CHAPTER 3

The Research Problem

A research problem is not a nuisance; it is a step toward new knowledge.

INSTRUCTIONAL OBJECTIVES

After studying this chapter, the student will be able to:

1. Define a research problem.
2. Identify potential sources of problems for educational research.
3. State the criteria to use for evaluating a research problem.
4. State the characteristics of a worthwhile theory.
5. Evaluate a given problem for research using the accepted criteria.
6. Take a general problem in an area of interest in education and formulate it in a specific form ready for empirical investigation.
7. Distinguish between the types of problem statements used in quantitative research and qualitative research.
8. Define terms such as *population* and *variables* as used in a quantitative research study.
9. Identify the population and the variables in a given study.

Systematic research begins with a **research problem.** In a classic work, John Dewey (1933) spoke of the first step in the scientific method as the recognition of a felt difficulty, an obstacle, or problem that puzzles the researcher. Your first step in the research process is therefore to select a problem for investigation. Selecting and formulating a problem is one of the most important aspects of doing research in any field. Beginning researchers are often surprised to find that this initial stage can take up a large part of the total time invested in a research project. There is no way to do research until a problem is recognized, thought through, and articulated in a useful way.

A researcher must first decide on the general problem area. This step is often difficult for beginning researchers. The difficulty is not due to a shortage of problems but, rather, to the fact that beginners must select a problem very early, when their understanding of how to do research is most limited. They are uncertain about the nature of research problems and how to go about solving them. Skill in doing research is to a large extent a matter of making wise choices about what to investigate. This skill takes time and repeated effort to develop, but the willing beginner can do it.

In order to ask questions that research can answer, one should have knowledge or experience in an area. We often hear students in difficult courses say, "I don't know enough to ask questions." Similarly, unless a researcher has knowledge or experience in an area, he or she does not know what additional knowledge is needed or how to obtain it through empirical investigation.

Furthermore, the question chosen for investigation should hold deep interest or be one about which the researcher is really curious. The choice must necessarily be very personal or else the researcher may find it difficult to muster the motivation to carry the research through to its end. Find a question that intrigues you and you will enjoy the search for a solution. For example, an elementary school teacher may be interested in finding a more effective way to teach reading. A high school biology teacher may want to know if using computer simulations would improve students' problem-solving skills. An elementary school principal may want to know if a mentoring program would improve the effectiveness of beginning teachers.

After having chosen the general area of investigation, the researcher then narrows it down to a specific statement of the research question. What specifically do you want to know or what do you want to predict? Unlikely as it may seem, once the researcher has selected a problem area and clearly articulated a question or statement, he or she has accomplished one of the most difficult phases of the research process.

SOURCES OF PROBLEMS

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 can help. Three important sources for research problems are experience, deductions from theory, and related literature. Noneducation sources may also be useful. These sources are appropriate in both quantitative and qualitative research.

EXPERIENCE

Among the most fruitful sources for beginning researchers are their own experiences as educational practitioners. Teachers have intuitions or hunches about new relationships or why certain things in school happen the way they do. Teachers often question the effectiveness of certain classroom practices that have become routine but that may be based more on tradition or authority than on scientific research. They wonder if alternative procedures would be more effective. A high school teacher might have a question about strategies to improve the achievement of at-risk students, or an elementary teacher may have questions about a new method to teach reading. In this age of accountability in education, teachers want to know if programs and practices they use are the most effective. Research can provide the answers to such questions.

Most graduate students in education have been in the classroom or are currently working full- or part-time in schools. Students who have not had teaching experience can get ideas from discussions and their reading in education courses. We recommend that you make a list of ideas, noting things that you question. By studying these notes, you will soon identify a worthwhile research problem.

THEORIES

Theories are a good source of problems for research. A *theory* may be defined as a set of interrelated statements, principles, and propositions that specify the relationships among variables. The application of the general principles embodied in a theory to specific educational problems is only hypothetical, however, until research empirically confirms them. For example, assume a researcher is interested in how adolescents form their academic self-concepts. Social comparison theory suggests that students form academic self-concepts by comparing their self-perceived academic accomplishments to some standard or frame of reference. The frame of reference for most students would be the perceived academic abilities of their classmates. One question that might arise is "Would gifted students placed in selective homogeneous classes have lower academic self-concepts over time than equally gifted students in heterogeneous or mixed-ability classes?" This question could be investigated by studying the change over time in the academic self-concept of gifted students in homogeneous classes compared with that of gifted students placed in regular, heterogeneous classes.

