and page of DAI on which the abstract of a given dissertation can be found. Once you have recorded this information on all relevant dissertations, read the abstracts. The final step is to obtain microfilm copies of any dissertations that are sufficiently important so that they can be studied in detail.

Master's Theses in Education

Master’s Theses in Education has been published annually since 1951. Master’s theses are listed under about 40 major educational topics covered in the table of contents, such as Achievement and Progress, Adult Education, Delinquency, and Higher Education. Only the author, title, and institution are given. The coverage is quite complete, however, listing nearly all institutions in the United States and Canada that offer master’s degrees in education. Earlier volumes contain an Author Index, a Subject Index, and an Institutional Index in which theses written at a given institution may be located. However, since 1980, only the Institutional Index is included. Any theses that appear to be very closely related to your proposed topic may be obtained through interlibrary loan.

Masters Abstracts International

Master’s theses available from University Microfilms International, about 1,500 per year, starting in 1962, are summarized by their authors in Master’s Abstracts. Entries are grouped by field of study and indexed by key words and author names. There are subtopics under Education that cover most major educational areas. Scan the table of contents to locate areas related to your interests.

Preliminary Sources Covering Periodicals and Newspapers

Education is a topic of wide general interest, and as a result much is written about it in popular magazines and newspapers. If your research topic is in an area that has received public attention, the following sources should be checked.
Reader’s Guide to Periodical Literature

The Reader’s Guide, published in New York by H. W. Wilson Co., 1900 to date, is an author and subject index similar in format to Education Index but covering general and nontechnical periodicals published in the United States. The magazines that are indexed change from time to time because the aim is to maintain a good subject balance and to overlook no major field rather than provide exhaustive coverage. At present about 200 magazines are being indexed. Reader’s Guide is an excellent source for studying the layperson’s views on education. Because many of the magazines covered have wide circulation, their influence upon public opinion can be significant.

Social Sciences Index

Published in New York by H. W. Wilson Co., 1974 to date, the Social Sciences Index is an author and subject index that covers approximately 350 English-language periodicals in the social sciences, including many foreign publications. It is a good source of references concerning how education is viewed by social scientists in fields such as anthropology, economics, environmental science, law, medical science, and sociology.

The New York Times Index

Published from 1851 to date, the New York Times Index provides an index of news printed in the New York Times. It is primarily a subject index but is extensively cross-referenced; it is also referenced by the names of persons covered in news stories. Brief summaries of most articles are given, along with date, page, and column of the issue in which the story may be found. This index is an excellent source of current information about education and permits studying the development of educational issues and events that could not be traced as accurately through any other source. We recommend you look up some current topic that interests you, such as federal aid to education, school building programs, or racial integration, in order to get some insight into the value of this index as a source of educational information. Most university libraries have the New York Times on microfilm, so searching this source is fairly easy once relevant articles are located in the Index.

Facts on File

Facts on File, Inc., published in New York from 1941 to date, summarizes news reported in more than 50 foreign and U.S. newspapers and magazines. This is a weekly digest of world news that is indexed twice monthly. Indexes are
cumulative through the year. The weekly digests are combined into a yearbook along with an annual index. Material from newspapers, magazines, broadcasts, government reports, and so forth are processed daily to produce the weekly digest. Material is indexed by subject and names of persons appearing in the news. Date of the event, page, and location on page in the digest section of the yearbook are given. Because the yearly index and weekly digests are bound together in one volume, Facts on File permits the student to locate and read summaries of important educational news stories without going to another source. It is much easier to use than The New York Times Index, but coverage is less thorough.

Sources of Information on Educational Materials

In planning a research project researchers are often interested in locating curriculum materials or educational products that will be useful in their research. Many graduate students carry out studies in which two groups of pupils are trained using different instructional programs and materials in order to determine which results in greater gains in pupil achievement. For example, comparisons between different first-grade reading programs or conventional versus "new" mathematics programs are often conducted and can make a useful contribution since they provide evidence that can be used by educators to help make curriculum decisions.

Because the review of literature must often be concerned with locating educational materials that can be employed in research, this section briefly describes several major sources of information that index such materials. If you fail to locate needed materials in these sources, you will find other catalogues and indexes of educational materials in the reference section of your college library.

NICEM Indexes

Published in Albuquerque, New Mexico, by Access Innovations, Inc., with current volumes dated from 1980 to 1985, NICEM Indexes (The National Information Center for Educational Media) contains a set of indexes that lists audiovisual educational materials in eight nonbook formats such as educational films, film strips, audiotapes, videotapes, slides, and overhead transparencies. Each index includes a subject guide, an alphabetical guide by title, and a producer-distributor code so that the reader can determine what items are available in his area of interest and where they may be obtained. A very brief description of each entry is included in the alphabetical guide.
Audio Video Market Place

Published annually in New York by R. R. Bowker, *Audio Video Market Place* covers about 4,500 producers of audio visual learning materials. Entries include name of organization, address, phone number, name of one or more executives and list of products, services, or interests. There is an alphabetical index.

Educators' Guide to Free Films (and others as listed below)

From Educators Progress Service in Randolph, Wisconsin, *Educators' Guide to Free Films* is published annually. This series of guides covers free films, filmstrips, guidance materials, science materials, social studies materials, teaching aids, audio and video materials, and health, physical education, and recreation materials. They are revised annually, and because a large percentage of the items listed change from year to year, you need to refer to the latest edition. The guides usually include brief descriptions and are indexed by title, subject, and source.

Many indexes and guides to educational materials are listed in *The Directory of Directories*. The latest edition to this guide should be checked for new sources of educational materials and for specialized sources not described in this chapter.

Educational Film Locator

*Educational Film Locator*, published in New York by R. R. Bowker in 1980, contains annotations and complete bibliographic data on over 40,000 films available from the Consortium of University Film Centers.

The Educators' Handbook of Interactive Videodiscs

*Educators' Handbook of Interactive Videodiscs* is a comprehensive list of videodiscs for educators.

The Elementary School Library Collection, 15th edition


11. See the Annotated References at the end of this chapter.
Conducting a Computer Search

In a comprehensive review of the literature, a computer search can be used to accomplish step 2 of the manual search process; that is, checking preliminary sources. You must still read the references that you select from the computer search, and you should make notes following essentially the same procedures described in this chapter. This work, however, is made easier because computer searches often provide printouts of abstracts; these belong to you and can be used to reject references that are not close enough to your topic to be read. If you receive a computer printout of your search, the bibliographical data and abstracts of the articles you plan to read can be cut out and pasted onto note cards, and you are thereby saved the effort of copying this information from a preliminary source. In many cases you will have to make additional notes when you read the reference to supplement the abstract obtained in the computer search, but the savings in time will still be significant.

A manual search of preliminary sources is a dull, time-consuming activity that the computer can carry out in a matter of minutes at low cost. Most of the computer search services described in this chapter mail the computer printouts shortly after the on-line search is completed so you usually receive them within ten days or less. For searches that involve only a few references, a printout may be obtained immediately from the terminal at which you are conducting the search. This procedure, however, becomes expensive for long searches since it greatly increases the time that the terminal is connected to the computer, that is, on-line time.

Manual searches are difficult to conduct for problems that involve several concepts that must all be present in a reference in order to fit the researcher’s needs. For example, a problem such as “the effects of television violence on the aggressive behavior of preschool children” involves four major concepts: television, violence, aggression, and preschool children. In a manual search, you would have to search at least one of these concepts (e.g., television) very thoroughly and then read the abstracts or the articles themselves to find references in which the other three concepts are also present. The computer can search designated preliminary sources in a matter of seconds to locate references in which all four concept terms are present.

Where Can You Have a Computer Search Conducted?

Many universities have terminals that link them to one of the information retrieval systems such as DIALOG Information Services, or the SDC/ORBIT system. You should visit the reference section of your library and see if a terminal is available. If not, many organizations provide computer searches of ERIC, which includes RIE and CJE and is probably the most useful single data
base for researchers in education. Having an on-line terminal available speeds up the computer search process, permits you to check the number of relevant references and to get other information that will usually result in a better search. If an on-line terminal is not available, commercial information retrieval services provide order forms on which you can list your problem, descriptors, and other information. These forms are then mailed to the service center where the information is fed into the computer and the search is carried out.

The cost of a computer search varies with the service used, the data base searched, and the length of the search. On-line computer time ranges from about $30 to $120 per hour, while the cost of printouts of the selected citations ranges from 10 cents to 35 cents for each citation. Careful planning of the search is essential in order to keep on-line computer time to a minimum. It is usually advisable to go over your search strategy with the person who operates the terminal before going on-line. A typical ERIC search on the Lockheed DIALOG system including a printout of 200 abstracts that is mailed to you will cost about $35.

The ERIC data base is also available on compact disc. We anticipate that many university libraries will purchase these discs, which should further reduce the cost of conducting searches.

In addition to ERIC, many other data bases can be very useful for reviewing literature on research problems. For example, there are currently more than 140 data bases available in the DIALOG system. A few of those most relevant to behavioral science research are listed below.12

Exceptional Child Education Resources (ECER) (1966 to present) focuses on the education of handicapped and gifted children. References are indexed using ERIC descriptors. This data base covers published and unpublished literature and is a valuable supplement to ERIC since only about one-fourth of the ECER citations are duplicated in ERIC. Information can be obtained from the Council for Exceptional Children, 1920 Association Drive, Reston, VA 22091.

PsycINFO (1967 to present) is essentially the computer form of Psychological Abstracts. The data base covers the world literature in psychology and related behavioral sciences. References are indexed using the Thesaurus of Psychological Index Terms. Many of the descriptors in this thesaurus differ from the ERIC descriptors. Check to see which descriptors best fit your problem. You may want to search both data bases. For further information contact the American Psychological Association, 1200 Seventeenth Street NW, Washington, DC 20036.

PsycALERT is a companion file to PsycINFO. It provides full bibliographic data for all material subsequently included in PsycINFO. Items are entered in

12. For a complete list of data bases available in DIALOG, check the most recent Database Catalog published by DIALOG Information Services.
PsyC ALERT very promptly and thus this file is useful for searching the most recent sources. Once complete data have been prepared, an item is transferred to PsyCINFO and dropped from PsyC ALERT.

Dissertation Abstracts On-Line (1861 to present) is based on materials from Dissertation Abstracts International and American Doctoral Dissertations. It is a definitive, subject, title, and author guide to virtually every American dissertation, thousands of Canadian dissertations, and many from institutions abroad. Abstracts are included for most dissertations completed after January 1980. You may search this source using DIALOG or use the DATRIX system by obtaining an order form from University Microfilms, 300 North Zeeb Road, Ann Arbor, MI 48106. List key words and other information about your topic, mail your order form, and you will receive a printout giving the title, author, degree date, and university for each reference. The issue and page reference in Dissertation Abstracts International (DAI) is also given if the dissertation has been abstracted.

For dissertations completed before 1980, you must locate the abstracts you need to read in DAI.

Federal Research in Progress data base provides access to information on ongoing and recently completed federally funded research projects in all fields, including the behavioral sciences. Data for each project typically include project title, funding organization, performing organization, principal investigator, period covered, funding level, and a brief summary of the work to be performed. This information can be useful in avoiding duplication of research effort, learning about current work, and locating possible funding sources for similar work. For further information contact the National Technical Information Service, 5285 Port Royal, Springfield, VA 22161.

In addition to the aforementioned, there are many data bases in the DIALOG system that are occasionally useful to researchers in the behavioral sciences. Among these are:

- **A-V ONLINE** gives a comprehensive coverage of nonprint educational material such as films, filmstrips, audio tapes, and phonograph records. File currently contains nearly 400,000 items.
- **Child Abuse and Neglect** (1965 to present) contains more than 15,000 records related to this topic.
- **Magazine Index** (1973 to present) provides a very broad coverage of general magazines. Over 435 popular magazines are covered.
- **Medline** (1966 to present) is produced by the U.S. National Library of Medicine. It currently contains over 5.2 million records and is a major source of biomedical literature. This data base is often useful to students doing research in physical education.
- **Mental Health Abstracts** (1969 to present) covers worldwide information related to mental health. Sources include over 600,000 records from 1,200 journals published in 41 countries.
- **National Newspaper Index** (1979 to present) indexes virtually everything.

NEVSEARCH (current month only) is a daily index of more than 2,000 news items from over 1,700 newspapers and other news sources. It is an excellent source for current news.

SOCIAL SCISEARCH (1972 to present) indexes every significant item from the 1,500 most important social science journals throughout the world plus selected items from 3,000 additional journals. Based on Social Science Citation Index.

Sociological Abstracts (1963 to present) covers the world’s literature in sociology and related disciplines. Covers more than 1,200 journals and other sources.

Steps in Conducting an On-Line Computer Search

The following steps have been carried out using the DIALOG system as an example. This system contains the data bases that are usually the most important for educational research problems. The same procedure can be used, with some adaptation, for conducting on-line searches with other systems.

1. Define research problem. To conduct a successful search you must write a short but precise statement of your research problem or topic. If your description is too general your search will probably produce a great many items that are not closely related to your problem and that will increase the cost. A statement such as “the academic self-concept of handicapped children in the elementary school” describes the researcher’s interest in a few words and is written in terms that will help focus the search, such as handicapped, self-concept, elementary. In contrast a topic such as “the self-concept of schoolchildren” is not precise enough to describe a viable research problem.

2. State specific purpose of search. Literature searches are conducted for several reasons. You should think through the precise purpose of your search since you will use different approaches for different kinds of searches.

Most searches are conducted as part of an exhaustive review of literature to be included as part of your thesis or dissertation. This kind of review must be very sharply focused but usually should include all relevant references for the past 10 years. All relevant narrow descriptors are chosen when possible, and the computer is instructed to locate references that contain combinations of descriptors, which further narrows the search. How narrow your search should be is determined partially by your topic, as discussed earlier in this chapter.

The computer can also be useful in assisting in a preliminary review of literature conducted to locate possible research problems. A computer search can locate recent references in your area of interest; these in turn can assist in limiting and better defining the problem. Usually such searches use broader descriptors and fewer combinations of descriptors since you have not yet settled on a narrow problem. To avoid getting very large numbers of references, it is
advisable to instruct the computer to select only the 10 to 30 most recent references for each descriptor or descriptor combination.

Computer searches can also be helpful in updating a review of literature. It is not uncommon for graduate students to take two or three years after completing the review of literature to complete a research project and write their thesis or dissertation. By this time the review will be somewhat out of date. Using the same descriptors employed in the initial search, you can update your review by instructing the computer to select only those references published since your initial computer search was conducted.

3. Select data base. The next step is to select one or more data bases that are most relevant to the research problem. For most educational studies a search of the ERIC database will produce most of the relevant literature. For the self-concept problem given as an example above, a search of Exceptional Child Education Resources and Psychological Abstracts, both of which are also available in the DIALOG system, could be added to ERIC to give a more complete coverage or could be used instead of ERIC.

4. Select descriptors. Using the procedures prescribed for your data bank, select the descriptors, index terms, or key words (all synonymous terms) that best describe your problem in terms the computer will accept. Remember that the exact terms used in indexing the materials into the system must be used. If you spell a descriptor incorrectly or make some similar error such as adding an s, the computer will not recognize the descriptor and will report no references.

Using the Thesaurus of ERIC Descriptors 11th Edition we would locate the descriptors that would fit our study of “the academic self-concept of handicapped children in the elementary school.” First we would find that there is no descriptor for academic self-concept. Instead, we find self-concept and self-esteem, both of which seem to fit our topic. Since there is no source available that gives precise definitions of the ERIC descriptors, we have no way of knowing how a reviewer decides to use one of these descriptors or the other. In this case it is best to include both in our search and to instruct the computer to select articles that use either. We also find two broad descriptors that could be used for handicapped schoolchildren. These are handicapped children and handicapped students. However, we find that both of these broad descriptors are listed as “invalid” descriptors, which means they are no longer used to describe current sources. We are advised to use the broad descriptor “disabilities” or preferably select more narrow descriptors that identify the specific disabilities we are most interested in. When we check the list of more narrow terms (NT) under “disabilities” we find learning disabilities and mild mental retardation. We decide that these are the two groups we are most interested in. Our final descriptors are elementary school students and elementary education.13

13 In the ERIC system the reviewer must include an “educational level” descriptor. The appropriate mandatory descriptor for our example would be elementary education. Although elementary school students better fits our problem it is advisable to use both since some reviewers will use the mandatory descriptor in place of elementary school students.
If we decide to use the Psychological Abstracts data base instead of ERIC, we would find the following in the Thesaurus of Psychological Index Terms, Fifth Edition: self-concept, self-perception, self-esteem, educable mentally retarded, learning disabilities, and elementary school students. Note that, although similar, these index terms are not identical to our ERIC descriptors.

5. Plan the computer search. In planning your search it is usually best to start with combinations of descriptors that produce references that precisely fit your needs. Descriptors may be combined using and and or. For example, using the six ERIC descriptors: (1) self-concept, (2) self-esteem, (3) learning disabilities, (4) mild mental retardation, (5) elementary school students, and (6) elementary education we can instruct the computer to select references having the following combination of descriptors:

\[(1) \text{Self-Concept} \quad \text{or} \quad (3) \text{Learning Disabilities} \quad \text{or} \quad (5) \text{Elementary School Students} \quad \text{and} \quad (2) \text{Self-Esteem} \quad \text{or} \quad (4) \text{Mild Mental Retardation} \quad \text{or} \quad (6) \text{Elementary Education}\]

For the computer, we would print this combination as (1 or 2) and (3 or 4) and (5 or 6). This asks the computer for any reference that includes a combination of either self-concept or self-esteem and either learning disabilities or mild mental retardation and elementary school students or elementary education. Notice that or connections tend to increase the number of references selected since there are more references that have one descriptor or the other than have either by itself. But and connections tend to reduce the number of selections since only references that have all the descriptors connected by-and would be selected. We have limited the three sample searches described below to a few descriptors. A far more complete search may be achieved if more descriptors are selected and sets of related descriptors are connected with or. This procedure is illustrated in figure 4.3.

Our search of the above combination produced 74 references, which indicates that our search was satisfactory for a typical thesis review. Often, when three or more descriptors are connected with and, the search will produce very few references, although the few produced will be on target.

You will recall that for research topics on which much work has been done, a narrow search is called for, whereas for topics on which little has been done the search must cover a broader area. In our example, if our initial search had been too narrow, we could have broadened it by removing the grade-level descriptors, that is, elementary school students and elementary education. When we ask the computer for references having (1 or 2) and (3 or 4), we find that there are 342 references. This search would produce many references that would not be relevant, but would also produce some that could provide valuable background information. In most cases a search that produces 342 references is too broad.
In order to provide more insight on how the various databases are related, we then repeated our initial search using the Exceptional Child Education Resources (ECER) database. This search located 103 references, of which 46 duplicated those found in the ERIC search.

We then carried out a third search using the PsycINFO database. The index terms selected were (1) self-concept, (2) self-perception, (3) self-esteem, (4) educable mentally retarded, (5) learning disabilities, and (6) elementary school students. The search we conducted may be written (1 or 2 or 3) and (4 or 5) and (6). Note that this is essentially similar to the ERIC and ECER searches. We located 82 references, only 17 of which were duplicated in either the ERIC or Exceptional Child Education Resources searches. Forty of the references located by PsycINFO were dissertations, which are not adequately covered in the ERIC database. These results suggest that in order to obtain a complete search it is advisable to check all relevant databases.

The importance of using combinations of descriptors is illustrated by the fact that the ERIC search produced 7,054 references with the learning disabilities descriptor and 9,973 references with the self-concept descriptor. Obviously, using a single descriptor will usually result in a very broad search and will produce many references that are of no importance to the researcher.

**Broad versus Narrow Descriptors**

One of the rules for assigning ERIC descriptors requires that a document be indexed to the specific level of subject matter covered. In other words, the reviewer should select the most specific descriptor that fits the subject matter of the article or document. This means that an article dealing with speech handicaps would not be given the additional descriptor disabilities, unless it deals with both disabilities in general and also with speech handicaps. This often confuses the researcher, who is likely to assume that a general term such as teaching would also be assigned to all the narrow terms under teaching such as diagnostic teaching, creative teaching, and peer teaching. In terms of planning a search, this rule means that in order to get the most complete coverage of your topic, you may choose to include both the broad descriptors and the narrow descriptors that are directly related to your research problem. Using broad descriptors, however, may result in your locating some references that are not closely related to your problem. Such references may provide useful background data or may help place your problem in a broader context, but they will usually be less important than those you locate using more specific descriptors. For example, in our ERIC search related to self-concept, if we used the broad descriptor disabilities instead of the two narrow descriptors learning disabilities and mild mental retardation, we would locate more references (82 versus 74) but many of these would deal with children having disabilities in which we are not interested.

In addition to descriptors, ERIC reports are also classified by author, by
File 1:ERIC–66087/July

SET ITEMS DESCRIPTION
IS SELF-CONCEPT [Each descriptor is entered; the computer (C) assigns a set number (S1, etc.) and reports how many references in the system have this descriptor.]
    S1 9973 SELF-CONCEPT (INDIVIDUALS’ PERCEPTIONS OF THEMSELVES)
IS SELF-ESTEEM
    S2 0 SELF-ESTEEM (Misspelled descriptor, C reports 0 items)
IS SELF-Esteem
    S3 3084 SELF-ESTEEM (INDIVIDUALS’ VALUE JUDGMENTS OF THEMSELVES)
IS LEARNING DISABILITIES
    S4 7054 LEARNING DISABILITIES (CATEGORY IN FEDERAL LEGISLATION REFERRING TO . . .)
IS MILD MENTAL RETARDATION
    S5 2746 MILD MENTAL RETARDATION (INTELLECTUAL FUNCTIONING THAT RANGES TWO TO . . .)
IS ELEMENTARY SCHOOL STUDENTS
    S6 9485 ELEMENTARY SCHOOL STUDENTS (NOTE: COORDINATE WITH THE APPROPRIATE MANDA . . .)
IS ELEMENTARY EDUCATION
    S7 35384 ELEMENTARY EDUCATION (EDUCATION PROVIDED IN KINDERGARTEN OR GRADE . . .)
IC (1 OR 3) AND (4 OR 5) AND (6 OR 7) (C is asked how many items are in this set, i.e., have this combination of descriptors.)
    S8 74 (1 OR 3) AND (4 OR 5) AND (6 OR 7) (There are 74 items in this set.)
IC (1 OR 3) AND (4 OR 5)
    S9 342 (1 OR 3) AND (4 OR 5) (When we omit the two grade level descriptors, the number of items increases to 342.)
IC 9/MAJ
    S10 66 8/MAJ (We ask C how many of the items in Set 8 have descriptors 1, 3, 4, 5, 6, 7 as major descriptors. There are 66.)
LIMITB/1977–1987 (We ask C how many of the 74 items in Set 8 were published from 1977 to 1987)
    S11 82 8/1977–1987 (62 of the 74 items were published from 1977 to 1987.)

Figure 4.3 Sample Computer Search, Illustrating Various Search Techniques
We ask C how many of the 62 items in Set 11 have descriptors 1, 3, 4, 6, 7 as major descriptors:

[S12 55] [11/MA] [There are 55 that have major descriptors.]

We ask C how many items in Set 12 come from CIE or RIE:

[S13 39] [12/E] [39 of the 55 items come from CIE. The remaining 16 items therefore come from RIE.]

We enter a new descriptor that we believe may help locate additional relevant references:

[S14 594] 14 [There are 594 items with "slow learners" as a descriptor.]

[S15 2746] 5 [There are 2746 items with "mild mental retardation," Set 3 as a descriptor.]

We believe that the descriptors "slow learners" (Set 14) and "mild mental retardation" (Set 3) might be applied to the same references. We ask C how many references have "slow learners" as a descriptor but NOT (shown by minus sign) "mild mental retardation." There are 336, indicating that the two descriptors are usually not applied to the same references.

We ask C how many references have Set 1 (self-concept) or Set 3 (self-esteem) and Set 15 (slow learners minus mild mental retardation). There are 20 which we may want to check.

We ask C how many items in ERIC have the term "academic self-concept" some place in the entry (i.e., title, abstract, etc.). This is a proximity search.

We ask C how many items in ERIC have the name of this test as an identifier (ID).

We ask C how many items have the name of this test as an identifier (ID).

We ask C how many items have the name of this test as an identifier (ID).

We ask C how many items have the name of this test as an identifier (ID).

We ask C how many items have the name of this test as an identifier (ID).

We ask C how many items have the name of this test as an identifier (ID). Searching identifiers is often nonproductive; Proximity searches are recommended instead.

We ask C how many items have SEI some place in the ERIC entry? SEI is the name commonly used for the Self-Esteem Inventories.

[SEI [Proximity search—How many items have SEI some place in the ERIC entry? SEI is the name commonly used for the Self-Esteem Inventories.]]

[SEI [There are 14 references that contain this term.]]

Figure 4.3 (continued)
This search aims at locating references that are closely "on target," i.e., directly concerned with academic self-concept.

There are 8 references in this set.

This search incorporates the two elementary descriptors with the broad "disabilities" descriptor.

There are 82 references; many will be off target because of using the broad descriptor.

There are 2586 dissertations in the ERIC file. This is only a small fraction of dissertations in education and related fields that have been completed since ERIC was started and shows that ERIC is a poor source for dissertations.

There are no dissertations in the ERIC data base related to our problem as described by Set 8.

There are no dissertations in ERIC data base in problem area described by Set 8.

No dissertations in file on topic of Set 9.

How many dissertations on self-concept or self-esteem?

There are 92.

Figure 4.3 continued
institution, and by identifier. For most computer searches these classifications are of little value. However, if you know that much important work in your area of interest has been conducted by a specific author or at a specific institution, you may want to search these classifications. Identifiers include terms such as geographical locations, trade names, equipment names, specific theories, tests, and testing programs. These may be useful in some searches, but we have found them of little value in the kinds of computer searches usually conducted by graduate students.

6. Conduct the search. Once you are on-line, the first step is to enter your descriptors and determine how many references are available under each descriptor. For example, in the ERIC search on self-concept, we found the following frequencies: self-concept, 9,973; self-esteem, 3,084; learning disabilities, 7,054; mild mental retardation, 2,746; elementary school students, 9,485; and elementary education, 35,384. (See figure 4.3.)

The next step is to enter each of your planned combinations of descriptors and ask the computer how many references are available for each combination. Next, you may decide to have the computer print out the bibliographical data on 5 to 10 of the references in a given combination to see what sort of references have been selected.

You would then select a combination of descriptors that will produce between 50 and 200 items and instruct the computer to send you a printout. Before proceeding, study figure 4.3 carefully. It shows how our sample search was entered into the computer and illustrates many of the techniques that you can employ in conducting a computer search. The information in brackets has been added to help you understand the process. For some data bases such as ERIC, you can request titles with ED or EJ numbers, complete bibliographical data, or complete bibliographical data plus an abstract. When available, the abstracts are usually worth the additional cost; for a DIALOG search of ERIC, the cost is 10 cents per citation for bibliographical data only and 14 cents for bibliographic data plus abstract. If you need only the ED and EJ numbers and the title, you can have these printed out on-line at no extra cost except contact time.

7. Review the printout. Once you have received the printout of references located in your computer search, study the abstracts and proceed with the rest of your literature review, using the procedures described in this chapter. If, in checking the bibliographies of articles you read, you locate important references that were not found in your computer search, study these carefully and try to determine why they were missed.

Researchers are often suspicious of computer searches because of having carried out a search in which references that they knew were relevant to their topic did not appear. The usual reasons for this are (1) the researcher’s failure to use a sufficient number of related terms with “or” connectors, and (2) the reviewer’s failure to select the correct descriptors. Keep in mind the process that is employed in preparing abstracts and selecting descriptors for a given article.
The article is assigned to one of the ERIC clearinghouses and someone who is presumably knowledgeable on the subject reads the article, prepares the abstract, and selects the descriptors. Unfortunately, both the preparation of the abstract and decision as to which descriptors are relevant are quite subjective. Therefore, if the same article were assigned for review to a half dozen different persons, it is unlikely that any two of these persons would include the same material in their abstract or would list exactly the same descriptors. This subjectivity is clearly illustrated by the two CJE printouts from the ERIC system shown in figure 4.4.

A close look at these references confirms that they are two different reviews of the same article. However, if you read the two abstracts, you will see that they have very little in common. A look at the descriptors is even more surprising. The first review lists nine descriptors, whereas the second review lists only six descriptors. Note furthermore that only four of the descriptors, "autism," "middle schools," "peer teaching" and "program descriptions" are common to the two reviews. This clearly illustrates the fallibility of this system.
Unless you are very thorough in planning the computer search, you may miss a great many important references. Therefore you may well want to conduct a second search after becoming more familiar with the field of study.

Proximity Searching

Proximity searching, also called full text searching, is a procedure for searching the citations entered in the data base for specific words or phrases. This technique is very useful (1) when you want to search a very narrow and sharply defined topic or (2) when there are no descriptor terms that really fit your topic.

Proximity searching may be carried out with any of the DIALOG data bases, although the coverage may differ from one data base to another. The search may be carried out for single words, phrases, or for two or more words that appear in close proximity in the material searched. These words do not have to be descriptor terms; any combination of words can be used.

You may also conduct a full text search using terms that have been truncated so that only the root term remains. For example, a search of the root term library would locate references containing any variation of that root term, such as library, libraries, librarians, thus providing a broader coverage of relevant citations.

For ERIC, the material searched for each reference includes the title, descriptions, identifiers, and abstract. For example, suppose we are interested in studies concerned with homeless people. Because no descriptor for homeless people is included in the ERIC Thesaurus, we select the descriptors economically disadvantaged and housing needs. We find that there are 2,483 items with the first as a descriptor, 354 with the second, but only 11 items when economically disadvantaged is joined with housing needs using an “and” connector. This combination seems to be about as close to our topic as we can get, using regular descriptors. A search of these 11 items would probably produce some references related to homeless people, but some of the 11 would also be “off target.”

You will obtain much more sharply focused citations if you carry out a full text or proximity search using the words “homeless people.” In conducting a proximity search, different instructions can be given to the computer so that different criteria will be met before a citation is selected. For example, if the “W-limiter” is used, one of the selected words (people) must directly follow the other (homeless) in order for the reference to be selected. If the “F-limiter” is used, both words must appear in the same field (for example, both words must be somewhere in the title). If the “C-limiter” is used, the selected words must only appear somewhere in the citation. Thus, the limiters can be used to broaden or narrow the search as desired.

When we searched homeless (W) people, we located 41 references. These citations were virtually all “on target,” thus providing much better coverage of
available literature than was obtained from combining the descriptors *economically disadvantaged* and *housing needs.*  

For most educational topics closely relevant descriptors or combinations of descriptors will be found in the ERIC Thesaurus, and in this case a search of these descriptors is the best choice. Proximity search, however, is a very useful tool when descriptors that are closely related to your topic are not available or when you need a few references that are sharply focused on a very specific topic.  

Proximity searching is also an excellent way to locate references that provide information on measures you plan to use in your research. For example when we conducted a proximity search of *Piers (W) Harris* (the name usually used for the Piers Harris Self-Concept Scale) we located 157 references (see Set 21 in figure 4.3).

**Step Three—Reading and Noting Selected References**

**Bibliography Card**

During your search of the preliminary sources, prepare a bibliography card for each book or article that you believe might contain material pertinent to the review. Although information included in the bibliographical data for a given citation is always about the same, these data can be recorded in many different formats. Before starting your review of the literature, check the rules in effect at your college concerning acceptable format for the bibliography section of the thesis or dissertation. Some schools permit you to use any format that is generally acceptable in your field of study. Other schools have a specific format that must be followed by all graduate students. If your school permits the use of any form that is acceptable in your field, the easiest approach will be for you to use the format of the preliminary source from which you expect to obtain most of your references. *Current Index to Journals in Education* is the most productive source for most students working in education, and therefore its format is advantageous to use when permitted. Most of the references will come from the subject index of *CIIJE,* and articles listed by subject give the title of the book or article before the author’s name. For your bibliography card, the author’s name (last name first) should be listed before the title. This change is necessary because it is much more convenient for you to maintain your note-card file in

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14. As of January 1986, “Homeless People” was added to the ERIC system as a descriptor. New descriptors are regularly added to the system. To find out what descriptors have been added since the current edition of the Thesaurus, check the most recent issue of *RIE* or *CIIJE.*

15. For another example of a proximity search see Set 17 in figure 4.3. In this case, even though the descriptors “Self-Concept” and “Self-Esteem” are fairly close to our topic, a proximity search of *Academic (W) Self (W) Concept* is more sharply focused and produced a few very relevant references when combined with descriptors *(4 or 5) and (6 or 7).*
alphabetical order by author, and the bibliography as prepared for your thesis
normally will be listed in this order. It is advisable to print the author's name;
misspelled names are a common source of errors and are difficult to detect when
proofreading.

Figure 4.5 shows a bibliography card in the CIJE format. If this format is
chosen, the bibliographic data from articles found in other sources, such as
Education Index and Psychological Abstracts, should be converted to the CIJE
format. Let us compare bibliographical data for an article as it appears in CIJE,
Education Index, and Psychological Abstracts:

Current Index to Journals in Education:
Battista, Michael. The Interaction between Two Instructional Treatments of Al-
gebraic Structures and Spatial-Visualization Ability. Journal of Educational Re-
search; v74 n5 p337–41 May-Jun 1981 (Reprint: UMI)

Education Index:
BATTISTA, Michael Interaction between two instructional treatments of algebraic

Psychological Abstracts:
Battista, Michael. (Purdue U) The interaction between two instructional treat-
ments of algebraic structures and spatial-visualization ability. Journal of Educa-
Although these forms are similar, note that the Journal of Educational Research is abbreviated in Education Index and not in the other two sources and that the volume number, pages, and year are given in different format. Note also that all main words in the title are capitalized in CJJE whereas only the first word is capitalized in the other sources. Finally, note that Education Index format omits "The" when this is the first word in the title. Obviously, many errors and inconsistencies can be avoided if you select one format and convert all references to that format when making up bibliography cards. Students reviewing the literature in one of the areas of educational psychology will normally obtain the majority of their references from Psychological Abstracts, and in this case, the Psychological Abstracts format may be preferred.

If your college has specified a format for the thesis bibliography that differs from the one used by your preliminary sources, the easiest procedure is to copy all bibliographic data from preliminary sources in whatever form it is found. Then, when you check the reference to determine whether or not it is relevant to your review of the literature, you may recopy the bibliographic data in the required school format at the bottom of your bibliographic card. You will need to do this only for those studies that contain pertinent information; usually, that is one out of every three or four preliminary references.

Accuracy is extremely important in preparing bibliography cards. A mistake in copying the data can often cause a great deal of extra work. For example, if you incorrectly copy the name of a journal, the date, volume or page numbers, you will fail to find the article when checking the source. Then you will be faced with the problem of trying to determine which part of your bibliographic citation is incorrect. These mistakes are easy to make unless you take special care. As you may well have covered a large number of preliminary sources, a mistake in the early stages may mean a lengthy second search. Even if you make an error in some portion of the bibliographic data that does not interfere with your locating the actual material, such as misspelling the author's name, the error is still serious, for you will probably repeat it in your thesis. Nothing reflects more unfavorably on the scholarship of a research worker than frequent errors in bibliographic data.

Using the Library

Now that you have completed your search of preliminary sources and have assembled a set of bibliography cards, the time has come to start checking these references in the library. The majority of your references will probably be in professional journals, because these are the principal outlets for primary source research articles.

If you visit several academic libraries, you will find two common arrangements for shelving and handling professional journals. Newer and smaller libraries often have these journals on open shelves in the reference area along
with desks or tables that students can use when reading the journals. This system is simplest for you, for you can locate the journals you need, read them, and usually make copies, all in the same area.

Older and larger university libraries, on the other hand, usually have their professional journals shelved in closed stacks. Ordering these materials through basic library procedures can waste a great deal of your time. If you are using a closed-stack library, we advise you to obtain a stack permit and examine the layout of the library, to determine what method of obtaining materials will require the least amount of time. In a library where periodicals in a given field are all shelved in a central location and where study space is available in the stacks, you will probably want to work in the stacks. Some libraries, however, do not permit students to enter the stacks, and some, because of space limitations, shelve journals in such a way that they are difficult to find and cannot be used in the immediate area in which they are shelved. In this case, you can usually save time by making out a call slip for about 10 periodicals and then, while waiting for the library clerk to return with your requests, making out another call slip for a second group of 10. While the clerk hunts down your second group, you can scan and make notes on the first group, and so on. Because a certain percentage of references that you ask for will prove to have nothing relevant, or will be lost, checked out, or in the bindery, you should always submit call slips for 10 or more references at a time.

Many professional journals are now available on microfilm. Libraries are making increasing use of this format because it is less expensive and requires less space than storing printed journals. Check the room in your library where microfilms and microfiches are stored. Most university libraries have equipment available for copying microfilm onto regular-sized sheets of paper; this is useful if you need a copy of an article or report for later reference.

Few of us except the most experienced reference librarians have a complete grasp of the many resources available in the typical university library. Most university libraries conduct tours for students at the beginning of each year or semester, and you will almost surely learn something new if you take such a tour. Also, don’t hesitate to ask questions; librarians as a group tend to want to help whenever possible.

Obtaining Materials Not Available Locally

You will almost certainly find that some of the materials you wish to examine are not available in your college library. There are several ways to obtain these materials, and you shouldn’t give up merely because a source is not immediately available. The quickest way to obtain copies of articles published in professional journals is to write directly to the author and ask for a reprint of the article. Authors usually have such reprints and are willing to send a reprint to anyone requesting it. Do send a stamped, self-addressed envelope with your request.
Reprints thus received are your personal property and should be kept in your file so that you may recheck them if necessary. The main problem in writing for reprints is obtaining the author's address. Psychological Abstracts usually provides such addresses. This information is not given in Education Index, however. A great many authors may be located by checking the various professional directories that are available, such as Who's Who in American Education, Biographical Directory of the American Psychological Association, and American Educational Research Association Directory of Members. Your reference librarian can usually suggest other directories if an individual is not listed in any of the above sources.

If you are unable to obtain a reprint of an article from its author, the next step is to see if the needed journal is available in another library in the vicinity. In large population centers where several colleges or universities are located within a small geographical area, you can usually find the materials you need at another local library. In areas where other libraries are few and far between, you may obtain needed materials through interlibrary loan. Check your library's policies on interlibrary loan; many libraries place restrictions on this service because it is rather expensive.

Often you may wish to examine a thesis or dissertation that is available only through the school library where the work was actually done. Such studies may be obtained through interlibrary loan, or microfilm copies of most dissertations may be obtained from University Microfilms, Inc. (Ann Arbor, Michigan). Microfilm copies of a dissertation can often be obtained at less expense than borrowing the dissertation itself through interlibrary loan. Even when it proves more expensive, microfilm is often preferable, since the copy need not be returned and is available for future reference.

You can usually obtain either microfilm or photostatic copies of any reference not available at your own library. The librarian at your library will locate the needed materials and arrange for their reproduction, but the cost of reproduction and shipping is usually yours. This varies considerably, usually from 15 cents to 35 cents per page, so having material photocopied is generally more practical for short articles than for books or lengthy documents. If, however, the reference appears to be of major importance, you should obtain it by some means. The satisfaction of knowing that you have done a thorough and scholarly review of the literature will more than compensate for the expense.

Taking Notes on Research Articles

Check through your bibliography cards and identify those covering studies that appear most important to your review of the literature. Then begin your review by checking the most recent of these important studies. The reason for starting with the most recent is that these, having earlier research as a foundation, are likely to be more valuable. By reading the most important articles first, you
quickly build up a reasonably deep understanding of your problem, and this makes it possible for you to profit more from the subsequent study of articles that are only peripherally related to your topic. This insight makes it much easier for you to fit these less important studies into the overall picture you are building of your field through the literature review.

When you finally open the journal to an article you wish to check, first read the abstract. Most research articles begin with a brief abstract or end with a summary. By reading these, you can usually determine whether or not the article contains any information that would justify reading the entire article. If, after reading the abstract or summary, you decide that the article is pertinent, first check the accuracy of your bibliographical data, because the source where you obtained these data might have been in error. Then record the same bibliographic data on the top of a 5 x 8 note card and take notes on the article as you read it. In order to save time, you may abbreviate the bibliographical data on this second card.

In a research article, the writer attempts to present the essential materials in as brief a form as possible. You will find that the average research article is only five or six pages long and thus takes little time to read, and that the majority of research articles follow a standard pattern that further reduces the time needed to review them. This format usually includes (1) a brief introduction, (2) the hypotheses to be tested, (3) a statement of the procedure including a description of the subjects, measures used, and research design, (4) a section giving the findings, and (5) a summary and conclusions. In taking notes, be as brief as possible without omitting anything that you feel you may want to use in the design of your study or the preparation of your research report. A brief outline of the reference using short sentences or phrases with headings for the problem or hypothesis, procedure, findings, and conclusions will usually be sufficient.

The procedures and findings usually require the most detailed notetaking. In order to make comparisons among related studies later on, record the number of subjects, sampling methods, treatments (independent variable), measures employed (dependent variable), research design, and any other procedure worthy of attention.

Findings should also be reported in some detail, especially for studies that are very relevant to your problem. Both significant and nonsignificant findings should be recorded, along with levels of significance for the former. In order to combine studies and draw an overall picture of the findings, it is useful to categorize studies as significant (+), nonsignificant (+), nonsignificant (–), and significant (–). The meta-analysis technique developed by Gene Glass and his associates provides a more sophisticated method of combining the results of related studies. If you plan to use this method, record the means and standard deviations of the experimental and control groups in experimental and quasi-

**Problem.** Effects on teacher interest to participate in a res. proj. of the following 3 variables: (1) nature of the res.; i.e., exp. vs. non-exp. (in exp., teachers randomly assigned to treatment; in non-exp. could choose treatment); (2) monetary reward vs. no reward; (3) time required to participate, i.e., 24 hours vs. 4-12 hours over 2-week period.

**Procedure.** Subj. were 58 teachers, gr. 2-8. 15 teachers gr. K, 1, 2 special subject dropped after data collected. Randomly assigned to 8 treatments, N per cell 5-11. Each tr. contained desc. of 5 proposed studies. Desc. identical except that the 3 ind. variables were manipulated.

**Findings.** ANOVA gave sig. higher interest for groups getting honorarium (10% kwk); NSD exp vs non-exp, NSD time, NS inter- actions were sig.

**Conclusions.** Financial incentive sig. increased teacher interest in participating.

**Comments.** Request for teacher commitment instead of interest would be more realistic. Cell sizes small. Dropping K, 1 tr. spec. teachers indicates poor planning.
experimental studies and the product-moment correlations in correlational studies.¹³

It is also desirable for you to record your own evaluation of the study and to note how it may relate to your research while the article is still fresh in your mind. In addition to your outline of the study, it is often profitable to record promising or unusual techniques employed in the study, new measures that may be of use, interesting theoretical points, and a critical evaluation including apparent weaknesses that make the results questionable. This critical evaluation of the research is important because you will often find several research reports that test similar hypotheses but yield different results. Unless you can make a critical evaluation of the research, it is difficult to determine which of the conflicting results is more likely to be correct. Chapter 5 presents a detailed discussion of methods for critically evaluating research articles (see figure 4.6 for a sample note card).

Taking Notes on Opinion Articles

In education many of the articles that you encounter will not be reports of research projects, but will describe the experiences or opinions of the author concerning some educational topic. Opinion articles do not follow the research article format and usually do not contain a summary. When checking the opinion article, first scan the article to get some idea of its content. One method of scanning is to read only the first sentence in each paragraph. After scanning, decide whether the article contains material of importance. If so, read the entire article. An abstract of the opinion article can usually be prepared most quickly using a sentence outline approach.

Quotations

When reading articles be alert for quotations that might be useful in preparing the review of the literature for your thesis or dissertation. If you find material you may wish to quote, the material to be quoted should be copied very carefully on the note card, enclosed in quotation marks, and the page from which the quote was taken noted. Most systems of referencing require that the page be given for direct quotations, and this also facilitates checking the quotation if necessary.

Students often use too many quotations in their reviews. A good rule to follow is to copy for possible quotations only materials that are stated very skillfully, or in very concise terms, or are typical and clear reflections of a particular point of view you wish to illustrate in your thesis. After copying a

¹⁶ See chapter 5 for a discussion of meta-analysis.
quotation, recheck to be sure that you have copied it exactly. Inaccurate quotations are a serious reflection on the scholarship of the writer, and it is almost certain that some of the quotations will be checked for accuracy by the faculty members who read the thesis.

Classifying Articles You Read

In reading articles for your review of the literature, you should keep constantly in mind the objective of your research and should attempt to relate the material you read to your research plan. Do not restrict yourself to the narrow study of only that research that is closely related to the work you are planning. Very often studies that are only partially related to your work will give you new theoretical viewpoints and acquaint you with new tools and methods that can be profitably applied to your research plan.

In reviewing the literature, you will usually find that the articles you read can be classified into several categories. For example, in doing a review of literature in the field of ability grouping, one of the authors found some articles that compared the achievement of students in ability-grouping and random-grouping systems, some articles that made comparisons of sociometric scores and social status measures between the two systems, some that discussed methods of grouping, and so on. In carrying out your review, be alert for such natural subdivisions because they form a basis for classifying note cards.

A Coding System

As some such pattern for your review emerges, develop a system of coding that will permit you to indicate what type of material is contained on a given note card. The coding system adopted by the research worker will be different for each review of the literature. An example of a coding system used by one of the authors in a review of the literature in ability grouping may be helpful in developing your own coding. These codes are generally placed in the upper-right-hand corner of the note card.

+ An important study
S Studies dealing with social interaction
A Studies dealing with achievement of pupils in different grouping systems
G Studies describing grouping systems and studies discussing problems involved in grouping, such as individual variability, and so forth
B Studies relating grouping to behavior problems
P Studies relating grouping to personality adjustment, personality variables, and self-concept

Using such a code is helpful in several ways. It makes you actively aware of the major areas of concentration in your topic. It makes it possible for you to
check quickly your notes on a specific portion of the literature, and it makes the job of writing up your review of the literature much easier. The more extensive studies, of course, may contain material relating to two or three subtopics. There are recorded by indicating all the codes for subtopics.

MISTAKES SOMETIMES MADE IN REVIEWING RESEARCH LITERATURE

1. The researcher carries out a hurried review of the literature to get started on the research project. This usually results in overlooking previous studies containing ideas that would have improved the student’s project.
2. Relies too heavily upon secondary sources.
3. Concentrates on findings when reading research articles, thus overlooking valuable information on methods, measures, and so forth.
4. Overlooks sources other than education journals, such as newspapers and popular magazines, which often contain articles on educational topics.
5. Fails to define satisfactorily the topic limits of the review of the literature. Searching too broad an area often leads to the student becoming discouraged or doing a slipshod job. Searching too narrow an area causes students to overlook many articles that are peripheral to their research topic but contain information that would help them design a better study.
6. Copies bibliographic data incorrectly and is then unable to locate the reference needed.
7. Copies far too much material onto note cards. This often indicates that the student does not have a clear understanding of the project and thus cannot separate important from unimportant information.
8. Fails to use all relevant narrow descriptors when conducting a computer search.

ANNOTATED REFERENCES

Jackson, Gregg B. “Methods for Integrative Reviews.” Review of Educational Research 50 (1980): 438-460. Critically analyzes procedures used by reviewers of the educational research literature. Because your thesis or dissertation will include a literature review, you can learn much from studying this article. The study analyzes 36 randomly sampled review articles and relates the findings to 6 basic tasks involved in conducting an integrative review: (1) selecting questions or hypotheses for the review, (2) sampling research articles to be reviewed, (3) describing the characteristics of the studies, (4) analyzing the findings, (5) interpreting the results, and (6) reporting the review. Jackson’s work identifies many deficiencies
Research Design
Qualitative & Quantitative Approaches

John W. Creswell

SAGE Publications
International Educational and Professional Publisher
Thousand Oaks  London  New Delhi
Use open-ended questions without reference to the literature or theory unless otherwise dictated by a qualitative design type.

Use a single focus and specify the research site in the research questions.

The following are examples of qualitative research questions drawing on several types of designs:

Example 1. An Ethnography

But how are these conceptions of social studies played out—or not played out—in classroom practice? A grand tour question ... How is each setting organized? (The beginning of the subquestions) ... What kind of interpersonal dynamics exist? ... How do the students, cooperating teachers, faculty members, and pupils act? ... What activities occur in each setting? What topics are discussed, and what information, opinions, and beliefs are exchanged among the participants? (Goodman & Adler, 1985, p. 2)

Example 2. A Grounded Theory Study

Two grand tour questions are presented. What are the major sources of academic change? What are the major processes through which academic change occurs? (Conrad, 1978, p. 101)

QUANTITATIVE RESEARCH QUESTIONS, OBJECTIVES, AND HYPOTHESES

In quantitative studies, as in qualitative studies, questions, objectives, and hypotheses represent specific restatements of the purpose of the study. In survey projects these restatements typically take the form of research questions and objectives; in experiments, they are hypotheses. Especially in doctoral dissertations, advisors recommend hypotheses in experiments because they represent the traditional, classical form of raising questions.

As discussed earlier, researchers present questions, hypotheses, and objectives as either a comparison between two or more groups in terms of a dependent variable or as a relationship of two or more independent and dependent variables. Researchers also write descriptive questions to describe responses to the independent or dependent variables. Several general guidelines, grounded in the quantitative paradigm, might direct the development of quantitative questions, objectives, and hypotheses:

Develop the hypotheses, questions, or objectives from theory. In the deductive methodological process of quantitative research, they are testable propositions deduced from theory (Kerlinger, 1979).

Keep the independent and dependent variables separate and measure them separately. This procedure reinforces the cause-and-effect logic of quantitative research.

When writing this passage, select one form—write questions, objectives, or hypotheses—but not a combination. A hypothesis represents a declarative statement of the relations between two or more variables (Kerlinger, 1979; Mason & Bramble, 1989). A research question also poses a relationship, but phrases the relationship as a question (Krathwohl, 1988); an objective is the same relationship statement in declarative form. Mixing hypotheses with questions or objectives conveys an informal (and redundant) style of writing.

If hypotheses are used, consider the alternative forms for writing them and make a choice based on the audience for the research. In the rhetoric of research, the formal, traditional language is to write hypotheses. Moreover, the traditional approach is to use "null" hypotheses, which simply state that there is no significant relationship between or among the variables (e.g., There is no significant difference in the accumulation of resources and the productivity of faculty). Researchers employ this form because it has philosophical advantages in statistical testing, and good researchers tend to be conservative and cautious in their statements of conclusions (Armstrong, 1974). Alternatively one finds in current journals the use of the "directional" or "alternative" hypothesis, in which the researcher
posits a direction for the relationship (e.g., the more the accumulation of resources, the more productive the researcher). One tends to use the alternative if the literature suggests a hypothesized direction for the variables [Krathwohl, 1988].

Consider then, writing hypotheses in one of four forms: literary null, literary alternative, operational null, and operational alternative. The literary form means that the variables will be stated in abstract, concept-oriented language; the operational form represents specific language. Examples of each type of hypothesis follow.

Example 3. Types of Hypotheses

Literary null hypothesis (concept oriented, no direction): There is no relationship between support services and academic persistence of nontraditional-aged college women.

Literary alternative hypothesis (concept oriented, directional): The more that nontraditional-aged college women use support services, the more they will persist academically.

Operational null hypothesis (operational, no direction): There is no relationship between the number of hours nontraditional-aged college women use the student union and their persistence at the college after their freshman year.

Operational alternative hypothesis (operational, directional): The more that nontraditional-aged college women use the student union, the more they will persist at the college after their freshman year.

Example 4. An Example of Literary Alternative Hypotheses

Mascarenhas [1989] studied the differences between type of ownership (state owned, publicly traded, and private) of firms in the offshore drilling industry. Specifically, the study explored such differences as domestic market dominance, international presence, and customer orientation. The study was a "controlled field study" using quasi-experimental procedures. This example illustrates hypotheses stated as "alternative" or "directional" in form, and he employed the language of variables written in the concept or "literary" form.

Questions, Objectives, and Hypotheses

Hypothesis 1: Publicly traded firms will have higher growth rates than privately held firms.

Hypothesis 2: Publicly traded enterprises will have a larger international scope than state-owned and privately held firms.

Hypothesis 3: State-owned firms will have a greater share of the domestic market than publicly traded or privately held firms.

Hypothesis 4: Publicly traded firms will have broader product lines than state-owned and privately held firms.

Hypothesis 5: State-owned firms are more likely to have state-owned enterprises as customers overseas.

Hypothesis 6: State-owned firms will have a higher customer-base stability than privately held firms.