Another interesting theory that has implications for education is Erik Erikson's (1967) classic theory of personality development. Erikson describes psychosocial development in terms of stages throughout the life span, each of which involves a critical issue or conflict that the person must resolve. Adolescence, which is one of these stages, has as its major task the development of a positive self-concept or, to use Erikson's term, a strong sense of identity. Forming a strong personal identity is difficult because competing roles and values face the young person. Research shows that adolescents who have achieved a sense of identity are more independent, more socially competent, better able to cope with stress, and have higher self-esteem. However, if the adolescent does not resolve the identity crisis, a sense of inferiority and personal alienation may result. It is interesting that students who have committed violent acts often report feelings of alienation. Erikson's theory could become the foundation for research on school violence. A researcher interested in studying school violence might ask, "Are there school practices that may contribute to feelings of isolation in some students? "What are some positive programs that might help improve students' self-image?" "How does the school deal with reported incidences of physical bullying or cyber-bullying?" and "Would other procedures be more effective?" A qualitative researcher might conduct a case study of an adolescent who has committed an act of school violence or of one who has been a victim of bullying.

Choosing a Theory

Not all theories are equally useful to a beginning researcher. Let us examine some of the characteristics one searches for in a good theory for a research study:

1. *An essential characteristic of a good theory is that it is testable*. The theory chosen should be one from which the researcher can make concise

predictions (hypotheses) about what will happen in new situations and can verify these predictions through empirical observation. As the hypotheses are supported in research studies, they then become part of the theory that adds to the body of knowledge. However, if the theory cannot be tested, it serves no useful purpose.

2. *A good theory is not only testable but also falsifiable*. Being falsifiable means that it is capable of being proven wrong. It is possible to gather evidence that contradicts the theory. A theory that explains why a tornado touched down in a certain area of a town by stating that the people there are being punished for their sins is not a theory that can be proven wrong. Thus, it is not a useful theory.

   Students sometimes find this concept of **falsifiability** difficult to understand. This concept derived from the philosopher Sir Karl Popper, who in *Logic of Scientific Discovery* (1965) argued that claims to knowledge "can never be proven or fully justified, they can only be refuted" (p. 40). A theory cannot ever be proved to be true because theories are generalizations that apply to all possible instances of the phenomena they are trying to explain, and it is not possible to test it against all possibilities. We say only that a theory has been supported; the more support it gets in a variety of research studies, the more confidence we have in the usefulness of the theory. However, it is possible to disprove a theory by gathering negative evidence that contradicts the theory. According to Popper, this is how most scientific progress is achieved. Neuman and Kreuger (2003) give a useful example: "If I want to test the claim that all swans are white, and I find 1000 white swans, I have not totally confirmed the causal law or pattern. All it takes is locating one black swan to refute my claim—one piece of negative evidence" (p. 40). Negative evidence indicates that the theory needs to be rejected or at least revised. To summarize, a good theory is one for which evidence can be gathered that will either support or refute the theory. Both outcomes must be possible.

3. *A good theory deals with some significant phenomenon or behavior that needs explanation, such as learning or motivation*.

4. *A good theory provides the simplest, clearest, and most plausible explanation for the phenomenon*. A good theory follows the principle of parsimony, which states that a theory should explain the largest number of facts with the smallest number of principles.

5. *A good theory has internal consistency*; its propositions do not contradict one another. For example, a "commonsense" theory of human separation may state "Absence makes the heart grow fonder" but also "Out of sight, out of mind." One could find evidence to support both of these propositions; thus, the theory would not be useful for predicting what might happen when people are separated.

In summary, think of an educational, psychological, or sociological theory that you find especially interesting. Read a summary of the theory in journals, textbooks, or primary sources, and then ask a question. A theory-based research question is beneficial because the results can be tied to a body of existing knowledge. The research can verify or fail to verify the theory, and it will most likely suggest other questions for research. You might talk to your professors to find out what they are working on or to get their suggestions.

RELATED LITERATURE

Another valuable source of problems is the published literature in your area of interest. In published research, you will find examples of research problems and the methods used to solve them. A review of related literature may help in the following ways:

1. You may find a study that needs to be replicated. You can repeat someone else's study, not exactly, but with some variation. You might use a different age group, different setting, or a different methodology. A study might even become a cross-cultural one to determine if the conclusions from research in one culture apply in other cultures. You need not be concerned that you are merely replicating a study rather than doing some new, groundbreaking research. Replication is a worthwhile activity because it provides more evidence of the validity of the original findings. As studies are repeated at different times and in different places, with the findings supported in each study, we can have increasing confidence in the scientific validity of the findings.