Hypothesis 7: In less visible contexts, publicly traded firms will employ more advanced technology than state-owned and privately held firms. [Mascarenhas, 1989, pp. 585-588]

\[ \text{\textbullet Unless the study merits a close examination of demographic variables, use variables other than demographics as independent variables. Because quantitative studies verify a theory, demographic variables (e.g., age, income level, educational level) typically enter these models as intervening or mediating variables in theories instead of major, independent variables.} \]

\[ \text{\textbullet Use the same pattern of word order in the questions, objectives, or hypotheses to establish a formal rhetorical style. Repeat key phrases and order the variables by beginning with the independent and concluding with the dependent variables. An example of word order with independent variables stated first in the phrase follows.} \]

Example 5. Standard Use of Language in Hypotheses

1. There is no relationship between use of ancillary support services and academic persistence of nontraditional-aged college women.
2. There is no relationship between family support systems and academic persistence of nontraditional-aged college women.
3. There is no relationship between ancillary support services and family support systems.
A MODEL FOR QUANTITATIVE QUESTIONS OR HYPOTHESES

Consider a model for writing questions or hypotheses based on writing descriptive questions (or hypotheses) followed by multivariate (or inferential) questions or hypotheses. I prefer the term multivariate because the researcher uses multiple variables. I also employ it to reflect both independent and dependent variables, though in experimental designs, multivariate clearly refers only to dependent variables.

In this model the writer specifies descriptive questions for each independent and dependent variable and important mediating variables in the study. These descriptive questions then are followed by multivariate questions that relate variables or compare groups. Finally, the multivariate questions are followed by questions that add any mediating or controlled variables.

Example 6. Descriptive and Multivariate Questions

To illustrate this approach, assume that one wants to examine the relationship of critical thinking skills [an independent variable measured on an instrument] and student achievement [a dependent variable measured by grades] in science classes for eighth-grade students in a large metropolitan school district. One wants to control for the mediating effects [intervening variables] of prior grades in science classes and parents' educational attainment. Following the model proposed above, the research questions might be written as follows:

Descriptive Questions

1. How do the students rate on critical thinking skills? [A descriptive question focused on the independent variable]
2. What are the student's achievement levels [or grades] in science classes? [A descriptive question focused on the dependent variable]
3. What is the student's prior grades in science classes? [A descriptive question focused on the mediating variable, prior grades]
4. What is the educational attainment of the parents of the eighth-grade students? [A descriptive question focused on the mediating variable, educational attainment of parents]

Multivariate Questions

5. Does critical thinking ability relate to student achievement? [A multivariate question relating the independent and dependent variables]
6. Does critical thinking ability relate to student achievement, controlling for the effects of prior grades in science and the educational attainment of the eight-grade parents? [A multivariate question relating the independent and dependent variables controlling for the mediating effects of the two intervening variables]

This example illustrates how one can take the purpose statement and first create specific research questions organized around descriptive analyses of the variables and then advance multivariate questions that relate variables. In other quantitative examples the researcher may want to compare groups, and the language may change to reflect this comparison in the multivariate questions. Still I would recommend the descriptive-multivariate model. Also, in other studies many more independent and dependent variables may be present in the model being tested, and a longer list of descriptive and multivariate questions would result.

Example 7. Combining Descriptive and Multivariate Questions

In the dental school example to follow, taken from a doctoral dissertation, notice how the author writes a descriptive research question followed by a multivariate question. This study examined the relationship between organizational structure and clinical instruction in dental college clinics.

What is the structure of clinical science instruction as measured by student/faculty ratios for each discipline in dental college clinics? . . . What are the relationships among measures of organizational size, organizational technology, organizational environment and discipline on student/faculty ratios? (DuBois, 1986, p. 13)
SUMMARY

Research questions, objectives, and hypotheses become signposts for explaining the purpose of the study and guiding the research. Writers use all three forms in studies. Questions are the most popular form for qualitative and survey projects, and hypotheses are for experimental studies. Qualitative researchers use the model of a grand tour question followed by a small, limited number of subquestions. These questions are descriptive in nature, evolve in design, and employ appropriate qualitative language. Quantitative questions, objectives, and hypotheses flow from a theory, use a language that orders the variables from independent to dependent, often include demographic variables as mediating influences, and employ standard wording to enable a reader to understand clearly the variables in the study. A model for writing quantitative questions is to pose descriptive questions, followed by multivariate questions.

WRITING EXERCISES

1. For a qualitative study, write one or two grand tour questions followed by five to seven subquestions.

2. For a quantitative study, write two sets of questions: In the first set pose description questions about the independent and dependent variables in the study; in the second set pose questions that relate (or compare) the independent variable(s) with the dependent variable(s).

3. Return to the working draft of your title. Retitle your study to reflect a qualitative or quantitative approach to the study. To write a qualitative title, consider the suggestions in Chapter 1 and be sure to state a central focus and use a literary style such as a question. To write a quantitative title, include the major independent and dependent variables and separate them with the conjunction and. Order the variables from independent to dependent so that they are consistent with the purpose statement and research questions/hypotheses.

Questions "Object... and Hypotheses"

- ADDITIONAL READINGS


In this brief article Robert Armstrong suggests that beginning researchers often are hindered by a lack of understanding of the nature and meaning of hypotheses. He provides a clear guide to the major implications of two types of hypothesis: the research hypothesis and the null hypothesis. Any hypothesis goes beyond the research question by proposing an answer. The proposed answer very likely exhibits the expectations of the researcher. However, if the research question is a genuinely exploratory one (as opposed to one seeking verification), the use of hypotheses may be inappropriate, for they will focus the researcher’s efforts.


These three authors emphasize that the research question is appropriate when the research is exploratory. However, a researcher should aim to state hypotheses when existing knowledge and theory permit formulation of reasonable predictions about the relationship of variables. Hypotheses permit more powerful and persuasive conclusions than do research questions, especially if hypotheses are small and perfectly testable, rather than large and amorphous.


Catherine Marshall and Gretchen Rossman emphasize how qualitative questions and problems usually come from real-world observations. These questions are not stated as hypotheses derived from theory, but rather as concerns that focus on interactions and processes in sociocultural systems and organizations. Such questions (and any subsequent answers) are enriched by the complexities of their empirical context. At the same time, Marshall and Rossman stress the need to place these research questions within a logical...
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CHAPTER 6
MEANING AND INTERPRETATION: QUALITATIVE METHODS

Rather than determining cause and effect, predicting, or describing the distribution of some attribute among a population, researchers may want to uncover the meaning of a phenomenon for those involved. Qualitative methods allow us to do just that. Qualitative methods are especially well suited for investigations in applied fields such as adult education and training because we want to improve practice. The improvement of practice comes from understanding the experiences of those involved. Further, applied fields often lack well-developed theories from which hypotheses can be deduced and tested; qualitative research is an inductive strategy which allows us to develop theory. This chapter will first present an overview of qualitative research, including the philosophical assumptions upon which it is based. Second, three major types of qualitative research—ethnography, case study, and grounded theory—will be discussed.

COMMON CHARACTERISTICS

We use the term qualitative research to cover a number of research strategies that share some common characteristics. In addition to the three types noted above, qualitative research has also been termed naturalistic inquiry, interpretive research, field study, phenomenological research, participant observation, and inductive research. The key philosophical assumption upon which all types of qualitative research are based, is the view that reality is constructed by individuals in interaction with their social worlds. Thus, there are many “realities” rather than the one, observable, measurable reality which is key to research based in the positivist paradigm (see Chapter 4).
Drawing from phenomenology and symbolic interaction in particular, qualitative researchers are interested in how people interpret their experiences, how they construct their worlds, what meaning they attribute to their experiences. The overall purposes of qualitative research are to achieve an understanding of how people make sense out of their lives, to delineate the process (rather than the outcome or product) of meaning-making, and to describe how people interpret what they experience.

In all forms of qualitative research, the researcher is the primary instrument for data collection and analysis. Since understanding is a key goal of this research, the human instrument, which is able to be immediately responsive and adaptive, would seem to be the ideal instrument for collecting and analyzing data. Guba and Lincoln (1981) point out that in addition to responsiveness and adaptability, the researcher as primary instrument is also able to: consider the total context of the phenomenon, rather than a particular segment; immediately process data as it is being collected, leading, if necessary, to refining data collection procedures; clarify and summarize material, checking with respondents for accuracy of interpretation; explore atypical or idiosyncratic responses. Of this last ability they write,

within the boundaries of standardized inquiry the atypical or idiosyncratic response would be lost, masked, or treated as a statistical deviation. . . . The ability to encounter such responses and to utilize them for increased understanding is possible, in fact only with human . . . instruments. (p. 138)

Being the primary instrument for data collection and analysis carries with it a responsibility to identify one’s shortcomings and biases that might impact the study. One does this not to make a qualitative study more “objective,” but to understand how one’s subjectivity shapes the investigation and its findings. Peshkin (1988, p. 35), in fact, points out that subjectivity “can be seen as virtuous, for it is the basis of researchers’ making a distinctive contribution, one that results from the unique configuration of their personal qualities joined to the data they have collected.”

Another characteristic of qualitative research is that it usually involves field work. The researcher physically goes to the site, the group of people, the institution, “the field” to collect data. This is, of course, always the case in anthropology where the intent is to learn about people of different cultures. Field work involves becoming intimately familiar with the phenomenon under study, whether it be a
case study of a single individual or a grounded theory study of a complex social interaction. Occasionally, qualitative studies have been conducted using written documents alone, but these are the exceptions.

Finally, qualitative research is primarily an inductive research strategy. As mentioned above, qualitative research is a particularly appropriate strategy to use where there is little knowledge about the problem. If there is a lack of theory, or if existing theory does not adequately explain the phenomenon, hypotheses cannot be used to structure an investigation. Rather, the researcher goes into the field with the intent of discovering the meaning a phenomenon has for those involved. What is uncovered is mediated through the researcher's own perspective, resulting in an interpretation, description, or explanation of the phenomenon. Typically, the researcher presents the findings in the form of categories, typologies, concepts, working hypotheses, even theory, which have been inductively derived from the data.

THE DESIGN OF A QUALITATIVE STUDY

Your beliefs about the nature of reality and about how knowledge is constructed, in addition to the problem you have identified and the question(s) you seek to answer, determine the selection of your research design. If you want to understand a phenomenon, uncover the meaning a situation has for those involved, or delineate a process—how things happen—then a qualitative design would be most appropriate. Most problem areas can be shaped to reflect these goals. For example, if you were interested in how to retain students in adult basic education programs, you could identify a program with a high retention rate and conduct a qualitative case study of that program, delineating those factors which seem to contribute to its success in retaining students. In another example, a researcher identified the problem area as how women executives have managed to be successful in a work setting (corporate America) that has not been particularly conducive to their advancement (Biernema, 1993). The researcher could have identified barriers and strategies from the literature and from her personal experience and surveyed women executives in Fortune 500 companies. However, she was more interested in how these women themselves perceived how they learned to succeed in a white male-dominated culture and undertook a qualitative study to address that purpose.
Once one has formulated a problem statement and research purpose (see Chapter 2) that is best addressed from a qualitative perspective, the next step is to select a sample and then collect data. Sample selection in qualitative research is purposeful. Since you are interested in the in-depth understanding of those who know the most (rather than the average opinion of the many), you select a purposeful sample. A purposeful sample, according to Patton (1990), is one from which you can learn the most; it is an “information-rich” case. In Bierema’s study above, she selected high-level executive women in Fortune 500 companies to interview. She was not interested in the secondhand opinions of others about how women in the organization had become successful. (For more on sample selection in qualitative research see LeCompte & PREISSLE, 1993; Merriam, 1988; Patton, 1990).

There are three basic ways to collect data in qualitative research. Interviewing is probably the most used in qualitative studies in adult education and training. Interviews range from highly structured, where specific questions and the order in which they are asked are determined ahead of time, to unstructured where one has topic areas to explore but neither the questions nor the order are predetermined. Most interviews fall somewhere in between in what is known as the semi-structured interview (Merriam, 1988). A second major means of collecting data is through observation. Like interviewing, there is a range here also from being a complete observer to being an active participant. A complete observer is unknown to those being observed, such as from behind a one-way mirror or in a public place. A very active participant observer might be someone who is a member of the group or organization who is thus participating while observing. A third major source of data is documents (written, oral, and visual) and artifacts. These are a natural source of information and usually already exist within the context of the study (interoffice memos, mission statements, press releases, student papers, photographs, to name a few). Documents can also be researcher-generated as when an investigator asks participants to keep logs or diaries regarding the phenomenon of interest.

In qualitative research, data are analyzed simultaneously during collection. That is, one analyzes data as they are being collected. This allows the researcher to make adjustments along the way, even to the point of redirecting data collection, and to “test” emerging concepts, themes, hypotheses. There are several strategies for data analysis, the most common being the constant comparative method discussed under grounded theory further in this chapter (see also Merriam, 1988; Miles & Huberman, 1994; Patton, 1990; Strauss, 1987; Wolcott, 1994).
The final step in a qualitative study is writing up the findings. While this is covered regarding research in general in Chapter 9, some points can be made about writing up qualitative research in particular. There is a standard format for writing up a research study that can be generally followed for qualitative research. However, since findings are usually in the form of words rather than numbers, it is sometimes difficult to know how much supporting data to include versus interpretation and analysis. Probably the best rule-of-thumb is to be sure to present as much data in the form of quotes from interviews, episodes from field observations, or documentary evidence to adequately and convincingly support your findings. In qualitative research it is the rich, thick descriptions, the words (not numbers) that persuade the reader of the trustworthiness of your findings. Nevertheless, in any report, there is tension between having the right amount of supporting data versus analysis and interpretation. A second problem is finding the right “voice” to present your findings. In qualitative research, writeups can vary from intimate, first-person accounts to more formal presentations (see Van Maanen, 1988; Wolcott, 1990). Reading a number of reports of qualitative research might be helpful in striking a balance between these two components.

VALIDITY AND RELIABILITY

Both producers and consumers of research want to be assured that the findings of an investigation are to be believed and trusted. In applied fields where practitioners intervene in people’s lives, it is particularly important that new practices derived from research are solidly supported. Thus issues of validity and reliability are important considerations in any kind of research. But how one views validity and reliability in qualitative research differs somewhat from positivist research. Following is a brief discussion of internal validity, reliability, and external validity or generalizability and the strategies that can be employed to ensure for each (for fuller discussions see Firestone, 1993; Guha & Lincoln, 1981; Merriam, 1988).

Internal validity asks the question, How congruent are one’s findings with reality? In quantitative research this question is usually construed as, Are we observing or measuring what we think we are observing or measuring? The question hinges on our understanding of reality and as was discussed earlier, qualitative inquiry assumes that there are multiple, changing realities. Reality is constructed by individuals. Thus in qualitative research the understanding of reality is really the researcher’s interpretation of someone else’s in-
terpretation. Because qualitative researchers are the primary instruments for data collection and analysis, interpretations of reality are accessed directly through observations and interviews. We are "closer" to reality than if an instrument had been interjected between the researcher and the researched. For this reason, internal validity is considered a strength of qualitative research.

To ensure that we are getting as close to reality as possible, we can use several strategies: (1) triangulation - the use of multiple investigators, multiple sources of data, or multiple methods to confirm the emerging findings (Mathison, 1988); (2) member checks - taking data collected from study participants and your tentative interpretations of these data back to the people from whom they were derived, asking if the data "ring true"; (3) peer/colleague examination - asking colleagues to examine your data and to comment on the plausibility of the emerging findings; (4) statement of researcher's experiences, assumptions, biases; and (5) submission/engagement in the research situation - collecting data over a long enough period of time to ensure an in-depth understanding of the phenomenon.

Reliability asks the question of the extent to which one's findings will be found again. That is, if the inquiry is replicated, would the findings be the same? In social science, the notion of reliability is problematic because human behavior is never static, nor is what many experience necessarily more reliable than what one person experiences. Consider the magician who can fool the audience of hundreds, but not the stagehand watching from the wings. Replication of a qualitative study will not yield the same results but this does not discredit the results of any particular study; there can be numerous interpretations of the same data. The more important question for qualitative researchers is whether the results are consistent with the data collected. Guba and Lincoln (1981), in fact, prefer to think of reliability as consistency or dependability.

There are at least three strategies one can use to ensure consistency. Triangulation and peer examination, defined above, can be used. The third, suggested by Guba and Lincoln (1981), is the audit trail. The audit trail operates on the same premise as when an auditor verifies the accounts of a business. "In order for an audit to take place, the investigator must describe in detail how data were collected, how categories were derived, and how decisions were made throughout the inquiry" (Merriam, 1988, p. 172).

External validity, or the extent to which findings can be generalized to other situations, has been the source of much debate in the qualitative research literature (Firestone, 1993). Findings cannot be
generalized in the statistical sense, that is, from a sample to a population. However, generalizability can be viewed as something different than this. Some authors think empirical generalizations are too lofty a goal for social science; instead we should think in terms of working hypotheses. In qualitative research one might end up with working hypotheses—hypotheses that reflect situation-specific conditions in a particular context. While there are other ways to think of generalizability, the most common conception is reader or user generalizability. In this view, the extent to which findings from an investigation can be applied to other situations is determined by the people in those situations. It is not up to the researcher to speculate how findings can be applied to other settings; it is up to the consumer of the research.

As with internal validity and reliability, there are strategies one can employ to strengthen this aspect of rigor. Thick description is most often cited. This involves providing enough information/description so that readers will be able to determine how closely their situations match the research situation, and hence, whether findings can be transferred. Multisite designs is another strategy. The use of several sites, cases, situations, especially those representing some variation, will allow the results to be applied to a greater range of other situations. Modal comparison is a third strategy that involves describing how typical the program, event, or sample is compared with the majority of others in the same class. Finally, one could randomly sample within the phenomenon being studied since there may be numerous component parts (teachers, administrators, students in a school system, for example), each of which could be sampled for inclusion in the study.

In summary, the trustworthiness of the findings of a study with a small, nonrandom sample is dependent upon the internal validity, reliability, and external validity of the study. As discussed above, there are ways to view each of these concerns that are congruent with the underlying assumptions and worldview of qualitative research. Likewise, there are strategies that investigators can employ to ensure for each of these components of rigor.

THREE TYPES OF QUALITATIVE RESEARCH

As mentioned earlier in the chapter, qualitative research is an umbrella term that covers several distinct forms of qualitative research. Three of the most common are ethnography, case study, and grounded theory. A fourth common form, phenomenology, is dis-
cussed in Chapter 5 under philosophical inquiry. The three to be discussed here all draw upon the same assumptions and worldview and are characterized by (1) the goal of research being understanding, (2) the researcher being the primary instrument of data collection and analysis, (3) fieldwork (in most instances), and (4) the inductive building of concepts, themes, categories, hypotheses, or theories. Each approach is distinguishable from the other two; however, a more detailed discussion of each method's purposes and procedures follows.

ETHNOGRAPHY

Ethnography is the research methodology developed by anthropologists to study human society and culture. Recently the term ethnography has been used interchangeably with field study, case study, naturalistic inquiry, qualitative research, and participant observation. Anthropologists and others familiar with ethnography, however, do not find these terms interchangeable. The term ethnography has two distinct meanings. Ethnography is (1) a set of methods or techniques used to collect data and (2) the written record that is the product of using ethnographic techniques.

Ethnographic techniques are the methods researchers use to uncover the social order and meaning a setting or situation has for the people actually participating in it. The five procedures commonly used in this type of investigation are participant observation, in-depth interviewing, life history, documentary analysis, and investigator diaries (records of the researcher's experiences and impressions). Employing any one of these procedures involves going into the field, "immersing oneself in a collective way of life for the purpose of gaining firsthand knowledge about some facet of it" (Shaffir et al., 1980, p. 6). Fieldwork involves entering the chosen setting, establishing rapport with the residents of that setting, maintaining some type of relationship with the subjects, and, finally, leaving the setting. What comes to mind here is the archetypical anthropologist who travels to exotic places, lives with the people for a period of time, and returns home to write an account of their cultural norms and social practices. Not all ethnographic researchers travel to foreign places, however. Much fieldwork has been conducted with particular social groups within the ethnographer's own society. In the United States, ethnographic studies have been published on many segments of society including ghetto dwellers, coal miners, and suburban housewives.
Participant observation is the cornerstone technique of ethnography, and a researcher might assume any of several variations of this technique. Junker (1960, pp. 35-38) describes four variations:

1. Complete participant. The researcher becomes a member of the group being studied, concealing the fact that he or she is observing as well as participating.
2. Participant as observer. The observer's activities are not concealed but are secondary to activities as a participant.
3. Observer as participant. The role of observer is publicly known, and participation becomes a secondary activity.
4. Complete observer. The observer is invisible to the activity (as in the case of a one-way mirror or hidden camera) or tries to become unnoticed (camera crews that live with their subjects, classroom observers).

The role assumed depends upon the type of information being sought and the idiosyncrasies of the group being investigated. The researcher’s role can also shift during the process of the investigation. In an interesting account of her firsthand experiences in a home for the aged, Pomer (1980) relates how she moved from being a participant observer as a volunteer worker, to complete participant as a programmer, to the stance of observer participant.

Participant observation is a time-consuming and demanding technique. One must establish rapport and trust with a group and become familiar enough to gain insights into the meaning of their lives. At the same time, one must be an observer, remaining as objective as possible while collecting information. This schizophrenic condition is exacerbated by medical problems, ethical issues, and the psychological stress inherent in employing a relatively unstructured research procedure in unfamiliar settings (Shaffir et al., 1980, p. 18). Indeed, several writers have commented upon the lack of description of fieldwork techniques and the lack of guidelines for conducting fieldwork (Berreman, 1968; Pelto, 1970; Shaffir et al., 1980). Pelto (1970) recommends that:

any extensive discussion of the art of fieldwork should include (among other things) sections on selection of informants, on gifts and payments, on when to take notes, on tactics with photographic equipment, on interactions with outsiders, on the giving of parties, on when to break taboos, and on many other subjects related to the central issue of impression management." (p. 225)

Another ethnographic technique used in fieldwork—interviewing—has been described and refined in recent years. Prospective re-
searchers can take courses in interviewing techniques, or they can read about the technique in the many books and articles on the topic. An interview is a "conversation with a purpose" (Dexter, 1970, p. 136). In ethnographic research, interviewing usually follows, or is integrated with, participant observation. Observations will often reveal which persons are important to interview as well as the type of information the researcher wants to extract in the interview. Interviewing is an indispensable tool in certain situations. "The ability to tap into the experience of others in their own natural language, while utilizing their value and belief frameworks, is virtually impossible without face-to-face and verbal interaction with them" (Guba & Lincoln, 1981, p. 155).

There are several types of interviews that can be employed in an investigation: team and panel interviewing, covert or overt interviewing, oral history interviewing, structured and unstructured interviewing (Guba & Lincoln, 1981). In most ethnographic studies, interviews are open ended or loosely structured so that the respondents' views of the topic can be obtained. By using an open-ended format, investigators hope to avoid predetermining the subjects' responses and, hence, their "views" of reality. Interviewing as a data collection technique is discussed more fully in Chapter 8.

Occasionally interviewing key informants (people who have a great amount of knowledge and can conceptualize their group's norms and beliefs) leads to the collection of life histories. Life histories are intensive autobiographical studies of selected members of the sociocultural group under study. "The richness and personalized nature of life histories afford a vividness and integration of cultural information that are of great value for understanding particular life ways" (Pelto, 1970, p. 99).

In addition to using participant observations, interviews, and life histories, an ethnographer may want to evaluate all available documents on the phenomenon being studied. As a resource, documents and records often (1) are easily accessible, low-cost, or free; (2) "constitute a legally unassailable base from which to defend oneself against allegations"; (3) represent the context of the research problem; (4) may be more objective sources of information than an interview; and (5) provide a base for further inquiry (Guba & Lincoln, 1981, pp. 232-234).

Fieldworkers are also encouraged to keep a diary (in addition to fieldnotes) of each day's happenings and record personal feelings, ideas, impressions, or insights with regard to those events. This diary becomes a source of data and allows researchers to trace their own development and biases throughout the course of the investigation.
From the foregoing description of ethnographic techniques, the role of investigator as instrument emerges as a paramount consideration. Several writers have elaborated on the personal qualities essential in a researcher who intends doing ethnographic research. Most suggest that the researcher needs to be empathetic, bright, flexible, energetic, imaginative, and adventuresome. Guba and Lincoln (1981), commenting on the many lists of desirable attributes, note that a person who possessed all of the suggested qualities

not only could be a good inquirer but undoubtedly would make a good president, a fine docto,
distinguishes ethnography from grounded theory—which builds theory—and case study—which describes and interprets a situation or social unit from the perspective of the researcher. Wolcott (1980) makes this distinction between technique and account:

Specific ethnographic techniques are freely available to any researcher who wants to approach a problem or setting descriptively. It is the essential anthropological concern for cultural context that distinguishes ethnographic method from fieldwork techniques and makes genuinely ethnography distinct from other ‘on-site-observer’ approaches. And when cultural interpretation is the goal, the ethnographer must be thinking like an anthropologist, not just looking like one. (p. 59)

Many of the same techniques of ethnography are used in case studies and grounded theory studies. Case study and grounded theory approaches do not have as a major focus sociocultural interpretation and so are even more useful to educators and trainers of adults who wish to conduct exploratory research within their field of practice.

CASE STUDY

The case study is an intensive description and analysis of a phenomenon or social unit such as an individual, group, institution, or community. In contrast to surveying a few variables across a large number of units, a case study tends to be concerned with investigating many, if not all, variables in a single unit. By concentrating upon a single phenomenon or entity (“the case”), this approach seeks to uncover the interplay of significant factors that is characteristic of the phenomenon. The case study seeks holistic description and interpretation. “The content of a case study is determined chiefly by its purpose, which typically is to reveal the properties of the class to which the instance being studied belongs” (Cuba & Lincoln, 1981, p. 371). If conducted over a period of time, the case study may be longitudinal; thus, changes over time become one of the variables of interest. Other case studies are concerned with describing a phenomenon as it exists at a particular time.

Unlike ethnography, which has been associated with only one discipline in particular, the case study method can be appropriately used in many fields. There are legal case studies, medical case studies, psychological case studies, and social case studies; there are even anthropological case studies of primitive cultures. Perhaps because of its widespread use, case study is sometimes confused with the terms case work, case method, and case history. Case study, as defined
above, refers to an intensive study of a particular social unit, whereas case work denotes "the developmental, adjustment, remedial, or corrective procedures that appropriately follow diagnosis of the causes of maladjustment" (Good & Scales, 1954, p. 729). Case method is an instructional technique whereby the major ingredients of a case study are presented to students for illustrative or problem-solving purposes. Case history—the tracing of a person, group, or institution's past—is sometimes part of a case study.

The case study is a basic design that can accommodate a variety of disciplinary perspectives (Merriam, 1988). In particular, case studies in education often draw upon concepts, theory, and research techniques from anthropology, history, sociology, and psychology. Thus a sociocultural analysis of a single social unit or phenomenon would introduce an ethnographic case study, whereas a description of an institution, program or practice as it has evolved over time would be a historical case study.

One of the characteristics of the case study approach is its adaptability to different research problems in many fields of study. Merriam (1988, pp. 11-13) has delineated four essential properties of a qualitative case study. Case studies are:

1. Particularistic. Case studies focus on a particular situation, event, program, or phenomenon.
2. Descriptive. The end product of a case study is a rich description of the phenomenon under study.
3. Heuristic. Case studies illuminate the reader's understanding of the phenomenon under study. They can bring about the discovery of new meaning, extend the reader's experience, or confirm what is known.
4. Inductive. Qualitative case studies for the most part rely upon inductive reasoning for the formulation of concepts, generalizations, or tentative hypotheses.

The process of conducting a case study consists of several steps, the first of which is the selection of the "case" to be analyzed. The selection is done purposefully, not randomly; that is, a particular person, site, program, process, community, or any other social unit is selected because it exhibits characteristics of interest to the researcher. The next step is to collect raw data. A wide range of data-collection techniques can be used by the case study researcher; observation, interviewing, and document analysis are probably the most common, although surveys and other instruments are sometimes used, depending upon the unit under investigation.
As information from various sources is being collected, the researcher may begin aggregating, organizing, and classifying the data into manageable units. Data can be organized chronologically, categorically, or placed within a typology. Aggregation is a process of abstracting generalities from particulars, of looking for patterns characteristic of most of the pieces of data. Several publications give detailed instructions for organizing and analyzing data (Merriam, 1988; Miles & Huberman, 1984; Patton, 1990; Strauss, 1987; Wolcott, 1994). Following is the sequence of procedures described by Guba and Lincoln (1981): First, any item of information from interviews, observations, or documents should be abstracted onto index cards, the first card beginning the first pile; "the second card is then assessed to determine whether it is similar or different from the first. If it is similar, it is placed into the same pile, but if it is different, a new pile is formed" (p. 314). Each pile is then given a name that best reflects the content of the cards in that pile. This name becomes a category or concept central to the study. As new data are collected, these categories become refined and reinforced. New data may also necessitate the formation of a new pile, and thus a new category.

While the index card method detailed by Guba and Lincoln may sound cumbersome, it is a good representation of the process of inductive data analysis. Essentially, the researcher’s task is to sort, analyze, and interpret the data collected in the study. This can be done with index cards as described, with xeroxed pages of data which can be sorted into labeled file folders, or with software programs. The use of computers in qualitative research has become quite common within the last decade or so (Fielding & Lee, 1991; Pfaffengerber, 1988; Tesch, 1990). Miles and Wittman (in Miles & Huberman, 1994) in fact, review 22 different software programs designed for qualitative research. The vast majority of computer programs allow you to efficiently manage your data through coding, memoing, counting, searching, and retrieving; they do not analyze your data for you. The more sophisticated programs may allow you to link data through rule-based or logic-based formats, but the hard work of analysis, of figuring out how data might be linked and what it all means, still resides with the researcher.

The data organization procedure described above by Guba and Lincoln is essentially inductive and results in the uncovering of new categories and concepts. Maimon et al. (1981) make the suggestion that grouped observations might also be labeled according to theoretical concepts already present in the social sciences, for example,
“In child development—sibling rivalry, attention-getting behavior, motor skills, language development; in sociology—alienation, conformity, deviance; in psychology—identity diffusion, depression; in political science—single-issue campaigning, fear mongering” (p. 225). Categories, concepts, and themes can thus be derived from the literature in an area, from an interpretation of the data by the researcher, or from exact words used by participants themselves (Corstas, 1992).

Writing the case study narrative constitutes the final step in the process. The narrative is a highly readable, descriptive picture of a phenomenon or social entity. It should “take the reader into the case situation, a person’s life, a group’s life, or a program’s life” (Patton, 1990, p. 386).

As with other research strategies, the case study has obvious strengths counterbalanced by limitations. The strengths of the case study approach are that it offers large amounts of rich, detailed information about a unity or phenomenon; it is useful as supporting information for planning major investigations in that it often reveals important variables or hypotheses that help structure further research; it allows researchers the flexibility to understand and even to answer questions about educational processes and problems. Some of the limitations of the case study are the following:

- Case studies can be expensive and time consuming.
- Training in observation and interviewing techniques and/or documentary analysis is necessary.
- Case study narratives tend to be lengthy documents, which policy makers and others have little time to read; also, writing the narrative to meet the needs of potential, though perhaps unknown, readers is a difficult task.
- Findings from case studies cannot be generalized in the same manner as findings from random samples; generalizability is related to what each user is trying to learn from the study.

In applied fields such as the education and training of adults, counseling, and vocational education, the case study has been used to describe and/or evaluate the efficacy of a new program or new approach to ongoing problems. For example, a multi-case study of in-service in innovative schools attempted to “determine the features of effective in-service and to establish the impact of these programs in terms of educational change at the school level” (van Tuinder, van der Vegt, & Veenman, 1993, p. 129). Others have used
the case study to explore aspects of practice not previously examined. Rowden's (1993) study of how human resource development functions in small to mid-size successful manufacturing businesses is an example of Tisdell's (1993) study of power relations in adult higher education classes.

Finally, readers are referred to a case study by Zeph (1991) of a career enhancement award program for community-based adult educators. Data were collected through interviews with participants, through observations of three group seminars, and through reviewing documents related to the program including the participants' applications for the award. Zeph found that involvement in the program resulted in significant personal development, which she labeled "The Expanded Self," and significant career development, labeled "The Reflective Practitioner."

In summary, the case study is a particularly useful methodology for exploring an area of a field of practice not well researched or conceptualized. In-depth describing and understanding of a phenomenon are needed before generalizations can be made and tested. Case study, which has as its purpose the description and interpretation of a unit of interest, can result in abstractions and conceptualizations of the phenomenon that will guide subsequent studies.

**GROUNDED THEORY**

Grounded theory is a distinctive research methodology popularized in the late 1960s with the publication of Glaser and Strauss's book, *The Discovery of Grounded Theory* (1967). As with ethnography and case study, the investigator in a grounded theory study is the primary instrument of data collection and analysis, and the mode of investigation is characterized by inductive fieldwork rather than deductive hypothesis testing. The end result of a grounded theory study is the building of theory—theory that emerges from, or is "grounded" in, the data. Grounded theory research emphasizes discovery: description and verification are secondary concerns.

As a qualitative, exploratory methodology, grounded theory is particularly suited to investigating problems for which little theory has been developed. The explanation of an area of human interaction or a social process emerges from a grounded theory study as either substantive or formal theory. Substantive theory deals with phenomena limited to particular real-world situations such as nursing home care, the academic life of community college adult students, or the budgeting of community resources. Formal theory is
more abstract and general (Weber's theory of bureaucracy, for example) and usually requires analysis of data from more than one substantive area.

In one scholar's opinion, generating substantive theory "is, or should be, a concern of researchers in applied professional fields such as adult education" (Darkenwald, 1980, p. 67). Darkenwald goes on to list several substantive areas well suited to grounded theory building: "literacy education in development countries, program development in university extension, rural community development, and continuing professional education" (p. 69). The major purpose of doing grounded theory research in an applied field "is to improve professional practice through gaining a better understanding of it" (p. 69).

Just how professional practice is enhanced is discussed at length by Glaser (1978) in a followup publication to the original book on grounded theory. Glaser recognizes that practitioners are knowledgeable, efficient, even expert in their particular fields of practice. "What the man [sic] in the know does not want is to be told what he already knows. What he wants to be told is how to handle what he knows with some increment in control and understanding of his area of action" (p. 13). A practitioner's knowledge is usually experiential and nontheoretical. The researcher can offer ideas, categories, and a theory that integrates the diverse elements of practice. Grounded theory—if it has truly been generated from the situation and is "grounded" in the data—will give the practitioner a conceptual tool with which to guide practice. As Glaser points out:

> With substantive theory the man [sic] in the know can start transcending his finite grasp of things. His knowledge which was heretofore not transferable, when used to generate theory, becomes transferable to other areas well known to him. His knowledge which was just known but not organized, is now ideationally organized. This allows him perceptible breakthroughs. (p. 13)

Grounded theory, whether substantive or formal, consists of categories, properties, and hypotheses. Categories and the properties that define or illuminate the categories, are conceptual elements of the theory. Categories and properties need to be both analytic—"sufficiently generalized to designate the characteristics of concrete entities, not the entities themselves"—and sensitizing—"yield a meaningful" picture, abetted by apt illustrations that enable one to grasp the reference in terms of one's own experience" (Glaser & Strauss, 1967, p. 38). Hypotheses are relationships among categories
and properties. Unlike hypotheses in experimental studies, grounded
theory hypotheses are tentative and suggestive rather than tested. In
a study of a college faculty's participation in in-service workshops,
for example, the researcher identified "workshop credibility" as one
of several categories explaining faculty participation (Rosenfeldt,
1981). A property that helped to define workshop credibility was
called "identification with sponsoring agent." The author hypothe-
sized that "workshop participation will depend on the extent to
which faculty members identify with the workshop sponsors.
Namely, the greater the identification of the potential participants
with the sponsoring agent, the greater the likelihood that professors
will participate in a given workshop" (p. 189). In another grounded
theory investigation, a study of middle-aged men uncovered "career
malaise" as a category reflective of the career situation of most of the
men in the study. "Boredom," "inertia," and "feeling trapped" de-


gin the category. It was hypothesized that the more acute one's "ca-


ger malaise," the more burdensome the sense of responsibility to


one's children and one's parents (Merriam, 1980). Numerous other
examples of grounded theory studies in sociology can be found in a
reader compiled by Glaser (1993). Several of the studies, such as "Cut-
ting Back After a Heart Attack: An Overview," "New Identities and
Family Life: A Study of Mothers Going to College," and "Doing Time:
A Grounded Analysis of the Altered Perception of Time in the Prison
Setting and Its Effects" are likely to be of interest to educators and
trainers for both content and grounded theory methodology.

Two studies that investigated concepts related to continuing pro-


fessional education were ones by Wagner (1990) and Ritt (1990).
Wagner used grounded theory methodology to identify factors that
influenced professional nurses who were recognized by their col-


leagues to be lifelong learners. Her study resulted in two major
propositions—(1) lifelong learning for the professional nurse is a
value developed early in life through family support as part of the
socialization process that is strengthened through professional
education; and (2) the result of lifelong learning is an expanded per-
sonal and professional understanding of self that is the source of
empowerment.

In a contrasting grounded theory study, Ritt (1990) examined the
evolution of a rather recent phenomenon in the nursing profession—
the role of the nurse consultant. Through indepth interviews with
nurse consultant practitioners, Ritt discovered how an individual be-
comes a nurse consultant and interventions that appropriately pre-
pared the nurse to function in that role. The study resulted in a theoretical model that described the development of the role of the nurse consultant.

In most grounded theory studies, data come from interviews and participants' observations. Glaser and Strauss (1967) note that a wide variety of documentary materials, fiction, and previous research are also potential sources of valuable data. Procedures for collecting and handling data can best be understood through familiarity with the techniques of grounded theory research. Theoretical sampling, comparison groups, constant comparative analysis, and saturation are grounded theory techniques that determine what data to collect, how to handle the data, and when to stop gathering data.

Data collection is guided by theoretical sampling in which "the analyst jointly collects, codes, and analyzes his data and decides what data to collect next and where to find them, in order to develop his theory as it emerges" (Glaser & Strauss, 1967, p. 45). An initial sample is chosen by its logical relevance to the research problem. The reader uses insights gleaned from early analysis to determine where to go next for more data. In a grounded theory study of adult education growth in New Jersey community colleges (MacNeil, 1981), for example, data were originally gathered from divisions of continuing education and community service. Early fieldwork revealed that studying adult student participation could not be limited to a single administrative unit. Subsequently, data were collected from interviews with a wide range of personnel involved in adult education programming.

The discovery of grounded theory is facilitated through the use of comparison groups. Comparing several groups reveals quickly the similarities and differences that give rise to theoretical categories. The strength of these emerging categories is tested by collecting data from diverse groups. In Glaser and Strauss's study of the process of dying (1965a), premature babies who died were first studied, and the emergent concepts then tested with terminal cancer patients. Glaser and Strauss (1965b) describe the use of comparison groups as follows:

Significant categories and hypotheses are first identified in the emerging analysis, during the preliminary fieldwork in one or a few groups and while scrutinizing substantive theories and data from other studies. Comparison groups are then located and chosen in accordance with the purposes of providing new data on categories or combinations of them, suggesting new hypotheses, and verifying initial hy-
hypotheses in diverse contexts ... These groups can be studied one at a
time or a number can be studied simultaneously. They can also be
studied in quick succession in order to check out major hypotheses be-
fore too much theory is built around them. (pp. 292–293)

The basic procedure in grounded theory research is the constant
comparative analysis of data, which consists of four stages (Glaser &
Strauss, 1967; Strauss, 1987). In the first stage one compares incidents,
generates tentative categories and/or properties to cover the inci-
dents, and codes each incident into as many tentative categories as
are appropriate. The researcher also records in memo form any in-
sights that occurred during the comparison of incidents.

In the second stage the comparison of units changes from “inci-
dent with incident” to “incident with properties of the category”
(Glaser & Strauss, 1967, p. 108). The researcher attempts to integrate
categories and their properties.

The third stage is characterized by the delimitation of the theory.
Here, similar categories are reduced to a smaller number of highly
conceptual categories; hypotheses are generated; data are further
checked for their “fit” into the overall framework. The simultaneous
collection and analysis of data end when the categories become sat-
urated. Saturation means that “no additional data are being found”
whereby the researcher “can develop properties of a category”
(Glaser & Strauss, 1967, p. 61). Further incidents of that category need
not be coded since doing so would only add bulk to the coded data and
nothing to the theory” (p. 111).

The fourth stage—the actual writing of the theory from coded data
and memos—occurs when “the researcher is convinced that his anal-
ytic framework forms a systematic substantive theory, that it is a rea-
sonably accurate statement of the matters studied, and that it is
couched in a form that others going into the field could use” (Glaser
& Strauss, 1967, p. 113).

In order to assess the credibility of theory generated through con-
stant comparative analysis of comparison groups, it is essential that
readers be told how data were collected, how coding was done, and
how the categories, properties, and hypotheses emerged from the
data. The value of the theory itself can be determined by the follow-
ing criteria suggested by Glaser and Strauss (1967):

1. Fitness. A theory must fit the substantive area to which it will
be applied; a theory that is closely related to the reality of the
substantive area of investigation is one that has been carefully
inducted from the data.
2. Understanding. Laypersons working in the substantive area should be able to understand and use the theory.

3. Generality. Categories of the generated theory "should not be so abstract as to lose their sensitizing aspect, but yet must be abstract enough to make... theory a general guide to multiconditional, everchanging daily situations" (p. 242).

4. Control. A theory must provide understanding of enough concepts and their interrelations "to enable the person who uses it to have enough control in everyday situations to make its application worthwhile" (p. 245).

Grounded theory as a research methodology is not without its critics. Some consider the approach to be undisciplined and impressionistic. The constant comparative method, if used properly, allows for a very systematic and even rigorous handling of data. Admittedly, the success of a grounded theory investigation depends to some extent upon the sensitivity and analytical powers of the investigator. Discovery, or the process of arriving at an insight that may later form a category or property in the theory, is not a process that can be mapped out for other researchers to follow. Only the tools that may facilitate discovery can be given to the researcher. The investigator remains central to this type of research.

Finally, the charge has been made that other investigators would have evolved different theories from the same data. While this may be true, it does not mean that the theory that has been developed is invalid or inconsistent with the data. Rather, the validity of the theory is judged by its overall explanatory power, by how well assertions are supported, by how well integrated the elements are, and by whether there is an internal, logical consistency to all dimensions of the theory. These same canons are applied to any theory.

Most would agree that applied professional fields such as those related to the education and training of adults do not yet have theoretical bases sufficient to structure all of future research. These fields can be advanced by the addition of theoretical frameworks derived from practice. These frameworks, in turn, can be tested by professionals who are concerned with expanding the knowledge base of their field.

REFERENCES


4 Research Design

What You'll Learn in This Chapter
Here you'll learn the wide variety of research designs available to social science researchers: variations concerning who or what is to be studied when, how, and for what purpose.

INTRODUCTION
 PURPOSES OF RESEARCH
 Exploration
 Description
 Explanation

UNITS OF ANALYSIS
 Individuals
 Groups
 Organizations
 Social Artifacts
 Units of Analysis in Review
 The Ecological Fallacy
 Reductionism

POINTS OF FOCUS
 Characteristics
 Orientations
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THE TIME DIMENSION
 Cross-Sectional Studies
 Longitudinal Studies
 - Approximating Longitudinal Studies

HOW TO DESIGN A RESEARCH PROJECT
 Getting Started
 Conceptualization
 Choice of Research Method
 Operationalization
 Population and Sampling
 Observations
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THE RESEARCH PROPOSAL
 Elements of a Research Proposal

MAIN POINTS
 REVIEW QUESTIONS AND EXERCISES
 ADDITIONAL READINGS
Introduction

Science is an enterprise dedicated to "finding out." No matter what you want to find out, though, there are likely to be a great many ways of doing it. That's true in life generally. Suppose, for example, that you want to find out whether a particular automobile—say, the new Burpo-Blasto—would be a good car for you. You could, of course, buy one and find out that way. You could talk to a lot of B-B owners or talk to people who considered buying one and didn't. You might check the classified ads to see if there were a lot of B-Bs being sold cheap. You could read a consumer magazine evaluation of Burpo-Blasto, or you could find out in a number of other ways. The same situation occurs in scientific inquiry.

Research design, the topic of this chapter, addresses the planning of scientific inquiry—designing a strategy for finding out something. Although the special details vary according to what you wish to study, there are two major aspects of research design. First, you must specify precisely what you want to find out. Second, you must determine the best way to do that. Interestingly, if you can handle the first consideration fully, you'll probably handle the second in the same process. As mathematicians say, a properly framed question contains the answer.

Ultimately, scientific inquiry comes down to making observations and interpreting what you've observed. (Parts 3 and 4 of this book deal with those two major aspects of social research.) Before you can observe and analyze, however, you need a plan. You need to determine what you're going to observe and analyze: why and how. That's what research design is all about.

Let's say you are interested in studying corruption in government. That's certainly a worthy and appropriate topic for social research. But what specifically are you interested in? What do you mean by corruption? What kinds of behavior do you have in mind? And what do you mean by government? Who do you want to study: all public employees? only civilian employees? elected officials? civil servants? Finally, what is your purpose? Do you want to find out how much corruption there is? Do you want to learn why corruption exists? These are the kinds of questions that need to be answered in the course of research design.

This chapter provides a general introduction to research design, and the other chapters in Part 2 elaborate on specific aspects. In practice, all aspects of research design are interrelated. I have separated them here to permit a reasonably coherent picture of research by doing that. In this chapter, I want to lay out the various possibilities for social research. In later chapters, the interrelationships among parts will become clearer.

We'll start with a brief examination of some main purposes for social research. Then, we'll consider units of analysis—the what or whom you want to study. This topic will be elaborated further in Chapter 8, which deals with sampling.

Next, we'll look at some of the points of focus you might take in studying those units of analysis. Chapters 5 and 6 elaborate on this topic by discussing the process of refining your measurements of whatever it is you choose to focus your research on. As we've seen, this aspect of research design is inexorably tied to the method of observation you'll use.

There are two additional topics dealing with research design covered in this chapter. First, I want to draw your attention to alternative ways of handling time in social research. As we'll see, it is sometimes appropriate to examine a static cross section of social life, but other studies follow social processes across time.

Next, a brief overview of the overall research process serves two purposes: (1) it gives you a map to the remainder of this book, and (2) it gives you a sense of how you might go about designing a study. In this latter regard, I've suggested some inexpensive research projects you could undertake.

Finally, I've said a little about research proposals. Often the actual conduct of research needs to be preceded by this detailing of your
intentions—to obtain funding for a major project or perhaps to get an instructor's approval for a class project. We'll see that this offers an excellent excuse and forum for ensuring you have considered all aspects of your research in advance.

So, let’s get started. We’ll begin with the various purposes of social research.

**Purposes of Research**

Social research, of course, serves many purposes. Three of the most common and useful purposes are exploration, description, and explanation. Although a given study can have more than one of these purposes—and most do—it will be useful to examine them separately because each has different implications for other aspects of research design.

**Exploration**

Much of social research is conducted to explore a topic, to provide a beginning familiarity with that topic. This purpose is typical when a researcher is examining a new interest or when the subject of study is itself relatively new and unstudied.

As an example, let’s suppose that widespread taxpayer dissatisfaction with the government erupted into a taxpayers’ revolt. People begin refusing to pay their taxes and organize themselves around that issue. You might like to learn more about the movement: How widespread is it? What levels and degrees of support are there within the community? How is the movement organized? What kinds of people are active in it? You might undertake an exploratory study to obtain at least approximate answers to some of these questions. You might check figures with tax-collecting officials, collect and study the literature of the movement, attend meetings, and interview leaders.

Exploratory studies are also appropriate in the case of more persistent phenomena. Perhaps a college student is unhappy with the college’s dormitory regulations and wants to work toward changing them. He or she might study the history of dormitory regulations at the college, meet with college officials to learn the reasons for the regulations, and talk to a number of students to get a rough idea of student sentiments on the subject. This latter activity would not necessarily yield a precise and accurate picture of student opinion, but it could suggest what the results of a more careful study might be.

Sometimes exploratory research is used through the use of focus groups, guided small group discussions. This technique is frequently used in market research, and we’ll examine it in further detail in Chapter 9 on experimentation.

Exploratory studies are most typically done for three purposes: (1) to satisfy the researcher’s curiosity and desire for better understanding, (2) to test the feasibility of undertaking a more careful study, and (3) to develop the methods to be employed in a more careful study.

Not long ago, for example, I became aware of the growing popularity of something called “channeling,” in which a person known as a channel or medium enters a trance state and begins speaking with a voice that asserts it originates outside the channel. Some of the voices say they come from a spirit world of the dead; some say they are from other planets; and still others say they exist in dimensions of reality difficult to explain in ordinary human terms. You may be familiar with channeling through the “Seth” books of Jane Roberts (1974) or more recent books by Shirley MacLaine (1983). The channelled voices are often referred to by the term entity, and the entities sometimes use the metaphor of radio or television for the phenomenon they represent. “When you watch the news,” one told me in the course of an interview, “you don’t believe Dan Rather is really inside the television set. The same is true of me. I use this medium’s body the way Dan Rather uses your television set.”
The idea of channeling interested me from a number of perspectives, not the least of which was the methodological question of how to study scientifically something that violates so much of what we take for granted, including scientific staples such as space, time, causation, individuality, and the like.

Lacking any rigorous theory or precise expectations, I merely set out to learn more. Using the various methods of field research discussed in Chapter 10, I began amassing information and forming categories for making sense of what I observed. I read books and articles about the phenomenon and talked to people who had attended channeling sessions. I then attended channeling sessions myself, observing those who attended as well as the channel and entity. Subsequently, I conducted personal interviews with numerous channels and entities.

In most interviews, I began by asking the human channels questions about how they first began channeling, what it was like, why they continued, as well as standard biographical questions. The channel would then go into a trance, and the interview soon continued with the entity speaking. "Who are you?" I might ask, "Where do you come from?" "Why are you doing this?" "How can I tell if you are real or a fake?" Although I went into these interview sessions with a number of questions prepared in advance, each of the interviews followed whatever course seemed appropriate in the light of answers given.

I've given you this example of exploration because it so nicely illustrates where social research often begins. Whereas researchers working from deductive theories have the key variables laid out in advance, one of my first tasks was to identify some of the possibly relevant variables. For example, I might note a channel's sex, age, education, religious background, regional origins, and previous participation in things metaphysical. I noted differences in the circumstances of channeling sessions. Some channels said they must go into deep trances; some use light trances; and others are essentially conscious throughout the sessions. Most sit down while channeling, but others stand and walk about. Some channels operate under very ordinary conditions; others seem to require metaphysical props such as dim lights, incense, chanting, and so forth.

As regards the entities, I have been interested in classifying where they say they come from. Over the course of my interviews, I've developed a set of questions about specific aspects of "reality," attempting to classify the answers they give. Similarly, I asked each to speak about future events.

Over the course of this research, my examination of specific topics has become increasingly focused as I've identified variables that seem worth pursuing. None, however, that I began with a reasonably blank slate.

Exploratory studies are very valuable in social scientific research. They are essential whenever a researcher is breaking new ground, and they can almost always yield new insights into a topic for research. Exploratory studies are also a source of grounded theory as discussed in Chapter 2.

The chief shortcoming of exploratory studies is that they seldom provide satisfactory answers to research questions. They can hint at the answers and can give insights into the research methods that could provide definitive answers. The reason exploratory studies are seldom definitive in themselves is the issue of representativeness, discussed at length in Chapter 8 in connection with sampling. Once you understand sampling and representativeness, you will be able to know whether a given exploratory study actually answered its research problem or only pointed the way toward an answer.

Description
A major purpose of many social scientific studies is to describe situations and events. The researcher observes and then describes what was observed. Because scientific observation is
careful and deliberate, however, scientific descriptions are typically more accurate and precise than casual descriptions.

The U.S. Census is an excellent example of descriptive social research. The goal of the census is to describe accurately and precisely a wide variety of characteristics of the U.S. population, as well as the populations of smaller areas such as states and counties. Other examples of descriptive studies are the computation of age-sex profiles of populations done by demographers and the computation of crime rates for different cities.

A Gallup Poll conducted during a political election campaign has the purpose of describing the voting intentions of the electorate. A product marketing survey normally has the purpose of describing the people who use, or would use, a particular product. A researcher who carefully chronicles the events that take place on a labor union picket line has, or at least serves, a descriptive purpose. A researcher who computes and reports the number of times individual legislators voted for or against organized labor also has or serves a descriptive purpose.