   For example, researchers have conducted numerous replications of Piaget's famous studies (1999) of the development of moral judgment in children. These studies have used Piaget's basic approach but have investigated the development of moral judgment in children of different socioeconomic classes, in children of the same chronological age but differing in intelligence level, in children differing in the extent of their participation in their own age groups, in children differing in the nature of parental discipline experienced in the home, and in both boys and girls. Recently, other investigators have used techniques that differed from Piaget's in their attempts to confirm his findings and conclusions. In general, the large body of research stemming from Piaget's investigations has supported his original conclusions. Thus, a single research study, if it deals with a significant problem and if its findings are exciting, can inspire many other studies.

2. You may find a question that represents the next logical step in the research on a problem. The outcomes of one piece of research very often lead to new questions. In the concluding sections of their research reports, researchers often describe new questions that have arisen and suggest additional studies that should be done. A productive way to extend studies is to introduce new variables into a research design for further control and for determining interaction effects among variables. Many multivariate studies are extensions of earlier single variable investigations (see Chapter 11).

In conclusion, published research can be a great source of ideas for research. With some critical analysis of the research in your field and a bit of creativity, you should be able to find several potentially researchable problems. Reading research will also help you by showing how previous researchers measured variables, selected samples, analyzed data, and so on.

Reviews of Research

Reviews of research that integrate and summarize studies on specific topics can be very useful for identifying a research problem. Those produced by the American Educational Research Association (AERA) are particularly useful.

The *Review of Educational Research* published quarterly by AERA since 1931 reviews and integrates educational literature on a different topic each volume. For example, the topic of volume 71 (2007) was "Difference, Diversity, and Distinctiveness in Education and Learning."

In 1973, AERA launched the annual *Review of Research in Education* to provide summaries of what research has been done, is being done, and needs to be done in a specific broad topic each year. Volume 82 (2008) focused on "What Counts as Knowledge in Educational Settings: Disciplinary Knowledge, Assessment, and Curriculum."

Approximately every 10 years, AERA publishes the *Handbook of Research on Teaching* (Gage, 1963; Travers, 1973; Wittrock, 1985; Richardson, 2001). These volumes list, summarize, and critically analyze research in the field of teaching. Each edition contains authoritative articles by specialists on selected topics in the field. The fourth edition is composed of 51 chapters from 81 authors, all of whom are experts in their respective fields. Comprehensive bibliographies are included, by selected topics. Among the topics in the fourth edition are policies for licensing and assessment of teachers, special education, middle school teaching, teaching as a moral activity, and the teaching of physical education.

AERA's *Encyclopedia of Educational Research* (2004), designed to present "a critical synthesis and interpretation of reported educational research," contains signed articles with bibliographies providing well-documented discussions of recent trends and developments, as well as traditional topics. This four-volume encyclopedia includes approximately 200 topics. It is a good basic source for preliminary overviews of research in various areas.

Other useful periodicals include *PsycINFO*, *Education Abstracts*, and specialized reviews such as Social Work Abstracts, Historical Abstracts, and MEDLINE (medicine). For more information on related literature, see Chapter 4.

NONEDUCATION SOURCES

You can adapt theories or procedures you encounter in other fields to apply to education. Often, movements that originate outside a profession lead people to new paths of research. The women's movement has led researchers to study gender stereotyping in educational materials, the influence of schools on the learning of sex roles, gender differences in achievement and personality, and so forth. The civil rights movement led to many studies about the education of minority children. The AIDS (acquired immunodeficiency syndrome) epidemic has stimulated a great deal of research on the best procedures and materials to use to acquaint young people in school with the danger of the disease and how best to protect themselves from it. The inspiration for much valuable research in education has come from such noneducation sources.

QUALITATIVE RESEARCH PROBLEMS

Just as is true for quantitative researchers, beginning qualitative researchers can look to their personal experiences and interests, to theory, to the professional literature, or to current social issues and real-world concerns to find a potential problem. You need to identify an area or a topic about which you have a real interest. For example, a beginning researcher might be interested in how learning-disabled students are integrated into regular high school classrooms.

Once researchers have selected the initial focus of inquiry, they need to identify exactly what they want to know about that topic. The focus of inquiry is thus narrowed to the aspect of the phenomenon that will be explored in the research study. The focus of inquiry mentioned previously can be stated as follows: "How do other students treat learning-disabled students?" "How do the learning-disabled respond?" Although the qualitative researcher intuitively arrives at hunches about the phenomenon, he or she does not formulate an initial hypothesis that the study tests.