**Explanation**

The third general purpose of social scientific research is to explain things. Reporting the voting intentions of an electorate is a descriptive activity, but reporting why some people plan to vote for Candidate A and others for Candidate B is an explanatory activity. Reporting why some cities have higher crime rates than others is a case of explanation, but simply reporting the different crime rates is a case of description. A researcher has an explanatory purpose if he or she wishes to know why an anti-abortion demonstration ended in a violent confrontation with police, as opposed to simply describing what happened.

Returning to the earlier issue of premarital sex, what factors do you suppose might have shaped people's attitudes? How about gender? Do you think men and women might differ in their opinions? Which do you think would be the most permissive about premarital sex? An explanatory analysis of the GSS data indicate that 45 percent of the men and 30 percent of the women said premarital sex was "not wrong at all."

Political orientations correlate strongly with attitudes about premarital sex. Among liberals, 53 percent say premarital sex is all right, compared to 42 percent of the moderates and 29 percent of the conservatives.

Religion also bears a strong influence on the issue. For example, 54 percent of those who never attend religious services say premarital sex is wrong at all, contrasted with 5 percent of those who attend more than once a week. Or, 52 percent of those who do not believe in an afterlife say premarital sex is okay, contrasted with 36 percent of those who do believe in an afterlife.

These abbreviated analyses should give you an indication of what the explanation purpose looks like in social science research. We'll get much deeper into this in Part 4 of the book.

Although it is useful to distinguish the three purposes of research, it bears repeating that most studies will have elements of all three. Suppose, for example, that you have set out to evaluate a new form of psychotherapy. Your study will have exploratory aspects, as you map out the impacts of the therapy. You will want to describe recovery rates, and you will undoubtedly seek to explain why the therapy works better for some types of people than for others.

You will see these several purposes at work in the following discussions of other aspects of research design. Let's turn now to a consideration of whom or what you want to explore, describe, and explain.

**Units of Analysis**

In social scientific research, there is a wide range of variation in what or who is studied: what are technically called the units of analysis.
Social scientists most typically perhaps have individual people as their units of analysis. You may make observations describing the characteristics of a large number of individual people, such as their sexes, ages, regions of birth, attitudes, and so forth. You can then combine the descriptions of the many individuals to provide a composite picture of the population that all those individuals compose.

For example, you may note the age and sex of each individual student enrolled in Political Science 110 and then characterize the students as a group as being 53 percent men and 47 percent women, and as having a mean age of 18.6 years. This is a descriptive analysis of the students taking Political Science 110. Although the final description would be of the class as a whole, the individual characteristics are aggregated for purposes of describing some larger group.

The same situation would exist in an explanatory study. Suppose you wished to discover whether students with a high grade point average received better grades in Political Science 110 than did students with a low grade point average. You would measure the grade point averages and the political science 110 grades of individual students. You might then aggregate all those students with a high grade point average and aggregate all those with a low grade point average and see which group received the best grades in the course. The purpose of the study would be to explain why some students do better in the course than others (looking at overall grade point averages as a possible explanation), but individual students would still be the units of analysis.

Units of analysis in a study are typically also the units of observation. Thus, in a study voting intentions, we would interview ("observe") individual voters. Sometimes, however, we "observe" our units of analysis indirectly. For example, we might ask husbands and wives their individual voting intentions, for the purpose of distinguishing couples who agree and disagree politically. We might want to find out whether political disagreements tend to cause divorce, perhaps. In this case, our units of analysis would be families, though the units of observation would be the individual wives and husbands.

Units of analysis, then, are those units or things we examine in order to create summary descriptions of all such units and to explain differences among them. This concept should be clarified further as we now consider a number of common social science units of analysis.

**Individuals**

As mentioned previously, individual human beings are perhaps the most typical units of analysis for social scientific research. We tend to describe and explain social groups and interactions by aggregating and manipulating the descriptions of individuals.

Any variety of individuals may be the unit of analysis for social scientific research. This point is more important than it may seem at first reading. The notion of generalized understanding in social science should suggest that scientific findings are most valuable when they apply to all kinds of people. In practice, however, social scientists seldom study all kinds of people. At the very least, their studies are typically limited to the people living in a single country, though some comparative studies stretch across national boundaries. Often, our studies are even more circumscribed.

Examples of circumscribed groups whose members may be units of analysis—i.e., the individual level—would be students, residents, workers, voters, parents, and faculty members. Note that each of these terms implies some population of individual persons. The term population will be considered in some detail in Chapter 8 on sampling. At this point, it is enough to realize that descriptive studies having individuals as their units of analysis typically aim to describe the population that comprises those individuals, whereas explanatory studies aim to discover the social dynamics operating within that population.

Individuals, as the units of analysis, may be characterized in terms of their membership in
social groupings. Thus, an individual may be described as belonging to a rich family or to a poor one, or a person may be described as having a college-educated mother or not. We might examine in a research project whether people with college-educated mothers are more likely to attend college than those with non-college-educated mothers or whether high school graduates in rich families are more likely to attend college than those in poor families. In each case, the individual would be the unit of analysis—not the mother or the family.

Groups
Social groups themselves may also be the units of analysis for social scientific research. Realize that this case is not the same as studying the individuals within a group. If you were to study the members of a criminal gang in order to learn about criminals, for example, the individual (criminal) would be the unit of analysis; but if you studied all the gangs in a city in order to learn the differences, say, between big gangs and small ones, between "uptown" and "downtown" gangs, and so forth, the unit of analysis would be the gang, a social group.

Families might be the units of analysis in a study. You might describe each family in terms of its total annual income and according to whether or not it had a color television. You could aggregate families and describe the mean income of families and the percentage with color televisions. You would then be in a position to determine whether families with higher incomes were more likely to have color televisions than those with lower incomes. The individual family in such a case would be the unit of analysis.

Other units of analysis at the group level could be friendship cliques, married couples, census blocks, cities, or geographic regions. Each of these terms also implies some population. Street gangs implies some population that includes all street gangs. The population of street gangs could be described, say, in terms of its geographical distribution throughout a city, and an explanatory study of street gangs might discover: say, whether large gangs were more likely than small ones to engage in intergang warfare.

Organizations
Formal social organizations may also be the units of analysis in social scientific research. An example would be corporations, implying, of course, a population of all corporations, national corporations might be characterized in terms of their number of employees, net annual profits, gross assets, number of defense contracts, number of employees who are from racial or ethnic minority groups, and so forth. We might determine whether large corporations hire a larger or smaller percentage of minority group employees than small corporations. Other examples of formal social organizations suitable as units of analysis would be churches, colleges, army divisions, academic departments, and supermarkets.

When social groups are the units of analysis, their characteristics may be derived from the characteristics of their individual members. Thus, a family might be described in terms of the age, race, or education of its head. In a descriptive study, then, we might find the percentage of all families that have a college-educated head of family. In an explanatory study, we might determine whether families with a college-educated head have, on the average, more or fewer children than families with "heads" who have not graduated from college. In each of these examples, however, the family would be the unit of analysis. (Had we asked whether college graduates—college-educated individuals—have more or fewer children than their less educated counterparts, then the individual person would have been the unit of analysis.) Social groups (and also individuals) may be characterized in other ways: for instance, according to their environments or their membership in larger groupings. Families, for example, might be described in terms of the types of dwelling they reside in; we might want to determine whether rich families are more likely to re-
side in single-family houses (as opposed to, say, apartments) than poor families. The unit of analysis would still be the family.

If all this seems unduly complicated, be assured that in most research projects you are likely to undertake, the unit of analysis will be relatively clear to you. When the unit of analysis is not so clear, however, it is absolutely essential to determine what it is; otherwise, you will be unable to determine what observations are to be made about whom or what.

Some studies have the purpose of making descriptions or explanations pertaining to more than one unit of analysis. In these cases, it is imperative that the researcher anticipate what conclusions he or she wishes to draw with regard to what units of analysis.

Social Artifacts

Another large group of possible units of analysis may be referred to generally as social artifacts, or the products of social beings or their behavior. One class of artifacts would include social objects such as books, poems, paintings, automobiles, buildings, songs, pottery, jokes, and scientific discoveries.

Each of these objects implies a population of all such objects: all books, all novels, all biographies, all introductory sociology textbooks, all cookbooks. An individual book might be characterized by its size, weight, length, price, content, number of pictures, volume of sale, or description of its author. The population of all books of a particular kind of book could be analyzed for the purpose of description or explanation.

A social scientist could analyze whether paintings by Russian, Chinese, or American artists showed the greatest degree of working-class consciousness, taking paintings as the units of analysis and describing each, in part, by the nationality of its creator. You might examine a local newspaper's editorials regarding a local university for purposes of describing, or perhaps explaining, changes in the newspaper's editorial position on the university over time; individual editorials would be the units of analysis.

Social interactions form another class of social artifacts suitable for social scientific research. Weddings would be an example. Weddings might be characterized as racially or religiously mixed or not, religious or secular in ceremony, resulting in divorce or not, or they could be characterized by descriptions of one or both of the marriage partners. Realize that when a researcher reports that weddings between partners of different religions are more likely to be performed by secular authorities than those between partners of the same religion, the weddings are the units of analysis and not the individual partners to them.

Other examples of social interactions that might be the units of analysis in social scientific research are friendship choices, court cases, traffic accidents, divorces, fistfights, shipboardings, airline hijackings, race riots, and congressional hearings.

Units of Analysis in Review

The purpose of this section has been to stretch your imagination somewhat regarding possible units of analysis for social scientific research. Although individual human beings are typically the units of analysis, that need not be the case. Indeed, many research questions can more appropriately be answered through the examination of other units of analysis.

Realize further that the units of analysis I've named and discussed here are not the only possibilities. Rosenberg (1968:234–248), for example, speaks of individual, group, organizational, institutional, spatial, cultural, and societal units of analysis. It is more important, therefore, that you grasp the logic of units of analysis than that you be able to repeat a list of the units of analysis.

The concept of the unit of analysis may seem more complicated than it needs to be. It is irrelevant what you call a given unit of analysis: a group, a formal organization, or a social artifact. It is essential, however, that you be
<table>
<thead>
<tr>
<th>Units of Analysis</th>
<th>Sample Statements</th>
</tr>
</thead>
<tbody>
<tr>
<td>Individuals</td>
<td>60% of the sample are women</td>
</tr>
<tr>
<td></td>
<td>10% of the sample are wearing an eye patch</td>
</tr>
<tr>
<td></td>
<td>10% of the sample have pig tails</td>
</tr>
<tr>
<td>Families</td>
<td>20% of the families have a single parent</td>
</tr>
<tr>
<td></td>
<td>40% of the families have two children</td>
</tr>
<tr>
<td></td>
<td>20% of the families have no children</td>
</tr>
<tr>
<td></td>
<td>The mean number of children per family is 1.2</td>
</tr>
</tbody>
</table>
Figure 4-1 Illustrations of Units of Analysis (continued)

<table>
<thead>
<tr>
<th>Units of Analysis</th>
<th>Sample Statements</th>
</tr>
</thead>
<tbody>
<tr>
<td>Households</td>
<td>20% of the households are occupied by more than one family</td>
</tr>
<tr>
<td></td>
<td>30% of the households have holes in their roofs</td>
</tr>
<tr>
<td></td>
<td>10% of the households are occupied by aliens</td>
</tr>
<tr>
<td></td>
<td>Notice also that 33% of the families live in multiple-family households with family as the unit of analysis</td>
</tr>
</tbody>
</table>
able to identify what your unit of analysis is. You must decide whether you are studying marriages or marriage partners, crimes or criminals, corporations or corporate executives. Unless you keep this point in mind constantly, you run the risk of making assertions about one unit of analysis based on the examination of another.

To test your grasp of the concept of units of analysis, here are some examples of real research topics. See if you can determine the unit of analysis in each. (The answers are at the end of this chapter.)

[1] Women watch TV more than men because they are likely to work fewer hours outside the home than men. ... Black people watch an average of approximately three-quarters of an hour more television per day than white people.
   (Hughes, 1980: 200)

[2] Of the 130 incorporated U.S. cities with more than 100,000 inhabitants in 1960, 128 had at least two short-term proprietary general hospitals accredited by the American Hospital Association.
   (Turk, 1980: 317)

[3] The early TM (Transcendental Meditation) organizations were small and informal. The Los Angeles group, begun in June 1959, met at a member's house where, incidentally, Maharishi was living.
   (Johnston, 1980: 337)

[4] However, it appears that the nursing staffs exercise strong influence over ... a decision to change the nursing care system. ... Conversely, among those decisions dominated by the administration and the medical staffs ... .
   (Connick, 1980: 77)

[5] In 1958, there were 13 establishments with 1,000 employees or more, accounting for 60 percent of the industry's value added. In 1977, the number of this type of establishment dropped to 11, but their share of industry value added had fallen to about 48 percent.
   (Yerk and Pigliaru, 1981: 41)

[6] Though 687,000 out of 2 million farmers in the United States are women, women historically have not been viewed as farmers, but rather, as the farmer's wife.
   (Yates, 1979: 8)

[7] The analysis of community opposition to group homes for the mentally handicapped ... indicates that deteriorating neighborhoods are most likely to organize in opposition, but that upper-middle class neighborhoods are most likely to enjoy private access to local officials. ...
   (Graham and Hogan, 1980: 313)

[8] ... some analysts during the 1960s predicted that the rise of economic ambition and political militancy among blacks would foster discontent with the 'otherworldly' black mainline churches.
   (Ellison and Sherkat, 1980: 351)

[9] This analysis explores whether propositions and empirical findings of contemporary theories of organizations directly apply to both private product producing organizations (PPPs) and public human service organizations (PSOs).
   (Schiffman and Fore, 1980: 580)

[10] This paper examines variations in job title structures across work roles. Analyzing 3,773 job titles in the California civil service system in 1985, we investigate how and why lines of work vary in the proliferation of job categories that differentiate ranks, functions, or particular organizational locations.
   (Strong and Boren, 1980: 475)

Figure 4.1 gives you a graphic illustration of some different units of analysis and the statements that might be made about them.

The Ecological Fallacy

At this point it is appropriate to introduce briefly two important concepts related to units of analysis: the ecological fallacy and reductionism. The first of these concepts, the ecological fallacy, means the danger, just mentioned, of making assertions about individuals as the unit of analysis based on the examination of groups or other aggregations. Let's consider a hypothetical illustration of this fallacy.

Suppose we are interested in learning something about the nature of electoral support...
received by a female political candidate in a recent city-wide election. Let's assume that we have the vote tally for each precinct so that we can tell which precincts gave her the greatest support and which gave her the least. Assume also that we have census data describing some of the characteristics of those precincts. Our analysis of such data might show that precincts whose voters were relatively young gave the female candidate a greater proportion of their votes than precincts whose voters had an older average age. We might be tempted to conclude from these findings that young voters were more likely to vote for the female candidate than older voters—that age affected support for the woman. In reaching such a conclusion, we run the risk of committing the ecological fallacy because it may have been the older voters in those "young" precincts who voted for the woman. Our problem is that we have examined precincts as our units of analysis and wish to draw conclusions about voters.

The same problem would arise if we discovered that crime rates were higher in cities having large African-American populations than in those with few African Americans. We would not know if the crimes were actually committed by African Americans. Or if we found suicide rates higher in Protestant countries than in Catholic ones, we still could not know for sure that more Protestants than Catholics committed suicide.

Very often the social scientist must address a particular research question through an ecological analysis such as those mentioned previously. Perhaps the most appropriate data are simply not available. For example, the precinct vote tallies and the precinct characteristics mentioned in our initial example might be easy to obtain, but we may not have the resources to conduct a postelection survey of individual voters. In such cases, we may reach a tentative conclusion, recognizing and noting the risk of committing the ecological fallacy.

Don't let these warnings against the ecological fallacy lead you into committing what we might call an individualistic fallacy. Some students approaching social research for the first time have trouble reconciling general patterns of attitudes and actions with individual exceptions they know of. If you know a rich Democrat, for example, that doesn't deny the fact that most rich people vote Republican—as a general pattern. Similarly, if you know someone who has gotten rich without any formal education, that doesn't deny the general pattern of higher education relating to higher income.

The ecological fallacy deals with something else altogether—drawing conclusions about individuals based solely on the observation of groups. Although the patterns observed among variables may be genuine, the danger here lies in drawing unwarranted assumptions about the cause of these patterns—assumptions about the individuals making up the groups.

Reductionism

A second concept related to units of analysis is reductionism. Basically, reductionism refers to an overly strict limitation on the kinds of concepts and variables to be considered as causes in explaining a broad range of human behavior. Sociologists may tend to consider only sociological variables (values, norms, roles); economists may consider only economic variables (supply and demand, marginal value); psychologists may consider only psychological variables (personality types, trauma). For example, what caused the American Revolution? A shared commitment to the value of individual liberty? The economic plight of the colonies in relation to Britain? The meganomia of the Founding Fathers? Scientists from different disciplines tend to look at different types of answers and ignore the others. Explaining all or most human behavior in terms of economic factors is called economic reductionism; explaining all or most human behavior in terms of psychological factors is called psychological reductionism; and so forth. Note how this issue relates to the Chapter 2 discussion of theoretical paradigms.

Reductionism of any type tends to suggest that particular units of analysis or variables are
more relevant than others. If we were to regard shared values as the cause of the American Revolution, our unit of analysis would be the individual colonist. An economist, though, might choose the thirteen different colonies as units of analysis and examine the economic organizations and conditions of each colony. A psychologist might choose individual leaders as the units of analysis for purposes of examining their personalities.

Reductionism, like the ecological fallacy, occurs with the use of inappropriate units of analysis. The appropriate unit of analysis for a given research question, however, is not always clear, and it is often debated by social scientists, especially across disciplinary boundaries.

Points of Focus

The preceding discussion of different possible units of analysis has frequently mentioned ways of describing or characterizing them. These ways represent aspects of those units of analysis that might be researched.

To present a general overview of this topic, we’ll consider three points of focus: characteristics, orientations, and actions. Although these do not exhaust the possibilities for research—nor are the three rigidly separate from each other—they should broaden your view of what social scientists can and do focus their attention on.

Characteristics

To begin, the various units of analysis may be characterized in terms of their characteristics or their states of being. Individual persons might be characterized by such states as sex, age, height, marital status, deformities, region of origin, or hearing ability. Social groups and formal organizations might be characterized by size, structure, location, and aggregated descriptions of their members. Physical objects as social artifacts might be described physically—by size, weight, and color, for example—or by the characteristics of the humans associated with them. Social interactions as units of analysis might be characterized in terms of where they occur, when they occur, or what the people involved are like.

These examples are not intended to represent an exhaustive list of possibilities. Nevertheless, they should suggest some of the ways to characterize units of analysis.

Orientations

When individual people are the units of analysis, we frequently investigate what are called orientations: attitudes, beliefs, personality traits, prejudices, predispositions, and the like. Individuals might be characterized as religious, politically liberal, anti-Semitic, intellectually sophisticated, superstitious, or scientific. Orientations, then, are general tendencies, inclinations, or predispositions.

Social groups and formal organizations, similarly, might be characterized in terms of their purposes, policies, regulations, or procedures, or in terms of the aggregated orientations of their members.

Social interactions might be similarly characterized. Airline hijackings might be characterized as politically or nonpolitically motivated, as might court cases and congressional hearings.

Actions

Sometimes social action is the focus of research. We may observe directly or accept secondhand accounts of individual human actions such as voting, bond buying, investing, striking, dropping out of school, going to church, or buying Brand X toothpaste. Secondhand accounts of actions may come from the participants themselves or from other sources. Thus, to find out whether people have registered to vote, we might ask them, or we might check the list of registered voters.

Social groups and formal organizations act as well. Families may go on picnics, pray to-
gether, fight over money, or move to another city. Fraternities may sponsor concerts, or sororities may collect money to send girls to camp. Corporations may contribute to political campaigns, merge with other corporations, fix prices, or go bankrupt.

Because social interactions are actions themselves, it is a little more difficult to imagine them engaging in actions. Nevertheless, marriages succeed or fail, court cases result in conviction or acquittal, and fast foods cool off or get out of hand.

Like the earlier discussion of units of analysis, the present section on points of focus appropriate for research is intended as a mind-expanding exercise, not as a definitive statement of all the possible or legitimate focal points. It matters little at this point whether you regard a person’s score on an IQ test as a characteristic, an orientation, or an action—only that you recognize it as something available for study.

Chapters 5 and 6 will return to these issues with a more rigorously analytical perspective.

The Time Dimension

Time plays a number of roles in the design and execution of research, quite aside from the time it takes to do research. When we examine causation in detail in Part 4, we’ll find that the time sequence of events and situations is a critical element in determining causation. Time is also involved in the issue of the generalizability of research findings. Do the descriptions and explanations that result from a particular study accurately represent the situation of ten years ago or ten years from now, or do they represent only the present state of affairs?

Thus far in this chapter, we have regarded research design as a process for deciding what aspects we shall observe, to whom, and for what purpose. Now we must consider a set of time-related options that cuts across each of these earlier considerations. Our observations may be made more or less at one time, or they may be deliberately stretched over a long period.

Cross-Sectional Studies

Many research projects are designed to study some phenomenon by taking a cross section of it at one time and analyzing that cross section carefully. Exploratory and descriptive studies are often cross-sectional. A single U.S. Census, for instance, is a study aimed at describing the U.S. population at a given time.

Many explanatory studies are also cross-sectional. A researcher who conducted a large-scale national survey to examine the sources of racial and religious prejudice would, in all likelihood, be dealing with a single time frame in the ongoing process of prejudice.

Explanatory cross-sectional studies have an inherent problem. Typically, their aim is to understand causal processes that occur over time, yet their conclusions are based on observations made at only one time. This problem is somewhat akin to that of determining the speed of a moving object on the basis of a high-speed, still photograph that freezes the movement of the object. Some of the ways in which you can deal with this difficult problem will be discussed later.

Longitudinal Studies

Other research projects called longitudinal studies are designed to permit observations over an extended period. An example is a researcher who participates in and observes the activities of a radical political group from the time of its inception to its demise. Analyses of newspaper editorials or Supreme Court decisions over time are other examples. In the latter instances, it would be irrelevant whether the researcher’s observations and analyses were made at one time or over the course of the actual events under study. Three special types of longitudinal studies should be noted here.

Trend studies are those that study changes within some general population over time.
Examples would be a comparison of U.S. Censuses over time, showing growth in the national population, or a series of Gallup Polls during the course of an election campaign, showing trends in the relative strengths and standing of different candidates.

Michael X. Delli Carpini and Scott Keeter (1991) wanted to know whether Americans today are better or more poorly informed about politics than those of an earlier generation. To find out, they compared the results of several Gallup polls conducted during the 1940s and 1950s with a 1989 survey that asked several of the same questions tapping political knowledge.

Overall, the analysis suggests current citizens are slightly better informed. In 1989, for example, 74 percent of the sample could name the vice president of the United States, compared with 67 percent in 1952. In 1989, substantially higher percentages could explain presidential vetoes and congressional overrides of vetoes than could do so in 1947. On the other hand, more of the 1947 sample could identify their U.S. representative (38 percent) than in 1989 (29 percent).

An in-depth analysis, however, indicated that the slight increase in political knowledge resulted from the fact that the people in the 1989 sample were more highly educated than those from earlier years. When educational levels were taken into account, the researchers concluded that political knowledge has actually declined (within specific educational groups).

Cohort studies examine more specific subpopulations (cohorts) as they change over time. Typically, a cohort is an age group, such as those born during the 1920s, but it can also be based on some other time grouping, such as people born during the Vietnam War, people who got married in 1964, and so forth. An example of a cohort study would be a series of national surveys, conducted perhaps every twenty years, to study the economic attitudes of the cohort born during the depression of the early 1930s. A sample of persons 20–25 years of age might be surveyed in 1950, another sample of those 40–45 years of age in 1970, and another sample of those 60–65 years of age in 1990.

Although the specific set of people studied in each of those surveys would be different, each sample would represent the survivors of the cohort born between 1930 and 1975.

James A. Davis (1992) turned to a cohort analysis in an attempt to understand shifting political orientations during the 1970s and 1980s in America. Overall, he found a liberal trend on issues such as race, sex/gender, religion, politics, crime, and free speech. But did this trend represent people in general getting a bit more liberal, or did it merely reflect more liberal younger generations replacing the conservative older ones?

To answer the question, Davis examined national surveys conducted in four time periods, five years apart. In each survey, he grouped the respondents into age groups, also five years apart. This strategy allowed him to compare different age groups at any given point in time, and it also let him follow the political development of each age group over time.

One of the questions he examined was whether a person who admitted to being a communist should be allowed to speak in the respondents' communities. Consistently, the younger respondents in each period of time were more willing to let the communist speak than were the older ones. Among those aged 20–40 in the first set of the survey, for example, 72 percent took this liberal position, contrasted with 27 percent among respondents 80 and older. What Davis found when he examined this cohort over time is shown on the top of page 97.

This pattern of a slight, conservative shift in the 1970s, followed by a liberal rebound in the 1980s, was typical among the several cohorts Davis analyzed (Davis 1992: 269).

Panel studies are similar to trend and cohort studies except that the same set of people is studied each time. One example would be a voting study in which the same sample of voters was interviewed every month during an elec-
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<tr>
<td>Age of Cohort</td>
<td>20–24</td>
<td>25–29</td>
<td>30–34</td>
<td>35–39</td>
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<tr>
<td>Percent who would let the community speak</td>
<td>72%</td>
<td>66%</td>
<td>73%</td>
<td>72%</td>
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The Time Dimension

By studying the same couples over time, the researchers were able to follow the specific problems that arose and the way the couples dealt with them. As a by-product of their research, they found that those studied the most intensively seemed to achieve a somewhat better marital adjustment. The researchers felt that the interviews may have forced couples to discuss matters that may have otherwise been buried under the surface.

Because the distinctions between trend, cohort, and panel studies are sometimes difficult to grasp at first, let's contrast the three study designs in terms of the same variable: political party affiliation. A trend study might look at shifts in the affiliations of the American electorate over time, as the Gallup Poll does on a regular basis. A cohort study might follow shifts in party affiliations among the Depression generation, specifically, say, people who were between 20 and 30 in 1932. We could study a sample of people 30–40 years old in 1942, a new sample of people aged 40–50 in 1952, and so forth. A panel study could start with a sample of the whole population or of some special subset and study those specific individuals over time. Notice that only the panel study would give a full picture of the shifts in party affiliations: from Democrat to Republican, from Republican to Democrat, and so forth. Cohort and trend studies would uncover only net changes.

Longitudinal studies have an obvious advantage over cross-sectional ones in providing information describing processes over time. But very often this advantage comes at a heavy cost in both time and money, especially in a large-scale survey. Observations may have to be made at the time events are occurring, and the method of observation may require many research workers.

Panel studies, which offer the most comprehensive data on changes over time, face a special
problem: panel attrition. Some of the respondents studied in the first wave of the survey may not participate in later waves. This is comparable to the problem of experimental mortality discussed in Chapter 9. The danger is that those who drop out of the study may not be typical, thereby distorting the results of the study. Thus, when Carol S. Aneshensel et al. conducted a panel study of adolescent girls (comparing Hispanics and non-Hispanics), they looked for and found differences in characteristics of survey drop-outs among Hispanics born in America and those born in Mexico. Those differences needed to be taken into account to avoid misleading conclusions about differences between Hispanics and non-Hispanics (Aneshensel et al., 1989).

Approximating Longitudinal Studies

Often it is possible to draw approximate conclusions about processes over time on the basis of simple logic. For example, a study of student drug use was conducted at the University of Hawaii (summarized in Chapter 2). Students were asked to report whether they had ever tried each of a number of illegal drugs. With regard to marijuana and LSD, it was found that some students had tried both drugs, some had tried only one, and others had not tried either. Because these data were collected at one time, and because some students presumably would experiment with drugs later on, it would appear that such a study could not tell the order in which students were likely to experiment with marijuana and LSD. Were students more likely to try marijuana or LSD first?

A closer examination of the data showed, however, that although some students reported having tried marijuana but not LSD, there were no students in the study who had tried only LSD. From this finding it was inferred—as common wisdom suggested—that marijuana use preceded LSD use. If the process of drug experimentation occurred in the opposite time order, then a study at a given time should have found some students who had tried LSD but not marijuana, and it should have found no students who had tried only marijuana.

Logical inferences may also be made whenever the time order of variables is clear. If we discover in a cross-sectional study of college students that those educated in private high schools received better college grades than those educated in public high schools, we would conclude that the type of high school attended affected college grades, not the other way around. Thus, even though our observations were made at only one time, we would feel justified in drawing conclusions about processes taking place across time.

Very often, age differences discovered in a cross-sectional study form the basis for inferring processes across time. Suppose you are interested in the patterns of worsening health over the course of the typical life cycle. You might examine how by studying the results of annual checkups in a large hospital. You could group health records according to the ages of those examined and rate each age group in terms of several health conditions—height, hearing, blood pressure, and so forth. By reading across the age group ratings for each health condition, you would have something approximating the health history of individuals. Thus, you might conclude that the average person develops vision problems earlier in life than hearing problems, for example. You would need to be cautious in this assumption, however, since the differences might reflect society-wide trends. Perhaps improved hearing examinations were instituted in the schools, but only the young people in your study had had the benefit of them.

Asking people to recall their pasts is another common way of approximating observations over time. We use this method when we ask people where they were born or when they graduated from high school or whom they voted for in 1988. The danger is this technique is evi-
The Time Dimension and Aging

by Joseph J. Leon
Behavioral Science Department, California State Polytechnic University, Pomona

One way to identify the type of time dimension used in a study is to imagine a number of different research projects on growing older in the American society. If we studied a sample of individuals in 1990 and compared the different age groups, the design would be termed cross-sectional. If we drew another sample of individuals using the same study instrument in the year 2000 and compared the new data with the 1990 data, the design would be termed trend.

Suppose we wished to study only those individuals who were 51-60 in the year 2000 and compare them with the 1990 sample of 41-50-year-old persons (the 41-50 age cohort); this study design would be termed cohort. The comparison could be made for the 51-60 and 61-70 age cohorts as well. Now, if we desired to do a panel study on growing older in America, we would draw a sample in the year 1990 and, using the same sampled individuals in the year 2000, do the study again. Remember, there would be fewer people in the year 2000 study because all the 41-50-year-old people in 1990 are 51-60 and there would be no 41-50-year-old individuals in the year 2000 study. Furthermore, some of the sampled individuals in 1990 would no longer be alive in the year 2000.

<table>
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<tr>
<th>STUDY TYPE</th>
<th>1990</th>
<th>2000</th>
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<tr>
<td>CROSS-SECTIONAL STUDY</td>
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<td>1990</td>
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<td>61-70</td>
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<td>1</td>
<td>71-80</td>
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<tr>
<td>COHORT STUDY</td>
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<td>1990</td>
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<td>1</td>
<td>71-80</td>
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<td>TREND STUDY</td>
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<td>1990</td>
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<tr>
<td>PANEL STUDY</td>
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<td>1990</td>
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<tr>
<td>1</td>
<td>71-80</td>
<td>71-80</td>
</tr>
</tbody>
</table>

*Denotes comparison

*Denotes same individuals

Sometimes people have faulty memories; sometimes they lie. When people are asked in postelection polls whom they voted for, the results inevitably show more people voting for the winner than did so on election day. Thus, although recall may be the only way of approximating observations across time, it must be used with caution.

These, then, are some of the ways in which time figures into social research and some of the ways social scientists have learned to cope with it. In designing any study, you need to look at
both the explicit and the implicit assumptions you are making about time. Are you interested in describing some process that occurs over time, or are you simply going to describe what exists now? If you want to describe a process occurring over time, will you be able to make observations at different points in the process, or will you have to approximate such observations—drawing logical inferences from what you can observe now? Unless you pay attention to questions like these, you are likely to get up in trouble. The box entitled "The Time Dimension and Aging" explores this issue further.

How to Design a Research Project

You’ve now seen some of the options available to social researchers in designing projects, but what if you were to undertake research? Where would you start? Then, where would you go? These are the topics of this final section of the chapter.

Although research design occurs at the beginning of a research project, it involves all the steps of the subsequent project. The comments that follow, then, should (1) give you some guidance on how to start a research project and (2) provide an overview of the topics that follow in later chapters of the book. Ultimately, the research project needs to be seen as a whole, and you need to grasp it as a whole in order to create a research design. (The Holographic Overview at the beginning of the book was designed to reduce this problem somewhat.) Unfortunately, both textbooks and human cognition operate on the basis of sequential parts.

Figure 4-2 presents a schematic view of the social science research process. I present this view reluctantly, since it may suggest more of a step-by-step order to research than is the case in practice. Nonetheless, as I’ve said, it should be useful to you to have some overview of the whole process before we launch into the specific details of particular components of research.

At the top of the diagram are interests, ideas, and theories, the possible beginning points for a line of research. The letters (A, B, X, Y, and so forth) represent variables or concepts such as prejudice or alienation. Thus, you might have a general interest in finding out what causes some people to be more prejudiced than others, or you might want to know some of the consequences of alienation, etc. Alternatively, your inquiry might begin with a specific idea about the way things are. You might have the idea that working on an assembly line causes alienation, for example. I have put a question mark in the diagram to indicate that you aren’t sure things are the way you suspect they are.

Finally, I have represented a theory as a complex set of relationships among several variables.

Notice, moreover, that there is often a movement back and forth across these several possible beginnings. An initial interest may lead to the formulation of an idea, which may be fit into a larger theory, and the theory may produce new ideas and create new interests.

Any or all of these three may suggest the need for empirical research. The purpose of such research can be to explore an interest, test a specific idea, or validate a complex theory. Whatever the purpose, a variety of decisions needs to be made, as indicated in the remainder of the diagram.

To make this discussion more concrete, let’s take a specific research example. Suppose you are concerned with the issue of abortion and have a special interest in learning why some college students support abortion rights, whereas others oppose them. Going a step further, let’s say you have formed the impression that students in the humanities and social sciences, seem generally more inclined to support the idea of abortion rights than those in the natural sciences. That kind of situation often leads people to design and conduct social research.

In terms of the options we’ve discussed earlier in the chapter, your research would be
Figure 4-2  The Research Process

INTEREST

? → Y
Y → ?

IDEA

X → Y
A → B

THEORY

A → B → E → F
C → D → X → Y

CONCEPTUALIZATION
Specify the meaning of the concepts and variables to be studied

OPERATIONALIZATION
How will we actually measure the variables under study?

CHOICE OF RESEARCH METHOD

Experiments
Survey research
Field research
Content analysis
Existing data research
Comparative research
Evaluation research

POPULATION AND SAMPLING

Whom do we want to be able to draw conclusions about? Who will be observed for that purpose?

OBSERVATIONS
Collecting data for analysis and interpretation

DATA PROCESSING
Transforming the data collected into a form appropriate to manipulation and analysis

ANALYSIS
Analyzing data and drawing conclusions

APPLICATION
Reporting results and assessing their implications
pretty much exploratory. You probably have both descriptive and explanatory interests. What percentage of the student body supports a woman’s right to an abortion, and what causes some to support it and others to oppose it? The units of analysis are individuals: college students. You might decide that a cross-sectional study would suit your purposes. Let’s assume you’d be satisfied to learn something about the way things are now. Although this would provide you with no direct evidence of processes taking place over time, you might be able to approximate some longitudinal analyses as discussed earlier.

Getting Started

The topmost portion of Figure 4.2 contains a number of possible activities. In pursuing your interest in student attitudes about abortion rights, you would undoubtedly want to read something about the issue. If you have a hunch that attitudes are somehow related to a college major, you might want to find out what other researchers may have written about that. Appendix A of this book will give you some assistance in using your college library. In addition, you would probably want to talk to people—some who support abortion rights and some who don’t. You would probably want to attend meetings of abortion-related groups. The purpose of all these activities is to prepare you to handle the various decisions of research design we are about to examine. As you review the previous research literature regarding abortion rights, you should note the design decisions other researchers have made, always asking whether the same decisions would satisfy your purpose.

What is your purpose, by the way? It’s important that you clarify that before designing your study. Do you plan to write a paper based on your research to satisfy a course requirement or as an honors thesis? Is your purpose to gain information that will support you in arguing for or against abortion rights? Do you want to write an article for the campus newspaper or for an academic journal?

Usually, your purpose for undertaking research can be expressed in the form of a report. Appendix B of this book will help you with the organization of research reports, and I would recommend that you outline such a report as the first step in the design of your project. Specifically, you should be clear about the kinds of statements you want to make when the research is complete. Here are two examples of such statements: “X percent of State U. students favor a woman’s right to choose an abortion.” “Engineers are (moreless) likely than sociologists to favor abortion rights.”

Although your final report may not look much like your initial image of it, this exercise will give you something against which to test the appropriateness of different research designs.

Conceptualization

We often talk pretty casually about social science concepts such as prejudice, alienation, religiosity, and liberalism. But it’s necessary to specify what we mean by these concepts in order to do research about them. Chapter 5 examines this process of conceptualization in depth. For now, let’s see what it might involve in the case of our hypothetical example.

If you are going to study how college students feel about abortion and why, the first thing you’ll have to specify is what you mean by “the right to an abortion.” Specifically, you will want to pay attention to the different conditions under which people might approve or disapprove of abortion: e.g., when the woman’s life is in danger, in the case of rape or incest, or simply because the woman wants to have an abortion. You will find that overall support for abortion varies according to the circumstances.

You will, of course, need to specify all the concepts you plan to study. If you want to study the possible effect of a college major, you’ll have to decide whether you want to limit that to officially declared majors or to also include students’ intentions in that regard. What will you do with those who have no major?
Choice of Research Method
As we'll see in Part 3 of this book, there are a variety of research methods available to the social scientist. Each of those methods has strengths and weaknesses, and certain concepts are more appropriately studied by some methods than by others.

In terms of our hypothetical study of attitudes toward abortion rights, a survey might be the most appropriate method: either interviewing students or asking them to fill out a questionnaire. As you'll see in Chapter 10, surveys are particularly well suited to the study of individuals' attitudes. This is not to say that you couldn't make good use of the other methods presented in Part 3. Through content analysis (discussed in Chapter 12), for example, you might examine letters to the editor and analyze the different images letter-writers have of abortion. Field research (Chapter 9) would provide an avenue to understanding how people interact with one another regarding the issue of abortion, how they discuss it, and how they change their minds. As you read Part 3, you'll see ways in which other research methods might be used in studying this topic. Usually, the best study design is one that uses more than one research method, taking advantage of their different strengths.

Operationalization
Having specified the concepts to be studied and having chosen the research method to be used, we must create concrete measurement techniques. Operationalization, discussed in Chapter 6, refers to the concrete steps or operations that will be used to measure specific concepts.

If you decided to study attitudes toward abortion rights by a survey, your operationalization would take the form of questionnaire items. Thus, you might operationalize your main variable by asking respondents whether they would approve a woman's right to have an abortion under a variety of conditions: in the case of rape or incest, if her life were threatened by the pregnancy, and so forth. Ask them to approve or disapprove separately for each situation.

Population and Sampling
In addition to refining concepts and measurements, decisions must be made about who or what to study. The population for a study is that group (usually of people) about whom we want to be able to draw conclusions. We are almost never able to study all the members of the population that interests us, however. In virtually every case, we must sample subjects for study. Chapter 8 describes methods for selecting samples that give an adequate reflection of the whole population that interests us. Notice in Figure 4-2 that decisions about population and sampling are related to decisions about the research method to be used.

In the study of abortion attitudes we've been discussing, the relevant population is the student population of your college. As you'll discover in Chapter 8, however, selecting a sample will require you to get more specific than that. Will you include part-time as well as full-time students? Only degree candidates or everyone? International students as well as U.S. citizens? Undergraduates, graduate students, or both? There are many such questions—each of which must be answered in terms of your research purpose. If your purpose is to predict how students would vote in a local referendum on abortion, you might want to limit your population to those eligible and likely to vote.

Observations
Having decided what to study among whom by what method, we are now ready to make observations—to collect empirical data. The chapters of Part 3, which describe the various research methods, give the different observation methods appropriate to each.

In the case of the abortion survey, you might want to print questionnaires and mail them to a sample selected from the student body, or you could arrange to have a team of interviewers...
conduct the survey over the telephone. The relative advantages and disadvantages of these and other possibilities are discussed in Chapter 10.

Data Processing
Depending on the research method chosen, you will have amassed a volume of observations in a form that probably isn’t easily interpretable. Chapter 14 describes some of the ways in which social scientific data are processed or transformed for quantitative analysis.

In the case of a survey, the “raw” observations are typically in the form of questionnaires with boxes checked, answers written in spaces, and the like. The data-processing phase for a survey typically involves the classification (coding) of written-in answers and the transformation of all information to some computer format: on magnetic diskettes or computer hard disk, for example.

Analysis
Finally, we manipulate the collected data for the purpose of drawing conclusions that reflect on the interests, ideas, and theories that initiated the inquiry. Chapters 15 through 17 describe a few of the many options available to you in analyzing data. Notice that the results of your analyses feed back into your initial interests, ideas, and theories. In practice, this feedback may very well represent the beginning of another cycle of inquiry.

In the study of student attitudes about abortion rights, the analysis phase would pursue both descriptive and explanatory aims. You might begin by calculating the percentages of students who favored or opposed each of the several different versions of abortion rights. Taken together, these several percentages would provide a good picture of student opinion on the issue.

Moving beyond simple description, you might describe the opinions of different subsets of the student body: men versus women; freshmen, sophomores, juniors, seniors, graduate students; engineering majors, sociology majors, English majors, and so forth. The description of subgroups could then lead you into an explanatory analysis, as explained in Chapter 16.

Application
The final stage of the research process involves the uses made of the research you’ve conducted and the conclusions you’ve reached. To start, you will probably want to communicate your findings, so that others will know what you’ve learned. It may be appropriate to prepare—and even publish—a written report. Perhaps you will make oral presentations, such as papers delivered to professional and scientific meetings. Other students would be interested in hearing what you have learned about them, in the case of the abortion rights study.

You may want to go beyond simply reporting what you have learned to discuss the implications of your findings. Do they say anything about actions that might be taken in support of policy goals? Both the proponents and the opponents of abortion rights would be interested.

Finally, you should consider what your research suggests in regard to further research on your subject. What mistakes should be corrected in future studies? What avenues—opened up slightly in your study—should be pursued further in later investigations? This aspect of the research process will be discussed further in Chapter 10.

Review
As this overview shows, research design involves a set of decisions regarding what topic is to be studied among what population with what research methods for what purpose. Whereas the earlier sections of this chapter—dealing with research purposes, units of analysis, points of focus—aimed at broadening your per-
spective in all these regards, research design is the process of narrowing, of focusing, your perspective for purposes of a particular study.

If you are doing a research project for a course you are taking, many aspects of research design may have been specified for you in advance. If you must do a project for a course in experimental methods, the method of research will have been specified for you. If the project is for a course in voting behavior, the research topic will have been somewhat specified. Because it would not be feasible for me to anticipate all such constraints, the following discussion will assume there are none.

In designing a research project, you will find it useful to begin by assessing three things: your own interests, your abilities, and the resources available to you. Each of these considerations will suggest a large number of possible studies.

Simulate the beginning of a somewhat conventional research project: Ask yourself what you are interested in understanding. Surely you have several questions about social behavior and attitudes. Why are some people politically liberal and others politically conservative? Why are some people more religious than others? Are college students becoming more vocationally oriented or less so? Do colleges and universities still discriminate against women faculty members? Are interracial marriages more or less successful than others? Do students learn more in large classes or small ones? Sit for a while and think about the kinds of questions that interest and concern you.

Once you have a few questions you would be interested in answering for yourself, think about the kind of information needed to answer them. What research units of analysis would provide the most relevant information: college students, corporations, voters, cities, or what? This question will probably be integrable in your thoughts from the question of research topics. Then ask which aspects of the units of analysis would provide the information you need to answer your research question.

Once you have some ideas about the kind of information relevant to your purpose, ask yourself how you might go about getting that information. Are the relevant data likely to be already available somewhere (say, in a government publication), or would you have to collect them yourself? If you think you would have to collect them, how would you go about doing that? Would it be necessary to interview a large number of people? Could you learn what you need to know by attending meetings of certain groups? Could you glean the data you need from books in the library?

As you answer these questions, you are well into the process of research design. Keep in mind your own research abilities and the resources available to you, however. Do not design the perfect study if you will be unable to carry it out. You may want to try a research method you have not used before, since research should be a learning experience in many ways, but you should not put yourself at too great a disadvantage.

Once you have a general idea of what you want to study and how, carefully review previous research in journals and books to see how other researchers have addressed the topic and what they have learned about it. Your review of the literature may lead you to revise your research design: Perhaps you will decide to use a previous researcher's method or even replicate an earlier study. The independent replication of research projects is a standard procedure in the physical sciences, and it is just as important in the social sciences, although we tend to overlook that. Or, you might want to go beyond replication and study some aspect of the topic that you feel previous researchers have overlooked.

Here's another approach you might take. Suppose a topic has been studied previously using field research methods. Can you design an experiment that would test the findings those earlier researchers produced? Or, can you think of existing statistics that could be used to test their conclusions? The use of several different
research methods to test the same finding is sometimes called triangulation, and you should always keep it in mind as a valuable research strategy. Because each research method has particular strengths and weaknesses, there is always a danger that research findings will reflect, at least in part, the method of inquiry. In the best of all worlds, your own research design should bring more than one research method to bear on the topic.

The Research Proposal

The purpose of this chapter has been to let you see the whole research process in overview. That’s useful in terms of learning, of course, but this chapter can serve you in another way as well. If you were to undertake a research project—an assignment for this course, perhaps, or even a major study you would have to have funded by the government or a large corporation—you might very well have to provide a research proposal describing what you intend to accomplish and how. We’ll conclude this chapter with a discussion of how you might prepare such a proposal.

Elements of a Research Proposal

Although some funding agencies (or your instructor, for that matter) may have specific requirements for the elements and/or structure of a research proposal, here are some basic elements that you should discuss.

Problem or Objective What exactly do you want to study? Why is it worth studying? Does the proposed study have practical significance? Does it contribute to our general understanding of things, to the construction of social theories, for example?

Literature Review What have others said about this topic? What theories address it and what do they say? What research has been done previously? Are there consistent findings or do past studies disagree? Are there flaws in the body of existing research that you feel you can remedy?

Subjects for Study Who or what will you study in order to collect data? Identify the subjects in general, theoretical terms, and in specific, more concrete terms, identify who is available for study and how you will reach them. Will it be appropriate to select a sample? If so, how will you do that? If there is any possibility that your research will have an impact on those you study, how will you ensure that they are not harmed by the research?

Measurement What are the key variables in your study? How will you define and measure them? Do your definitions and measurement methods duplicate (that’s okay, incidentally) or differ from those of previous research on this topic? If you have already developed your measurement device (for example, questionnaire) or will be using something previously developed by others, it might be appropriate to include a copy in an appendix to your proposal.

Data-Collection Methods How will you actually collect the data for your study? Will you conduct an experiment or a survey? Will you undertake field research, or are you going to focus on the reanalysis of statistics already created by others?

Analysis Indicate the kind of analysis you plan to conduct. If you anticipate the use of specific analytical techniques—stepwise regression, factor analysis, and so on—you might say that. More important, however, spell out the purpose and logic of your analysis. Are you interested in precise description? Do you intend to explain why things are the way they are? Do you plan to account for variations in some quality?

For example, why are some students more liberal than others? What possible explanatory variables will your analysis consider, and how?
will you know if you've explained variations adequately?

**Schedule** It is often appropriate to provide a schedule for the various stages of research. Even if you don't do this for the proposal, do it for yourself. Unless you have a timeline for accomplishing the several stages of research and keeping in touch with who you’re doing, you may end up in trouble.

**Budget** If you are asking someone to give you money to pay for the costs of your research, you will need to provide a budget, specifying how the money will go. Large, expensive projects include budgetary categories such as personnel, equipment, supplies, and expenses such as telephones and postage. Even for a more modest project, which you will pay for yourself, it’s a good idea to spend some time anticipating any expenses involved: office supplies, photocopying, computer disks, telephone calls, transportation, and so on.

As you can see, if you were interested in conducting a social science research project, it would be a good idea to prepare a research proposal for your own purposes, even if you weren’t required to do so by your instructor or a funding agency. If you are going to invest your time and energy in such a project, you should do what you can to ensure a return on that investment.

Now that you've had a broad overview of social research, let's move on to the remaining chapters in this book and learn exactly how to design and execute each specific step. If you have found a research topic that really interests you, it would be useful to keep that topic in mind as you see how you might go about studying it.

**Main Points**

- Description is the precise measurement and reporting of the characteristics of some population or phenomenon under study.
- Explanation is the discovery and reporting of relationships among different aspects of the phenomenon under study. Whereas descriptive studies answer the question “What's so?” explanatory ones tend to answer the question “Why?”
- Units of analysis are the people or things whose characteristics social researchers observe, describe, and explain. Typically, the unit of analysis in social research is an individual person, but it may also be a group or a social artifact.
- Whatever the units of analysis in research, they offer numerous points of focus that might be subjected to research: characteristics, orientations, and actions, for example.
- Cross-sectional studies are those based on observations made at one time. Although such studies are limited by this characteristic, inferences can be made about processes that occur over time.
- Longitudinal studies are those in which observations are made at many times. Such observations may be made of samples from general populations (trend studies), samples drawn from more specific subpopulations (cohort studies), or the same sample of people each time (panel studies).
- Conceptualization is the process clarifying what is meant by the concepts being used in a study.
- Operationalization is the specification of precisely how variables are to be measured—an extension of the process begun with conceptualization.
- A research proposal provides a preview of why a study will be undertaken and how it will be conducted. It is a useful device for planning and may be required in some circumstances.
Review Questions and Exercises

1. Make up a research example—different from those discussed in the text—that would illustrate a researcher falling into the trap of the ecological fallacy. Then describe a modified research project that would avoid that trap.

2. Look through an academic research journal and find examples of at least three different units of analysis. Identify each unit of analysis, and present a quotation from the journal in which that unit of analysis is reported.

Additional Readings


Casley, D. J. and D. A. Lury, *Data Collection in Developing Countries* (Oxford: Clarendon Press, 1987). Mostly we’ve talked about designing social research in the United States or similar countries. This book discusses the special problems of research in the developing world.


Hunt, Morton, *Profiles of Social Research: The Scientific Study of Human Interactions* (New York: Basic Books, 1985). An engaging and informative series of project biographies: James Coleman’s study of segregated schools is presented, as well as several other major projects that illustrate the elements of social research in actual practice.


Menard, Scott, *Longitudinal Research* (Newbury Park, CA: Sage, 1991). Beginning with an explanation of the purposes for conducting longitudinal research, the author goes on to detail a variety of study designs, as well as suggestions for the analysis of longitudinal data.


Answers to Units of Analysis

Exercise (page 92)

1. individuals (men and women, black and white people)
2. groups (incorporated U.S. cities)
3. groups (Transcendental Meditation organizations)
4. groups (nursing staffs)
5. groups (establishments)
6. individuals (women and men farmers)
7. groups (neighborhoods)
8. individuals (black-Americans)
9. organizations (service and production organizations)
10. artifacts (job titles)
Research Methods in the Social Sciences
SECOND EDITION

DAVID NACHMIAS
CHAVA NACHMIAS

St. Martin's Press
New York
CHAPTER 9

Questionnaire Construction

INTRODUCTION

The last chapter focused on survey research as a method of data collection. In this chapter we discuss the questionnaire as the main instrument in survey research. We start by discussing the foundation of all questionnaires—the question. We then look at the content of questions and differentiate between open-ended, closed-ended, and contingency type questions. We follow by analyzing the format and sequence of questions. The next section introduces possible biases in the wording of questions. In this context we discuss leading, double-barreled, and threatening questions. Finally, in the last two sections, the cover letter accompanying the questionnaire and the instructions included in it are described.

THE QUESTION

The foundation of all questionnaires is the question. The questionnaire must translate the research objectives into specific questions; answers to such questions will provide the data for hypothesis testing. The question must also motivate the respondent so that the necessary information is obtained. It is to these two ends that the question becomes the focus around which the questionnaire is constructed. The major considerations involved in formulating the question are its content, structure, format, and sequence. These issues are examined in the following sections.

CONTENT OF QUESTIONS

Survey questions may be concerned with facts, opinions, attitudes, respondents' motivation, and their level of familiarity with a certain sub-
Most questions, however, can be classified into the two general categories of (1) factual questions or (2) opinion and attitude questions.