Suppose one is interested in the general topic of bullying behavior in elementary schools. Elementary teachers have long observed that some students are bullies and others become their victims. In a qualitative study, a researcher might ask how and why this behavior develops and could use naturalistic observation to investigate this behavior in an elementary school. The investigator could use video cameras and remote microphones to record instances of children being exposed repeatedly to negative verbal or physical actions on the part of one or more classmates. The researcher would want to interview the bullies to find out what they are thinking and what their motives and goals are. The victims would also be interviewed to learn about their feelings. The researcher might also examine gender differences in bullying behavior and the reaction of peers to this behavior.

EVALUATING THE PROBLEM

After you have tentatively selected a question that interests you, you need to ask if it is a question that warrants an expenditure of time and effort to investigate. The following are criteria that one can use to evaluate a research problem:

1. *The problem should have significance*—that is, it should be one whose solution will make a contribution to educational theory or practice. The problem may fill in gaps in current knowledge or help resolve some of the inconsistencies in previous research. You should be able to answer the question "So what?" with respect to your proposed study. Would the solution make any difference to educational practice? Would other educators be interested in the findings? Would the findings be useful in an educational decision-making situation?
2. *The problem should be one that will lead to new problems and so to further research*. A good study, while arriving at an answer to one question, usually generates a number of other questions that need investigation. Avoid trivial problems that have little or no relationship to theory or previous research.

   We suggest that a beginning researcher consider selecting a problem that could possibly be expanded or followed up later in a master's thesis or even a doctoral dissertation. It may be helpful if students familiarize themselves with the research efforts of their professors, who not only can suggest related problems needing investigation but also may later serve as a mentor or a doctoral committee member.
3. *The problem must be researchable*. Although this criterion would seem self-evident, in practice, many proposed problems are not researchable. A researchable problem is one that can be attacked empirically; that is, it is possible to gather data that answer the question. Many interesting questions in education cannot be answered by scientific research. Philosophic questions, for example, that ask what should be done are not researchable and should

be avoided. Questions such as "Should we offer more vocational training in the high school?" or "Should schools give more attention to character education?" cannot be answered by scientifically gathering and analyzing data.

It is possible to restate philosophic questions to make them researchable. The previous question could be restated as follows: "What is the effect of a character education program on the incidence of cheating in high school?" It would be possible to gather data on this question, which could then be used by educators to help make decisions about a character education program.

4. *The problem should be suitable for the researcher*. The problem may be excellent from the standpoint of the previous criteria but inappropriate for the individual. First, the problem should be one in which you, the researcher, have a genuine interest and about which you can be enthusiastic. It should be a problem whose solution is personally important because of what it could contribute to your own knowledge or to improving your performance as an educational practitioner. Unless the problem is meaningful and interesting, it is doubtful whether you would be willing to expend the time and energy to do a thorough job.

   In addition to interest, one must have the necessary research skills to carry the study through to completion. One may have to develop and validate instruments or do complex statistical analyses. Another consideration is whether you will have access to participants and the data necessary to answer the research question. Lastly, one should choose a problem that can be investigated in the allotted time and with the resources available. Do not select a problem that is too large or too involved, and be sure to allow adequate time for constructing instruments, administering instruments, conducting interviews or observations, analyzing data, and writing the report.

5. *The problem should be ethically appropriate*. That is, the problem should be one that you can investigate without violating ethical principles. Unlike researchers in the physical sciences, educational researchers are dealing with human subjects with feelings, sensitivities, and rights who must be treated ethically. We discuss ethics in greater detail in Chapters 15 and 20. At this point, we mention briefly three issues the researcher should consider:

   a. *Consent*. Researchers need to obtain consent from the intended subjects. Subjects should be able to choose whether they wish to participate in the study or not. Obtain consent from subjects after taking steps to ensure that they have a complete understanding of the procedures to be used, any risks involved, and any demands that will be placed on them. Obtain parental consent if minor children are to be involved in the study.

   b. *Protection from harm*. Do not plan research that may cause physical harm or psychological harm such as stress, discomfort, or embarrassment that could have lasting adverse effects. Fortunately, most educational research does not involve great risk of harm to subjects. However, the potential for harm always exists, and a researcher should be prepared if a participant requests counseling or other help after participating in the study.

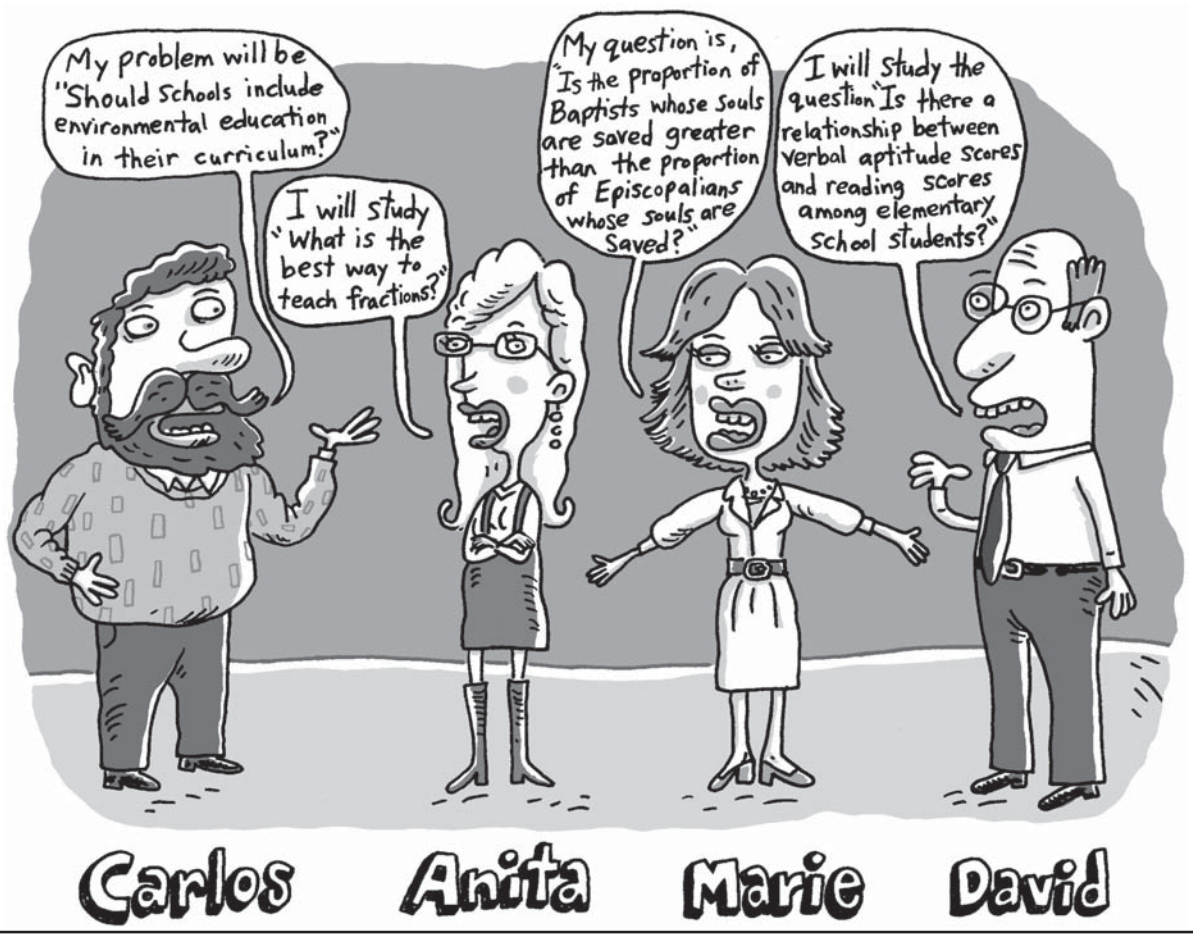
   c. *Privacy*. A researcher should invade the privacy of subjects as minimally as possible. For example, a researcher may plan to use an inventory that

asks adolescents questions about sexual experiences, religious beliefs, attitudes toward parents, or other sensitive topics. In this case, the researcher should not attach names to the inventories. Subjects have the right to expect that their anonymity will be preserved. Most educational researchers are interested in group data rather than individual responses; the scores or responses of individuals are generally pooled and reported as group averages, which tends to minimize the risk of invading privacy. Table 3.1 summarizes the criteria of a good research problem.

Table 3.1 Characteristics of a Good Research Problem

1. The problem is significant (it will contribute to the body of knowledge in education).
2. The problem is one that will lead to further research.
3. The problem is researchable (it can be investigated through the collection of data).
4. The problem is suitable (it is interesting and suits the researcher's skills, time, and available resources).
5. The problem is ethical (it will not cause harm to subjects).

PICTURE THIS



Joe Rocco

THINK ABOUT IT 3.1

How do the questions in the cartoon rate on the criteria for evaluating research problems?

Answers:

1. Carlos: Research cannot answer questions of "should." The question could be rewritten as "Do students who have had a unit on environmental awareness demonstrate greater knowledge of and more positive attitudes toward environmental issues than students who have had a control unit?" Then one could randomly assign some students to have a unit on environmental awareness while others have a unit not related to the environment. At the completion of the units, one could measure the students on their knowledge of the environment, their attitudes toward environmental legislation, and environmentally appropriate behaviors such as not littering.
2. Anita: As stated, the question is not researchable. There are so many possible ways to teach fractions that one could never investigate the outcomes of them all. One could operationally define two or three methods and compare the success of students taught by the different methods, using the same test of knowledge of fractions for all groups.
3. Marie: There is no way in this world to determine whose soul has been saved. A feasible question might be "Is the proportion of Baptists who say their souls have been saved different from the proportion of Episcopalians who say their souls have been saved?"
4. David: The question is trivial because it has been investigated sufficiently in past research.

STATING THE RESEARCH PROBLEM

After you have selected and evaluated the problem, the next task is to state the problem in a form amenable to investigation. We cannot overemphasize the importance of a clear statement of the problem. Beginning researchers often have a general idea of what they want to investigate but have trouble articulating it as a workable problem. They cannot make progress until they can state unambiguously what they are going to do. The statement of the problem varies according to the type of research. Thus, we consider quantitative and qualitative research statements separately.

THE PROBLEM STATEMENT IN QUANTITATIVE RESEARCH

The **problem statement** in quantitative research specifies the variables and the population of interest. The problem statement can be a declarative one such as "This study investigates the effect of computer simulations on the science achievement of middle school students." The statement can ask a question about a relationship between the two (or more) variables. The previous problem might be restated as "What is the relationship between use of computer simulations and achievement in middle school science?" Some scholars prefer the question form simply because it is straightforward and psychologically seems to orient the researcher to the task at hand—namely, to find the answer to the question. But either is an acceptable way to present the research problem.

The problem can be further clarified by operationally defining the variables involved. In the previous example, you might specify what computer simulations will be used, how science achievement will be measured, and how the sample of middle school students will be selected. The problem statement then becomes "What is the effect of a computer-assisted biology course on performance on the Test of Biological Concepts of students in an eighth-grade biology class?" One can then proceed to plan an experiment that compares the scores on the Test of Biological Concepts by students having the computer instruction with those of similar students having the traditional biology curriculum.

THE PROBLEM STATEMENT IN QUALITATIVE RESEARCH

Qualitative researchers also begin with a problem, but they state it much more broadly than in quantitative research. A qualitative problem statement or question indicates the *general* purpose of the study. Formulation of a qualitative problem begins with the identification of a general topic or an area you want to know more about. This general topic of interest is sometimes referred to by qualitative researchers as the **focus of inquiry**. This initial broad focus provides the framework but allows for changes as the study proceeds. As the researcher gathers data and discovers new meanings, the general problem narrows to more specific topics and new questions may arise. For example, Piert (2007) conducted a qualitative study to learn about a rite-of-passage program for transitioning black young people into adulthood. The program draws upon African traditional culture to impart values, improve self-concept, and develop cultural awareness. The specific problem was "What are the perceptions of former students who had experienced a rite-of-passage program while attending an African centered high school?" The findings suggest that the participants perceived the rite of passage as a community endeavor that facilitated their transition into adulthood. They viewed it as a method to inculcate social, cultural, and political values that will ensure the positive development of black young adults within the black community as well as American society.

Whereas the quantitative researcher always states the problem before collecting data, the qualitative researcher may formulate problems after beginning to collect data. In fact, the researcher often does not present the final statement of the problem—which typically specifies the setting, subjects, context, and aim of the study—until he or she has collected at least some data.

In qualitative research, the statement may be somewhat general in the beginning, but it will become more focused as the study proceeds. After exploring the sites, the people, and the situations, the researcher narrows the options and states the research problem more specifically.

IDENTIFYING POPULATION AND VARIABLES

A good strategy for shaping a felt problem—or a vague notion of what you want to investigate—into a researchable problem is to think in terms of population and variables. For example, let us consider Ms. Burke, an elementary school principal whose question is "Does individual tutoring by upper-grade students have a positive effect on the reading achievement of younger below-average readers?"

It is usually easiest to identify the **population**—those people about whom you wish to learn something. The population here is below-average readers. Reading ability is not a variable in this question because all the children being considered have already been diagnosed as below-average readers. Having identified below-average readers as the population in the original statement, Ms. Burke should now ask herself if that is really the population she wants. She will probably decide that below-average readers is too broad a category and she should confine herself to a particular age. Thus, she selects below-average second-grade readers.

Now she is ready to identify the variables in the remainder of her original statement. "Individual tutoring" can be made into a variable by varying the type of tutoring used, varying the amount of tutoring time, or having some children receive the tutoring and others not receive tutoring. Ms. Burke decides that the last alternative concerns what she really wants to know, so she rewrites the relevant part of the question to "Does receiving a specified amount of individual tutoring versus no tutoring … ?" Thus, tutoring is the independent variable because it is antecedent to reading achievement, and the principal is predicting that the tutoring will have an effect on reading achievement, the dependent variable. Recall that the dependent variable is the outcome of interest, and the independent variable is hypothesized to influence the dependent variable. Now it becomes obvious that the word *tutoring* is too general. Unless all subjects receive the same type and amount of tutoring, the results of the study will be meaningless. Ms. Burke decides to use word flash drill as the specific type of tutoring and to specify 15 minutes per day as the amount of time.

The phrase "have a positive effect on" is quite vague until she considers it in terms of her independent variable. Does word flash drill have an effect on … what? She knows it has an effect on word flash recall, but she wants to study its effects on other aspects of reading behavior that might be observed: expressive oral reading, silent reading, positive feelings toward reading, number of books read, comprehension, and so forth. However, she is afraid that teachers might rate good word callers as comprehending more and being more positive toward reading, whereas they view the poorer word callers as more inferior on these variables than they really are. She wants a dependent variable that is independent of teacher judgment and decides to use reading scores from the California Achievement Test (CAT) as the dependent variable.

Ms. Burke's revised statement of the problem now reads "Among below-average second-grade readers, is there a difference in CAT reading scores between those who have received 15 minutes per day of individual word flash drill by upper-grade students and those who have received no word drill?" This question tells whom she is studying, what will be done differently for some students, and what she expects differential treatment to influence. Note also that the value judgment "positive effect" has been dropped from the question.

It is often useful to follow this procedure in a formal manner similar to that used for diagramming a sentence. You can begin by drawing a vertical line and writing *Population* to the left and *Variables* to the right. Then list these elements in the study below the horizontal line. For the preceding example, the diagram would be as follows:

Population	Variables
Below-average second-grade readers	• Word flash drill for 15 minutes daily by upper-grade students versus no word flash drill (independent) • Reading scores on CAT (dependent)

Let us take another question: "What is the effect of having experienced versus not having experienced a preschool program on the reading achievement of first-graders?"

Population	Variables
First-graders	• Having experienced versus not having experienced a preschool program (independent) • Reading achievement (dependent)

This question is complete in that it has an identified population and both independent and dependent variables. Because "preschool program" precedes "reading achievement of first-graders," the former can be identified as the independent variable and the latter as the dependent variable.

Let us look at another example: "Does high school driver education do any good?" As it stands, the question has neither a population nor variables. An investigator starting with this question might first decide to compare 18-year-old drivers who have had high school driver education with those who have not. You now have a population statement and an independent variable. Now you can turn your attention to selecting a dependent variable. What effect might having versus not having driver education have on 18-year-old drivers? Let us say you decide that "accident rate" would be a suitable dependent variable. Putting these elements into a diagram, you now have the following:

Population	Variables
18-year-old drivers	• Have had versus have not had high school driver education (independent) • Accident rate (dependent)

You can now state a complete question: "Do 18-year-old drivers who have had high school driver education have a lower accident rate than 18-year-old drivers who have not had high school driver education?"

The question "What is the relationship of dogmatism to political attitudes among college freshmen?" illustrates another point. Consider this diagram:

Population	Variables
College freshmen	• Dogmatism • Political attitudes

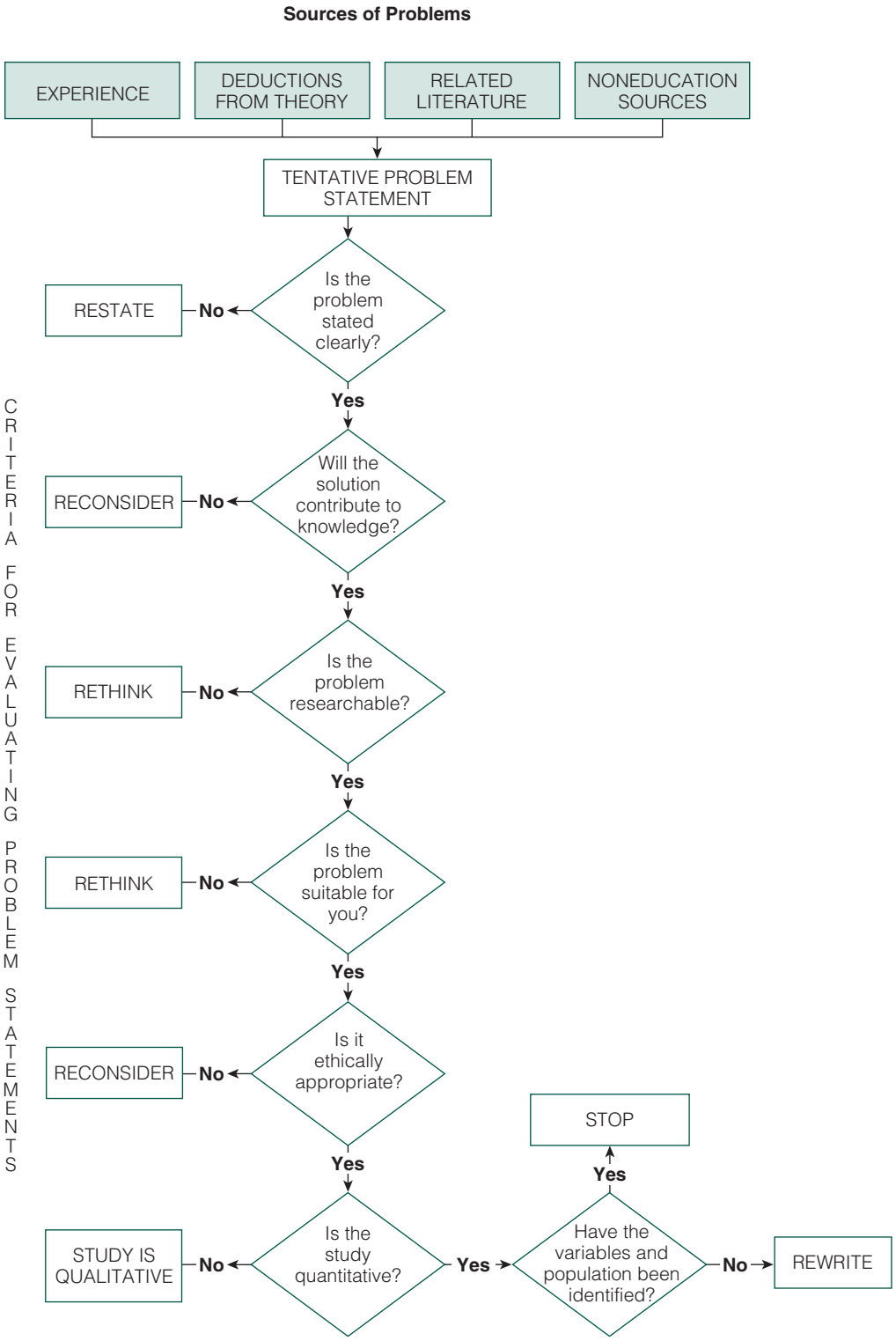


Figure 3.1 Developing a Research Problem

This question is complete with a population and two variables. However, you cannot label the variables as independent and dependent because it cannot be determined which is antecedent to the other.

If you conduct a study to investigate status quo rather than a relationship between variables, it may be complete with only one variable. For example, you might study the opinions of college seniors concerning legalization of marijuana. In this case, the population is college seniors and the single variable is their opinions on the subject. The process of evaluating a problem for research is summarized in Figure 3.1.

Think About It 3.2

For the revised problems of Carlos, Anita, and Marie, identify and/or add the independent variable(s), dependent variable, and population that they will need to identify in order to begin research on their questions.

Answers

1. Carlos

Population	*Independent Variable*	*Dependent Variables*
High school students	Unit on environmental awareness vs. control unit	Knowledge of environment Attitude toward environmental issues

2. Anita

Population	*Independent Variable*	*Dependent Variable*
Fourth-graders	Method of teaching fractions	Student success with fractions

3. Marie

Population	*Independent Variable*	*Dependent Variable*
Church members (Baptists and Episcopalians)	Religious affiliation	Whether they report their souls saved or not

SUMMARY

The first task facing researchers is selecting a researchable problem and stating it in a form suitable for research. To find a problem, investigators may look to their personal experiences, to theories from which questions