**Factual Questions**

Factual questions are designed to elicit objective information from the respondents regarding their background, their environment, their habits, and the like. The most common type of a factual question is the background question, which is asked mainly to provide information by which respondents can be classified, such as sex, age, marital status, education, or income. Such classifications, in turn, may aid in explaining differences in behaviors and attitudes. The following is an example of such a question:

“What was the last grade you completed in school?” (please check one)

- 0 to 8 years
- 1 to 2 years high school
- 3 to 4 years high school; high school graduate __ Yes __ No
- 1 to 2 years college
- 3 to 4 years college; college graduate __ Yes __ No
- 5 or more years college

Other kinds of factual questions are intended to provide information on the respondents' social environment (“Will you please tell me who are the people living in your household?”), their means of transportation (“How do you generally get to work?”), or their leisure activities (“How often do you go to the movies?”). Factual questions are thought to be easier to design than other types of questions. However, even factual questions can present the researcher with problems. Oppenheim refers to several examples of the kind of difficulties that are likely to occur with factual questions. In a housing survey many respondents reported fewer bedrooms than their houses actually contained, simply because they did not think of a den, a playroom, or a guest room as “bedrooms” in the sense intended by the question. Similarly, in a market survey concerning drinking habits, many failed to mention “instant” coffee because they did not consider it as “coffee.” These examples point to a possibly different frame of reference between the investigator and the respondents. A clear definition of what is meant by the concept is always required to avoid this.


**Opinion Questions**

The concept “attitude” refers to the sum total of a person’s inclinations, prejudices, ideas, fears, and convictions about any specific topic. Opinions, on the other hand, are the verbal expression of attitudes. Thus, a statement such as “The United States should fight communism in the Middle East” would reflect an opinion that is against communism, but an attitude about communism would mean a more general orientation of what a person feels and thinks about communism.

An attitude can lead to a tendency to act or react in a certain manner when confronted with certain stimuli. The individual’s attitudes are expressed in speech or behavior, only when the object of the attitude is perceived. A person may have strong attitudes for or against communism, but these are aroused and conveyed only when that person encounters some issue connected with Communists or when he or she is confronted with a stimulus such as a question in an interview.

Attitudes can be described by their content (what the attitude is about), by their direction (positive, neutral, or negative feelings about the object or issue in question), and by their intensity (an attitude may be held with greater or lesser vehemence). To one person, communism may be but of passing interest; to another, it may be of great significance and lead that person to join anti-Communist organizations. One would expect the latter to agree or disagree more years college than would the former to questions dealing with, say, trade with the Soviet Union.

In general, we are interested in measuring attitudes because they account for the respondent’s general inclination. The study of opinion is of interest only in so far as it is a symbol of an attitude. The main difference between asking for opinions and measuring attitudes is that an opinion is generally measured by estimating what proportion of the surveyed population say they agree with a single opinion statement.

Attitudes are measured by attitude scales consisting of five or more attitude statements, with which the respondent is asked to agree or disagree. An essential requirement of attitude measurement is that such attitude statements be scaled; that is, that the statements be selected and put together from a much larger number of attitude statements according to certain techniques. These techniques, called attitude scaling, will be discussed in Chapter 16.

Survey questions about opinions and attitudes present more problems in construction than questions about factual data. It is relatively simple to obtain accurate information on, for example, whether or not a person


4. Ibid.
is married or single. One may reasonably assume that the respondent knows whether he or she is married or not. With opinions or attitudes, the assumption that the respondents know cannot always be made. For example, respondents may not have an attitude towards communism, or if they do, it might be largely latent. Moreover, given that many attitudes have various aspects or dimensions, the respondent may agree with one aspect and disagree with another. This is why attitudes cannot be measured by a single question. For example, if a respondent strongly disagrees with the statement “Trade with the Soviet Union should be encouraged,” this does not imply a broad anti-Communist attitude. This person’s disagreement may be due to personal circumstances; for instance, the person may think that trade with the Soviet Union would harm his or her business. By using several attitude statements, one can reduce the effects of one-sided responses.

Finally, answers to opinion and attitude questions are more sensitive to changes in wording, emphasis, and sequence than are those to factual questions. This reflects, in part, the multidimensionality of many attitudes. Questions presented in different ways sometimes reflect different aspects of the attitude and thus result in different answers.

**TYPES OF QUESTIONS**

The content of the question is only one important aspect in the construction of survey questionnaires. The researcher must also consider the structure of the question and the format of the response categories accompanying the questions. Three types of question structures can be distinguished and will be discussed in the following sections: (1) open-ended questions, (2) closed-ended questions, and (3) contingency questions.

**Open-Ended and Closed-Ended Questions**

Questions in a questionnaire can be either open-ended or closed-ended. In a closed-ended question, respondents are offered a set of answers from which they are asked to choose the one that most closely represents their views. For example, to measure political conservatism in the United States, Angus Campbell and coauthors used, among other questions, the following closed-ended question:


“All groups can live in harmony in this country without changing the system in any way.”

<table>
<thead>
<tr>
<th>Strongly agree</th>
<th>Agree</th>
<th>Disagree</th>
<th>Strongly disagree</th>
</tr>
</thead>
</table>

Agreement with the question indicated conservatism. Answers to closed-ended questions can be more elaborate. To measure group cohesiveness, Stanley Sesshore7 asked,

“Do you feel that you are really part of your work group?”

| Included in most ways | Included in some ways, but not in others | Don’t feel I really belong | Don’t work with any one group of people | Not ascertained |

Closed-ended questions are easy to ask and quick to be answered; they require no writing by either respondent or interviewer, and their analysis is straightforward. Their major drawback is that they may introduce bias, either by forcing the respondent to choose from given alternatives or by making the respondent select alternatives that might not have otherwise occurred.

Open-ended questions are not followed by any kind of specified choice, and the respondents’ answers are recorded in full. For instance, the question “What do you personally feel are the most important problems the government in Washington should try to take care of?” is an open-ended question used frequently in questionnaires designed to study public opinion. The virtue of the open-ended question is that it does not force the respondent to adapt to preconceived answers: having understood the intent of the question, one can express one’s thoughts freely, spontaneously, and in one’s own language. If the answers to open-ended questions are unclear, the interviewer may probe, that is, ask the respondent to explain further or to give a rationale for something stated earlier. Open-ended questions, then, are flexible: they have possibilities of depth, they enable the interviewer to clear up misunderstandings, and they encourage rapport. However, open-ended questions are difficult to answer and still more difficult to analyze. The researcher has to design a coding frame in order to classify the various answers; in this process, the details of the information provided by the respondent might get lost (see Chapter 11).

The appropriateness of either open-ended or closed-ended questions depends upon a number of factors. Some years ago, Paul Lazarsfeld suggested the use of the following considerations to determine appropriateness:

1. **The objectives of the questionnaire.** Closed-ended questions are suitable when the researcher's objective is to lead the respondent to express agreement or disagreement with an explicit point of view. When the researcher wishes to learn about the process by which the respondent arrived at a particular point of view, an open-ended question is likely to be more appropriate.

2. **The respondent's level of information about the topic in question.** Open-ended questions provide opportunities for the interviewer to ascertain lack of information on the part of the respondent, whereas closed-ended questions do not. Obviously, it is futile to raise questions that are beyond the experiences of respondents.

3. **The extent to which the topic has been thought through by the respondent.** The open-ended question is preferable in situations where the respondents have not yet crystallized their opinions. The use of a closed-ended question in such situations involves a risk that in accepting one of the alternatives offered, the respondent may make a choice that is quite different from an opinion that would have otherwise been expressed had he or she gone through the process of recall and evaluation of past experience.

4. **The ease with which the content of the answer can be communicated by the respondent or the extent to which the respondent is motivated to communicate on the topic.** The closed-ended question requires less motivation to communicate on the part of the respondent, and the response itself is usually less revealing to the respondent (and hence less threatening) than in the case of the open-ended question. The researcher who uses closed-ended questions tends to encounter less frequent refusals to respond.

Sometimes there may be good reasons for asking the same question in both open-ended and closed-ended form. For example, an open-ended answer to the question “Who rules America?” will provide a clear idea of the respondent's conception of the political system and the significance that the person attaches to different power groups. Although this datum is most valuable, it might not allow comparison of one group of respondents with another. Furthermore, one cannot be sure that all information of importance to the respondent has been mentioned; factors such as the inability to articulate thoughts or a momentary lapse of memory may cause omission of significant points. Therefore, the researcher can ask the same question again, later in the interview, but this time in closed-ended form.

**Contingency Questions**

Frequently questions that are relevant to some respondents may be irrelevant to others. For example, the question “Check the most important reasons why you are not going to college” obviously applies only to those high school students who are planning to go to college at all. It is often necessary to include questions that might apply only to some respondents and not to others. Some questions may be relevant only to females and not to males; others will only apply to respondents who are self-employed, and so on.

A contingence question—a special case of a closed-ended question—is one that applies only to a subgroup of respondents. The relevance of the question to this subgroup is determined by the answer of all respondents to a preceding filter question. For example, in a news media survey the filter question might read, “Do you regularly follow the news in the papers?” The contingency question could be, “What recent event do you remember reading about? (Give a brief description.)” The relevance of the second question to the respondent is contingent upon his or her response to the filter question. Only respondents who responded “Yes” to the filter question will find the contingency question relevant.

Therefore, the response categories of the filter questions will be 1. Yes (answer the following question); 2. No (skip to question 3).

The formats for filter and contingency questions vary. One alternative, as in the preceding example, is to write directions next to each response category of the filter question. Another common format is to use arrows to direct the respondent either to skip to another question or to answer the contingency question, as in the following example:

- Is this the first full-time job you have held since you graduated from college?
  1. Yes
  2. No

What happened to the job you had before—were you promoted, laid-off, or what? (Check one.)
  1. Company folded.
  2. Laid off or fired.
  3. Job stopped; work was seasonal.
  4. Voluntarily quit.
  5. Promoted; relocated.
  6. Other.

Another format is to box the contingency questions and to set it apart from the ordinary questions to be answered by everybody. An example of such a format, taken out of a questionnaire used in a study of high school social climate is shown in Box 9.1.9

**Box 9.1.**

**Answer Questions Below If You Are a Senior Planning To Go to College Next Fall. Non-Seniors Skip to Question 144.**

137. Did you take the College Entrance Board Exams?
   
   __ yes __ no

138. Do you definitely know yet which college you will attend?
   
   __ yes __ no

139. If "yes," how does this school compare to the others you were considering, in each of the following ways?

   1. □  2. □  3. □  4. □ Offering the course of study you want.
   1. □  2. □  3. □  4. □ General reputation of the school.

**Skip to Question 151 on the Next Page.**

When there are several subgroups to which the questionnaire is addressed and when several contingency questions apply to each subgroup, it is useful to indicate by number which questions the respondent should answer. The instructions are written next to the appropriate response categories in the filter question. This is demonstrated in the following example.

Are you looking for another job at this time?

   __ yes __ no
   __ don’t know __ inappropriate

---


**Question Format**

In this section we will discuss some of the common techniques of structuring the response categories of closed-ended questions. The general format is to present all possible answers and have the respondent check the appropriate categories. The respondent can either circle his or her answer or check a box or a blank as in the following examples:

"What is your marital status?"

- Married
- Single
- Divorced
- Widowed

Of course, specific directions should be provided as to whether the respondent is to circle a number or check a blank or a box. Among these three methods the least recommended is the blank method because often the respondent will check between the blanks and it will be difficult to tell which category was intended. The method of circling a code number is preferable to the box method because the circled code number can later be punched on cards, and this facilitates the data processing (see, Chapter 11).

**Rating**

One of the most common formats for questions asked in social science surveys is the rating scale. The rating scale is used whenever respondents are asked to make a judgment in terms of sets of ordered categories, such as "strongly agree," "favorable," or "very often." For example:

"Police should be allowed to conduct a full search of any motorist arrested for an offense such as speeding."

1. Strongly agree
2. Agree
3. Disagree
4. Strongly disagree
5. No opinion

The response categories of such questions are termed "quantifiers"; they reflect the intensity of the particular judgment involved. The following sets of response categories are quite common:

1. Strongly agree
2. Agree
3. Depends
4. Disagree
5. "Strongly disagree"
The numerical codes that accompany these categories are usually interpreted to represent the intensity of the response categories, so that the higher the number, the more intense the response. Yet it should be emphasized that though we assume that the quantifiers involved are ordered by their intensity, it does not imply that the distance between them is equal. Indeed rating scales such as these are most often measured on ordinal levels of measurement, as discussed in Chapter 6.

Despite the difficulty in estimating intensities, we cannot typically ask respondents for exact estimates because most would have a great deal of difficulty with the task. Although it would seem relatively easy to report how many hours in the past week a person watched television, most people have greater difficulty in estimating precisely events of relatively low salience, such as attitudes about foreign policy.10

Matrix Questions

The matrix question is a method for organizing a large set of rating questions that have the same response categories. The following is an example of such a device.

Which of the following statements do you (1) strongly agree to, (2) agree with, (3) find that it depends, (4) disagree with, or (5) strongly disagree with:

<table>
<thead>
<tr>
<th>Strongly Agree</th>
<th>Agree</th>
<th>Depends</th>
<th>Disagree</th>
<th>Strongly Disagree</th>
</tr>
</thead>
<tbody>
<tr>
<td>My vote gives me all the power I want in governmental affairs</td>
<td>( )</td>
<td>( )</td>
<td>( )</td>
<td>( )</td>
</tr>
<tr>
<td>If I complained to a city agency, they would fix it up whatever was wrong</td>
<td>( )</td>
<td>( )</td>
<td>( )</td>
<td>( )</td>
</tr>
<tr>
<td>I’ve sometimes wished that government officials paid more attention to what I thought</td>
<td>( )</td>
<td>( )</td>
<td>( )</td>
<td>( )</td>
</tr>
</tbody>
</table>


The Card Sort

Another way to measure intensities of judgments is the card sort, where the respondent is handed a set of cards with a statement on each card and is asked to sort them into one of seven boxes, depending on his or her degree of agreement with the statement. The following is an example of such a device:

| How strongly do you agree or disagree with the following statement: People who are capable of working but don’t are a drain on society. |
|---|---|---|---|---|---|---|
| Strongly Agree | ( ) | ( ) | ( ) | ( ) | ( ) |
| Agree | ( ) | ( ) | ( ) | ( ) |
| Depends | ( ) | ( ) | ( ) | ( ) |
| Disagree | ( ) | ( ) | ( ) | ( ) |
| Strongly Disagree | ( ) | ( ) | ( ) | ( ) |

The Semantic Differential

The semantic differential is another type of a rating scale. It measures the respondent’s reaction to some object or concept in terms of rating on bipolar scales defined with contrasting adjectives at each end:11

<table>
<thead>
<tr>
<th>Good</th>
<th>3</th>
<th>2</th>
<th>1</th>
<th>0</th>
<th>1</th>
<th>2</th>
<th>3</th>
</tr>
</thead>
<tbody>
<tr>
<td>Bad</td>
<td>3</td>
<td>2</td>
<td>1</td>
<td>0</td>
<td>1</td>
<td>2</td>
<td>3</td>
</tr>
</tbody>
</table>

The “0” marks the neutral position on the scale, and the positions 1–3 measure the intensities in either direction, with 1 being the slightest reaction and 3 the most intense.

An example of an application of the semantic differential is presented as follows:12

Here is a list of pairs of words you might use to describe civil servants. Between each pair is a measuring stick of seven lines. Taking the first pair of words—i.e., “good/bad”—as an example, the line on the extreme left would mean that the civil servant is very good, the next line would mean he or she is fairly good, and so on. The words at the top of your card will help you choose the line you think is appropriate.

Now will you tell me which line you would use to describe civil servants?

<table>
<thead>
<tr>
<th>Very</th>
<th>Fairly</th>
<th>Slightly</th>
<th>Neither</th>
<th>Slightly</th>
<th>Fairly</th>
<th>Very</th>
</tr>
</thead>
<tbody>
<tr>
<td>Good</td>
<td></td>
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<td></td>
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<tr>
<td>Honest</td>
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<tr>
<td>Efficient</td>
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<tr>
<td>Deep</td>
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<td></td>
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<tr>
<td>Active</td>
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</table>

**Ranking**

Ranking is used in questionnaires whenever we want to obtain information regarding the degree of importance or the set priorities that people give to a set of attitudes or objects. For instance, in a survey on the quality of life respondents were asked to rank order various dimensions they consider important in life.

"I would like you to tell me what you have found important in life. Would you please look at this card and tell me which of these is most important to you as a goal in your life, which comes next in importance, which is third, and so forth?"

A prosperous life (having a good income and being able to afford the "good" things in life)
- 1st rank
- 2nd rank
- 3rd rank
- 4th rank

A family life (a life completely centered on my family)
- 1st rank
- 2nd rank
- 3rd rank
- 4th rank

An important life (a life of achievement that brings me respect and recognition)
- 1st rank
- 2nd rank
- 3rd rank
- 4th rank

A secure life (making certain that all basic needs and expenses are provided)
- 1st rank
- 2nd rank
- 3rd rank
- 4th rank

**SEQUENCE OF QUESTIONS**

After the format of questions is determined, consideration should be given to the order in which they are placed in the questionnaire. Two general patterns of question sequence have been found to be most appropriate for motivating respondents to cooperate: the funnel sequence and the inverted funnel sequence.

**The Funnel Sequence**

In the funnel sequence, each successive question is related to the previous question and has a progressively narrower scope. For example, if one were interested in finding out how respondents’ views of political, economic, and social problems are related to the newspapers they read, one might want to know what sorts of things the respondents think of as problems, what the perceived relative significance of each problem is, how much information they have on the topic, what their sources of information are, and whether certain newspapers have influenced their thinking on the problem. The following questions form a funnel sequence: (1) "What do you think are some of the most important problems facing the nation?” (2) "Of all the problems you have just mentioned, which do you think is the most important one?” (3) "Where have you obtained most of the information about this problem?” (4) "Do you read the Washington Post?”

When the objective of the survey is to obtain detailed information and when the respondent is motivated to supply the information, the funnel approach helps the respondent recall details more efficiently. Furthermore, by asking the broadest questions first, the interviewer can avoid imposing a frame of reference before obtaining the respondent’s perspective. When the objective of the survey is to discover unanticipated responses, broader questions should be pursued first.\(^{13}\)

DATA COLLECTION

The Inverted Funnel Sequence

In the inverted funnel sequence, narrower questions are followed by broader ones. When the topic of the survey does not strongly motivate the respondents to communicate—either because the topic is not important to them or because their experiences are not recent enough to be vivid in their memory—it may be helpful to begin with the narrow questions, which are easier to answer, and reserve the broader (and more difficult) ones until later. If the purpose is to obtain a generalization in the form of a judgment regarding a concrete situation and if the interviewer is unfamiliar with the facts but the respondent knows them, then narrower questions aimed at establishing specific facts should precede questions requiring an overall judgment.14

In the following example, an attempt was made to obtain the respondents’ judgment regarding the effectiveness of rescue operations during a disaster. To help people make an unbiased judgment, the researcher felt that it was better to deal with the specifics first, later asking for the generalization.15

1. How many people were killed in the tornado?
2. How many do you suppose were injured so seriously that they had to go to the hospital?
3. How long was it before most of the injured got to the hospital?
4. Did you see anyone administer first aid by giving artificial respiration or stopping bleeding? Who was it?
5. In general, how well do you think the first aid and rescue operations were carried out?

The order in which the questions are presented has been shown to affect the degree to which the respondent is willing to cooperate with the researcher.16 In addition, question order influences the reliability of the response. For example, there is evidence showing that the position of an item in a list has a significant impact on its being chosen, with items appearing first being endorsed more often.17 It has been also shown that when respondents are asked to assign numerical values to a set of items (for example, according to their degree of importance), the items appearing first tend to receive a higher rank.

In the following question, respondents are more likely to assign the first rank to the first category than to the last one simply because it is listed first.

“Among the items below, what does it take to be important and looked up to by the other fellows here at school?” (Rank from 1 to 6.)
- coming from the right family
- leader in activities
- having a nice car
- high grades, honor roll
- being an athletic star
- being in the leading crowd

This problem may arise especially in situations where the questions are subjective statements like attitudes, which are not central or salient to the respondent. In such situations the item appearing first tends to form a point of reference for all items that follow. This problem can be overcome by acquainting respondents with the list of items before evaluating them. Alternatively, the order of presentation could be randomized so that the order effects will be randomized, too, and will not result in any systematic bias.18

Finally, it should be pointed out that questions that are presented first in the questionnaire should put the respondent at ease; and if an interviewer is present, they should help in creating rapport between the interviewer and the respondent. Thus, the opening question should be easy to answer, preferably interesting, and not deal with sensitive issues. For example, questions about the respondent’s drinking habit or sex life, if placed at the beginning, in all likelihood will increase the refusal rate. It is also recommended that open-ended questions be placed later, for they usually require more time and thought and thus may reduce the respondent’s initial motivation to cooperate.

AVOIDING BIAS: PITFALLS IN QUESTIONNAIRE CONSTRUCTION

Wording of the Question

The question must be worded so that it is comprehended by the respondent. For example, the researcher’s vocabulary might include a verbal word such as charismatic, which would not be understood by the proverbialman in the street. If the respondents are individuals from all walks of life, then the interviewer’s vocabulary should be understandable by

15. Ibid., p. 570.
the average eighth-grader. Furthermore, words that are subject to a wide variety of interpretation should either be avoided or qualified by specifying their frame of reference. Asking whether one is a liberal might, according to one’s interpretation of the term, refer to one’s education, one’s politics, one’s profession, or one’s sex life. On the other hand, a question such as “Do you consider yourself liberal? Politically, I mean,” instructs the respondent to use the political frame of reference in answering the question. Questions should be worded so that the respondent understands the question and so that the question has one and the same meaning for each respondent unless the researcher desires to assess differentials in meaning.

Response Set
A response set is the tendency to answer all questions in a specific direction regardless of the questions’ content. This may be a problem when a set of questions is presented together in the same response format, as in the case of the matrix question and especially when the questions all refer to the same topic. For example, when a set of questions reflects a proabortion attitude, respondents who are against abortion may check all the right-hand response categories simply because they assume that these categories all express objection to abortion. A response set can be avoided by changing the question format, either by varying the response categories for each question or by avoiding the lumping together of questions referring to the same topic.

Leading Questions
The term leading question refers to a question phrased in such a manner that it appears to the respondent that the researcher expects a certain answer. A question designed to elicit general attitudes toward social protest might read, “How do you feel about student protest?” The same question phrased in a leading form might read, “You wouldn’t say that you were in favor of student protest, would you?” A more subtle form of a leading question might be, “Would you say that you are not in favor of student protest?” This last question makes it easier for respondents to answer yes than no. In answering yes, they are agreeing with the language of the question and are not contradicting the interviewer.

The term social desirability refers to the tendency of respondents to agree with questions that support accepted norms or that are perceived as socially desirable. Questions that reflect a socially undesirable behavior or attitude are endorsed less frequently than those high on the scale of social desirability. For example, Derek Phillips reported that people’s scores on a mental health test are directly related to their assessment of the desirability reflected in the items.

Another kind of leading question makes use of words that have become emotionally loaded, either favorably or unfavorably. Terms such as socialist or starvation make respondents react not so much to the issue posed by the question as to the loaded phrase itself. Consider the following two questions: “The President has made several public statements advocating school integration. Do you think that we should integrate our schools?” and “Socialists have always advocated school integration. Do you think we should integrate our schools?” These two questions are loaded, but in different directions; more respondents will tend to agree with the first.

Leading questions are to be avoided if one is looking for undisguised responses. Under certain circumstances, however, leading questions may serve the research objective. The question “Would you favor sending food overseas to feed the starving people of India?” was used to determine the number of people who were so strongly opposed to shipping food to other countries that they rejected the idea even within the strong emotional context of “starving people.”

Threatening Questions
Often it is necessary to include questions on topics that the respondent may find embarrassing and thus difficult to answer. These types of questions, denoted as threatening questions, are, according to Norman Bradburn and coauthors, “anxiety-arousing questions about, for example, behaviors that are illegal or contra-normative or about behaviors that, though not socially deviant, are not usually discussed in public without some tension.” Threatening questions may inquire, for example, about the respondents’ gambling habits, about their drinking, whether or not they smoke marijuana or abuse their children, or about their sexual behavior.

There is considerable empirical evidence that threatening questions lead to response bias; that is, denial of the behavior in question or to underreporting. In general, the reporting of certain behaviors decreases as questions increase in their degree of threat.


23. 1.
a threatening question, respondents are caught in a conflict between the role demands of the "good respondent," who responds truthfully to all the questions, and the tendency to present oneself positively. The conflict is usually resolved, not by refusing to answer, but by reporting that one did not engage in that particular activity when they, in fact, did.\(^\text{24}\)

As threatening questions may produce biased responses, it is important that researchers first identify whether or not certain questions are threatening. Norman Bradburn and Seymour Sudman suggest that the best method to determine the relative threat of questions is to ask respondents to rate question topics as to how uneasy they thought most people would feel in talking about them.\(^\text{25}\) One could also ask about the respondent's own reactions to the questions or rate the degree of difficulty the topics caused in the interview.

Once it is determined which are threatening questions, what should we do about them? In a comprehensive study dealing with response effects to threatening questions in survey research, Bradburn and Sudman propose that the construction of questions makes a great deal of difference.\(^\text{26}\) Perhaps the most significant finding in their study was the discovery that the amount of reporting behavior is considerably increased by using a long introduction to the question rather than asking short questions; by an open-ended rather than a closed-ended format; and, to a lesser extent, by letting the respondents pick their own words to talk about the sensitive topics. Their questionnaire contained an item about the number of times in the past year the respondent had become intoxicated. In the short closed form the item read: "In the past year, how often did you become intoxicated while drinking any kind of beverage?" Respondents were asked to classify their response into one of the following categories:

- Never
- Once a year or less
- Every few months
- Once a month
- Every few weeks
- Once a week
- Several times a week
- Daily

In the open-ended, long form, the respondents were first asked to provide their own word for intoxication: "Sometimes people drink a little too much beer, wine, or whiskey so that they act different from usual. What word do you think we should use to describe people when they drink an empty stomach or drink a little too much and become (respondent's word). In the past year, how often have you become (respondent's word) while drinking any kind of alcoholic beverage?" No response categories were provided for these questions.\(^\text{27}\)

**Double-Barreled Questions**

Double-barreled questions include two or more questions in one. The following item, included in an opinion poll, during the 1979 Iranian crisis is an example:

> "The United States should reduce its dependence on foreign oil and stop selling grain to Iran."

- Agree
- Depends
- Disagree
- Strongly Disagree

The problem with such a question is that it might confuse respondents who agree with one aspect of the question—reducing dependence on foreign oil—but disagree with the other—selling grain to Iran. Many questions that include and are very likely doubled-barreled, as in the following statement:

> "The United States should take a harder line at the SALT negotiating table and bolster NATO forces in Europe."

or

> "Would you say that most people are like you and can be trusted?"

Both statements include two separate questions that are identified by the use of and. Questions with and can be used, however, if the dimensions separated by and are mutually exclusive and the respondent is asked to select one or to rank them according to some criterion. For instance:

> "At the present time, the country is faced with two major problems— inflation and an energy shortage. Which of these two problems would you say is the most important?"

1. Inflation
2. Energy shortage

\(^{24}\) Ibid.

\(^{25}\) Bradburn and Sudman, *Improving Interview Methods and Questionnaire Design*, p. 163.

\(^{26}\) Ibid., pp. 14-25.

\(^{27}\) Ibid., p.
COVER LETTER

After the questionnaire has been constructed, the next step is to write an introductory statement (for a personal telephone interview) or a cover letter (for a mail questionnaire) in order to explain the purpose of the survey to the respondents and to assure a high response rate. This is of particular importance in mail questionnaires, where the difficulty of securing a high response rate, especially when one needs to ask more than a few simple questions, is well documented (see Chapter 8).

A cover letter must succeed in overcoming any resistance or prejudice the respondent may have against the survey. As such, it should (1) identify the sponsoring organization or the persons conducting the study, (2) explain the purpose of the study, (3) tell why it is important

BOX 8.2.

To Program Operators:

The Office of Manpower Planning, Department of Community Affairs, in conjunction with the State Manpower Services Council, has funded a special evaluation of public service employment projects authorized under Title VI of the Comprehensive Employment and Training Act. This evaluation is being conducted by Dr. M. L. Burnim in the Institute for Social Research at Florida State University. The purpose of the evaluation is to determine the impact of public service employment projects on unem- ployed persons in Florida and to measure the benefits of these projects to the communities in which they are conducted.

As you know, public service employment is a major part of the federal, state, and local strategy to overcome the employment and income problems of economically disadvantaged, unemployed people. There is no question that the program is needed throughout the country to create jobs and training opportunities for large numbers of people who remain unemployed. You are probably also aware, however, that public service employment programs are quite controversial and their future may be in jeopardy. Part of the reason that these programs are so controversial is that no systematic evaluation of the benefits of these programs for the individuals employed and the communities served has been conducted.

Because this specific evaluation has significant national policy implication, I strongly urge you to assist the research team in compiling the necessary data. It is very important that you complete the survey questionnaire transmitted to you as soon as possible.

Thank you for your cooperation.

Sincerely,

Edward A. Feaver, Director
Office of Manpower Planning

| BOX 8.3. |

Dear Friend:

We are conducting a survey sponsored by the University of Wisconsin-Milwaukee and assisted by the American Civil Liberties Union (ACLU). Our purpose is to learn more about how people like you feel about certain aspects of civil liberties and how beliefs are related to behavior. You have been selected at random to participate in this survey—thus your opinions will represent the opinions of thousands of people much like yourself.

Enclosed find a copy of our questionnaire. While it is a bit lengthy and will require about 30 minutes to complete, we hope that you will take the time to complete it and return the questionnaire to us in the enclosed self-addressed envelope. The information you provide will contribute to an important study and may also be used to influence ACLU policy.

A bit about confidentiality. We promise you confidentiality under the academic ethics standards of the American Political Science Association. Your name will not be revealed or associated with your response nor will anyone outside of the project staff here at the University of Wisconsin-Milwaukee be allowed to see your response. Thus, while the ACLU may be interested in the policy implications of our study they will not be furnished with any information which in any way identifies you as an individual. Please note the number in the upper right-hand corner of the questionnaire. This number allows us to temporarily identify you. By referring to this number we will know that you responded to the questionnaire and will not send you the follow-up mailing we will have to send to nonrespondents.

We appreciate your willingness to help us in our research effort. If you like a copy of our completed study please indicate this on the last page of the questionnaire. We will make certain that you receive a copy of our results. We believe that you will find the questionnaire both interesting and provocative and look forward to receiving your reply.

Sincerely yours,

Richard D. Bingham
Associate Professor

James L. Gibson
Assistant Professor

Enclosures

NOTE: If by some chance you recently received and responded to this questionnaire please return the blank questionnaire to us indicating "duplicate" on the first page.
that the respondent answer the questionnaire, and (4) assure the respondent that the information provided by him or her will be held in strict confidence.

In general, the cover letter for a mail questionnaire needs to be more detailed than the introductory statement in a personal interview. In an interview, the interviewer is always there to explain or persuade the respondent should that become necessary. With a mail questionnaire, the cover letter is all there is, and thus its function is very significant.

Two examples of cover letters used in various mail surveys are shown here. The first, reported in Box 9.2 on p. 228, was used in a mail questionnaire designed and conducted by the Institute of Social Research in Florida State University under the auspices of the State Department of Manpower Planning of Florida to evaluate the Public Service Employment and Training Act, Title VI (CETA). 28

The second example, reported in Box 9.3, on p. 229, is taken from a study on commitment to civil liberties, conducted by investigators at the University of Wisconsin-Milwaukee. 29 The letter emphasizes the confidentiality of the study and explains in detail how the individual responses will be used (see Box 9.3).

Finally, an important issue is the style used in the cover letter, that is, whether it is a formal or a semipersonal letter. In the two examples given, a form letter was sent out to all respondents included in the sample. Alternatively, rather than addressing the letter to "Dear Friend" or "Dear Respondent," the addressee's address is individually typed at the top of the letter, which also contains an individually typed personalized salutation and is individually signed by the investigator. It has been shown that the semipersonal letter generated a slightly higher response rate than the form letter. 30

INSTRUCTIONS

Another element to be considered when constructing a questionnaire is the instructions that go with each question or with a set of questions. Instructions should be included with questions that are not self-explanatory; they may range from very simple ones such as "circle the appropriate category" to more complex instructions that explain how to rank order a set of priorities. When the questionnaire is administered by an interviewer, the instructions are usually written for the interviewer and thus are often short and concise, instructing the interviewer what to do when the respondent provides a certain answer, when to probe for a more detailed answer, or how to clarify a certain question. The following is an example of instructions written for the interviewer:

Who was your employer on your last job?

(PROBE FOR CORRECT CATEGORY)

Private
City
County*
State
Federal
Self-employed
Public, Nonprofit
Other _____ (specify)

While in an interview study the interviewer is available to answer any questions that may be raised by the respondent, this is not the case with mail questionnaires. There, any questions that remain vague or unclear are likely to result in no response or incorrect answers. Therefore, providing clear instructions is extremely important. The type of instructions vary from general ones introducing the questionnaire or its subsections to specific ones preceding individual questions.

The following is an example of general instructions given at the beginning of a questionnaire on attitudes towards civil liberties: 31

INSTRUCTIONS: For each of the following questions please mark the answers that come closest to the way you feel about the issue. There are no "right" or "wrong" answers—please answer the questions as honestly as possible. Answer each of the questions in the order in which it appears. If you wish to make additional comments on any of the specific questions or on the issues in general, use the space at the end of the questionnaire. Your opinions are extremely important for understanding these complex civil liberty issues—we greatly appreciate your cooperation.

The next example, from the same questionnaire, introduces a subsection, presented in a matrix format:

As you know, there are many groups in America that try to get the government or the American people to see things more their way. We

31. Bingham and Gibson, "Conditions of Commitment to Civil Liberties."
would like to get your opinions toward what you perceive to be the aims, objectives, or ideas advocated by these groups. In particular, we would like your opinion on how significant the change in the American system of government would be if the ideas of the group were put into practice. Please rate each of the following groups in terms of the nature of the change in our system of government that would follow the implementation of their ideas.

<table>
<thead>
<tr>
<th></th>
<th>Communists</th>
<th>Nazis</th>
<th>Ku Klux Klan</th>
</tr>
</thead>
<tbody>
<tr>
<td>The ideas, if implemented, would create a totally different and much worse system of government.</td>
<td>☐</td>
<td>☐</td>
<td>☐</td>
</tr>
<tr>
<td>The ideas, if implemented, would significantly change our system of government for the worse.</td>
<td>☐</td>
<td>☐</td>
<td>☐</td>
</tr>
<tr>
<td>I oppose the ideas, but they would not change our system of government if they were implemented.</td>
<td>☐</td>
<td>☐</td>
<td>☐</td>
</tr>
<tr>
<td>I support the ideas, but they would not change our system of government if they were implemented.</td>
<td>☐</td>
<td>☐</td>
<td>☐</td>
</tr>
<tr>
<td>The ideas, if implemented, would create a totally different and much better system of government.</td>
<td>☐</td>
<td>☐</td>
<td>☐</td>
</tr>
<tr>
<td>No Opinion.</td>
<td>☐</td>
<td>☐</td>
<td>☐</td>
</tr>
</tbody>
</table>

Finally, the last example is of a specific instruction in replying to a single question.

**About how many states have you lived in during your life? (Count only those states that you lived in for at least one year.)**

**CONSTRUCTING A QUESTIONNAIRE: A CASE STUDY**

There are many stages involved in the construction of a questionnaire, beginning with the research problem and going through the process of formulating the questions and considering the format and the type of questions to be used. To illustrate these, we have included in this section a complete questionnaire used in an actual study conducted in 1968 by the Institute for Social Research at the University of Michigan.33

The study’s objective was to explore the attitudes and perceptions related to urban problems and race relations in fifteen northern cities in the United States. It sought to define the social and psychological characteristics as well as the aspirations of the black and white urban populations. A black sample and a white sample were selected in each of the fifteen cities in the study. Approximately 175 black and 175 white respondents were interviewed in each city. In addition, 366 whites were interviewed in two suburban areas. Altogether, 2,900 black respondents and 2,900 white respondents were interviewed. Individuals interviewed were between the ages of sixteen and sixty-nine and lived in private households.

The study used two questionnaire forms—one for whites and one for blacks. Questions about background characteristics were almost identical in the two forms. The attitudinal questions were also identical in both interview forms, but there was a greater number of questions addressed exclusively to one racial group or to the other. The questionnaires contained attitudinal questions probing the respondent’s satisfaction with neighborhood services, their feelings about the effectiveness of the government in dealing with urban problems, the respondents’ interracial relationships, their attitude toward integration, and their perception of the hostility between the races. Following in Box 9.4 is a shortened version of the original questionnaire addressed to blacks.

You will notice that the questionnaire starts off with identification numbers for the person being interviewed as well as his or her location. There is also room to provide information on when the interviewer began. Question 1 is an example of an attitude question on degree of satisfaction with services provided by the city. The question was put in a matrix format. Note also that instructions are provided both for the interviewer (items A and B through E) and the respondent. Question 2 has a closed-ended and open-ended component (A). Item A is also a contingency question. Questions 3, 5, 6, and 7 are also examples of contingency type questions. The first part is the filter question, and the second is the contingency question, which applies only to those who have checked specific categories in the first part. All questions use a numerical code, which is checked off by the interviewer.

Finally, the last section of the questionnaire is an example of the relative advantage of an interview over other modes of filling out questionnaires (mail, telephone). The interviewer can provide detailed information on the general appearance and attitude of the respondents, which can help in interpreting their response pattern.

---

### Box 9.4 Urban Problems Study, January, 1968

**DATA COLLECTION**

#### TIME INTERVIEW

<table>
<thead>
<tr>
<th>Interview Date</th>
<th>PM</th>
</tr>
</thead>
</table>

#### FOR OFFICE USE ONLY

<table>
<thead>
<tr>
<th>Segment Number</th>
<th>9</th>
</tr>
</thead>
<tbody>
<tr>
<td>Line Number</td>
<td>10</td>
</tr>
<tr>
<td>Person Number</td>
<td>19</td>
</tr>
</tbody>
</table>

1. First, I'd like to ask how satisfied you are with some of the main services the city is supposed to provide for your neighborhood. What about the quality of public schools in this neighborhood—are you generally satisfied, somewhat dissatisfied, or very dissatisfied? (Code A below, and ASK B THROUGH E)

   **A.** Quality of public schools
   - 1: Very dissatisfied
   - 2: Somewhat dissatisfied
   - 3: Satisfied
   - 4: Very satisfied

2. Thinking about city services like schools, parks, and garbage collection, do you think your neighborhood gets better, about the same, or worse services than most other parts of the city?

   **A.** IF BETTER OR WORSE: What is the reason this neighborhood gets

3. If you have a serious complaint about poor service by the city, do you think you can get city officials to do something about it if you call them?

   **A.** Have you ever called a city official with a complaint about poor service?

4. In general, do you think (CITY) city officials pay more, less, or the same attention to a request or complaint from a Negro as from a white person?

   **A.** IF DON'T KNOW: What would you expect the effect would be—to make things better, worse, or won't there be much change?

---

**QUESTIONNAIRE: INSTRUCTION 533**

Now let's talk about the problems of (CITY) as a whole.

3. Do you think the Mayor of (CITY) is trying as hard as he can to solve the main problems of the city, or that he is not doing all he could to solve these problems?

   **A.** IF NOT DOING ALL HE COULD:

   - 1: Trying as hard as he can
   - 2: Not doing all he could (ASK A): X
   - 3: Don't know

6. How about the State government? Do you think they are trying as hard as they can to solve the main problems of cities like (CITY), or that they are not doing all they could to solve these problems?

   **A.** IF NOT DOING ALL THEY COULD:

   - 1: Trying as hard as they can
   - 2: Not doing all they could (ASK A): X
   - 3: Don't know

7. How about the Federal government in Washington, D.C.? Do you think they are trying as hard as they can to solve the main problems of cities like (CITY), or that they are not doing all they could to solve these problems?

   **A.** IF NOT DOING ALL THEY COULD:

   - 1: Trying as hard as they can
   - 2: Not doing all they could (ASK A): X
   - 3: Don't know

8. A Negro has been elected Mayor of Cleveland and also of Gary, Indiana. What effect do you think this will have on solving city problems in Cleveland and Gary? Do you think it will make things better, worse, or won't there be much change?

   **A.** IF DON'T KNOW:

   - 1: Better
   - 2: Worse
   - 3: Not much change

---

Note: The table includes questions and responses related to urban problems and city services, asking about satisfaction levels, service quality, and government effectiveness.
### Questionnaire Construction

12. Some people say the police frisk or search people without a good reason. Do you think this happens often, to people in this neighborhood?

<table>
<thead>
<tr>
<th>Yes</th>
<th>ASK A</th>
<th>1</th>
</tr>
</thead>
<tbody>
<tr>
<td>No</td>
<td>(ASK A)</td>
<td>2</td>
</tr>
<tr>
<td>Don't know</td>
<td>(ASK A)</td>
<td>3</td>
</tr>
</tbody>
</table>

#### If Yes or Don't Know
- **A.** Has it ever happened to you?
  - Yes | ASK B & C | 4
  - No  | (ASK C) | 5

#### If Yes to A
- **B.** How long ago was that (the last time)?
  - Years ago | 6

#### If Yes or No to A
- **C.** Has it happened to anyone you know?
  - Yes  | 7
  - No  | 8

13. Some people say the police rough up people unnecessarily when they are arresting them or afterwards. Do you think this happens to people in this neighborhood?

<table>
<thead>
<tr>
<th>Yes</th>
<th>ASK A</th>
<th>1</th>
</tr>
</thead>
<tbody>
<tr>
<td>No</td>
<td>(ASK A)</td>
<td>2</td>
</tr>
<tr>
<td>Don't know</td>
<td>(ASK A)</td>
<td>3</td>
</tr>
</tbody>
</table>

#### If Yes or Don't Know
- **A.** Has it ever happened to you?
  - Yes | ASK B & C | 4
  - No  | (ASK C) | 5

#### If Yes to A
- **B.** How long ago was that (the last time)?
  - Years ago | 6

#### If Yes or No to A
- **C.** Has it happened to anyone you know?
  - Yes  | 7
  - No  | 8

14. Do you think Negro citizens are generally given better treatment by Negro policemen, by white policemen, or that it doesn't make much difference?

| Negro policemen | ASK A | 1 |
| White policemen | ASK A | 2 |
| Not much difference | 3 |
| Don't know | 4 |

#### If Negro or White Policemen
- **A.** Why do you think this is?

9. Have you heard about federal antipoverty programs such as Head Start, the Job Corps, Community Action Centers, etc.?

| Yes  | 1 |
| No  | 5 |

#### If Yes, Heard of One or More
- **A.** In general, do you think the antipoverty program is doing a good job, a fair job, or a poor job? Why would you say the antipoverty program is doing a good (fair/poor) job?
  - Good job | 1 |
  - Fair    | 2 |
  - Poor   | 3 |
  - Don't know | 4 |

#### If Yes to A
- **B.** Has anyone in your family taken part in any of these programs in any way?
  - Yes | ASK C | 5
  - No  | (ASK C) | 6

#### If Yes to B
- **C.** What program(s) and in what way?
  - Name of Program(s) | 7
  - Kind of Participation | 8

Now I want to talk about some complaints people have made about the police.

10. First, some people say the police don't come quickly when you call them for help. Do you think this happens to people in this neighborhood?

| Yes  | 1 |
| No  | 5 |

#### If Yes or Don't Know
- **A.** Has it ever happened to you?
  - Yes | ASK B & C | 4
  - No  | (ASK C) | 5

#### If Yes to A
- **B.** How long ago was that (the last time)?
  - Years ago | 6

#### If Yes or No to A
- **C.** Has it happened to anyone you know?
  - Yes  | 7
  - No  | 8

11. Some people say the police don't show respect for people or they use insulting language. Do you think this happens to people in this neighborhood?

| Yes  | 1 |
| No  | 5 |

#### If Yes or Don't Know
- **A.** Has it ever happened to you?
  - Yes | ASK B & C | 4
  - No  | (ASK C) | 5

#### If Yes to A
- **B.** How long ago was that (the last time)?
  - Years ago | 6

#### If Yes or No to A
- **C.** Has it happened to anyone you know?
  - Yes  | 7
  - No  | 8

15. In general, do you think judges in [CITY] are usually harder on Negroes, harder on whites, or that there is not much difference?  

<table>
<thead>
<tr>
<th>RECORDED VALUES</th>
<th></th>
</tr>
</thead>
<tbody>
<tr>
<td>Harder on Negroes</td>
<td>1</td>
</tr>
<tr>
<td>Harder on whites</td>
<td>3</td>
</tr>
<tr>
<td>Not much difference</td>
<td>2</td>
</tr>
<tr>
<td>Don't know</td>
<td>8</td>
</tr>
</tbody>
</table>

16. Do you personally feel safer from crime now than you did two or three years ago, or is there no change, or do you feel less safe?  

<table>
<thead>
<tr>
<th>not asked of R</th>
<th></th>
</tr>
</thead>
<tbody>
<tr>
<td>Safer today</td>
<td>1</td>
</tr>
<tr>
<td>No change</td>
<td>3</td>
</tr>
<tr>
<td>Less safe</td>
<td>2</td>
</tr>
</tbody>
</table>

17. Do you think a man can safely walk alone in this neighborhood after dark, or would he be be wise not to?  

<table>
<thead>
<tr>
<th>not asked of R</th>
<th></th>
</tr>
</thead>
<tbody>
<tr>
<td>Can safely walk alone</td>
<td>1</td>
</tr>
<tr>
<td>Wise not to</td>
<td>2</td>
</tr>
<tr>
<td>Don't know</td>
<td>8</td>
</tr>
</tbody>
</table>

18. Here are some complaints you hear sometimes about stores and merchants. Would you tell me if these things ever happen to you when you shop in stores in or near this neighborhood?  

<table>
<thead>
<tr>
<th>A. Do you think you are unfairly overcharged for goods often, sometimes, rarely, or never?</th>
<th></th>
</tr>
</thead>
<tbody>
<tr>
<td>Other</td>
<td>1</td>
</tr>
<tr>
<td>Interviewer's name</td>
<td>2</td>
</tr>
<tr>
<td>Other than arguements</td>
<td>3</td>
</tr>
<tr>
<td>Very</td>
<td>4</td>
</tr>
<tr>
<td>(GO TO B)</td>
<td>5</td>
</tr>
</tbody>
</table>

<table>
<thead>
<tr>
<th>B. Do you think you are sold spoiled or inferior goods often, sometimes, rarely, or never?</th>
<th></th>
</tr>
</thead>
<tbody>
<tr>
<td>1</td>
<td>2</td>
</tr>
<tr>
<td>3</td>
<td>4</td>
</tr>
</tbody>
</table>

<table>
<thead>
<tr>
<th>C. In such stores, are you treated differently often, sometimes, rarely, or never?</th>
<th></th>
</tr>
</thead>
<tbody>
<tr>
<td>1</td>
<td>2</td>
</tr>
<tr>
<td>3</td>
<td>4</td>
</tr>
</tbody>
</table>

D. IF NEVER SHOP IN NEIGHBORHOOD: Why don't you shop around here?  

PILL IN ITEMS BELOW IMMEDIATELY AFTER LEAVING RESPONDENT  

F. What persons over 14 years of age were present during interview?  

<table>
<thead>
<tr>
<th>CIRCLE ALL THAT APPLY.</th>
<th></th>
</tr>
</thead>
<tbody>
<tr>
<td>None</td>
<td>0</td>
</tr>
<tr>
<td>Spouse</td>
<td>1</td>
</tr>
<tr>
<td>Parent</td>
<td>2</td>
</tr>
<tr>
<td>Child over 14</td>
<td>3</td>
</tr>
<tr>
<td>Other relative or friend</td>
<td>4</td>
</tr>
<tr>
<td>Other (SPECIFY)</td>
<td>5</td>
</tr>
</tbody>
</table>

G. Neatness of home interior:  

| Very neat and clean | 1 |
| Fairly neat and clean | 2 |
| Fairly messy | 3 |
| Very messy | 4 |

H. Does respondent dress to show "black identity" in any way? CIRCLE ALL THAT APPLY.  

| R has "natural (Afro) hair style" | 1 |
| R wears "black power button" | 2 |
| Other signs of "black identity" (SPECIFY) | 3 |

I. Date of Interview:  

| v. 69 |  |

J. Interviewer's Signature:  

SUMMARY  

The foundation of all questionnaires is the question. The questionnaire must translate the research objectives into specific questions. Answers to these questions will provide the necessary data for hypothesis testing. Most questions can be classified as either factual or opinion and attitude questions. Factual questions are designed to elicit objective information from the respondent. Opinion and attitude questions, on the other hand, are concerned with inclinations, preferences, prejudices, ideas, fears, and convictions. In general, survey questions about opinions and attitudes are much more complex to construct than questions about personal facts. Answers to opinion and attitude questions are more sen-
itive to changes in wording, emphasis, and sequence than are those to factual questions.

Four types of question structure can be distinguished: (1) open-ended questions, (2) closed-ended questions, (3) contingency questions, and (4) matrix questions. In closed-ended questions, respondents are offered a set of response categories from which they must choose the one that most closely represents their view. Open-ended questions are not followed by any kind of choice and the respondents' answers are recorded in full. A contingency question is one that applies only to a subgroup of respondents. The relevance of the question to this subgroup is determined by the answer of all respondents to a preceding filter question. The matrix question is a method for organizing a large set of items that have the same response categories.

One of the most common formats for questions asked in surveys is the rating scale. It is a judgment made by the respondent in terms of sets of ordered categories. There are several types of rating scales, including the card sort and the semantic differential. Ranking is used in questionnaires whenever the objective is to obtain information regarding the degree of importance or the priorities that people give to a set of attitudes or objects.

Questions must be worded so that they are comprehended by all respondents. A leading question is a question phrased in such a manner that it appears to the respondent that the researcher expects a certain answer. Threatening questions are those that raise the anxiety level of the respondents. Both types of questions may lead to response bias. Leading questions should be avoided, and threatening questions need to be constructed with great sensitivity, using special techniques, such as a long introduction to the question and open-ended rather than closed-ended questions.

KEY TERMS FOR REVIEW

<table>
<thead>
<tr>
<th>Question</th>
<th>Contingency question</th>
<th>Ranking</th>
</tr>
</thead>
<tbody>
<tr>
<td>Factual</td>
<td></td>
<td>Leading questions</td>
</tr>
<tr>
<td>question</td>
<td></td>
<td>Threatening questions</td>
</tr>
<tr>
<td>Opinion</td>
<td>Rating</td>
<td>Double-barreled questions</td>
</tr>
<tr>
<td>Attitude</td>
<td>Matrix question</td>
<td></td>
</tr>
<tr>
<td>Open-ended</td>
<td>Quanti fier</td>
<td></td>
</tr>
<tr>
<td>question</td>
<td>Semantic question</td>
<td></td>
</tr>
<tr>
<td>Closed-ended</td>
<td>differential</td>
<td></td>
</tr>
</tbody>
</table>

ADDITIONAL READINGS


A METHOD OF CRITIQUING EDUCATIONAL RESEARCH

(Use for article critiques. Answer item-by-item; not in prose form. Do not need to rewrite the questions.)

Answer the following questions yes or no and explain your answer.

I. What type of research most accurately describes this study?

II. THE PROBLEM

1. Was the problem clearly defined?
2. Were verifiable (or null) hypotheses, research questions, or objectives formulated?
3. Was the problem logically deduced from some theory?
4. What is (are) the independent variable(s)?
5. What is (are) the dependent variable(s)?

III. THE DESIGN

1. Was an appropriate research design utilized to answer the problem?
2. Was the population studied clearly specified?
3. Were the sampling methods clearly outlined?
4. Was a control or comparison group chosen in the same manner and from the same population as the sample?
5. Were the treatments randomly assigned to the groups?
6. Did the study include a replication?
7. Was the alpha level specified a priori?

IV. THE PROCEDURE

1. Were treatments and/or data collecting methods described so that you could replicate the study?
2. Were the size and characteristics of the sample adequately described?
3. Were the treatments administered so that extraneous sources of error were either held constant for all treatments and control groups or randomized among subjects within all groups?

V. THE MEASUREMENT

1. Was any evidence of the reliability of the instrumentation given?
2. Was any evidence of the validity of the instrumentation given?

(continued)

Miller, L. E. (Undated). AGR. EDU 885: Research methods. The Ohio State University.
VI. THE INTERPRETATION

1. Were the conclusions consistent with the obtained results?
2. Were the generalizations confined to the population from which the sample was drawn?

VII. GENERAL

1. Was this a significant study? Why? (Your opinion).

Adapted from: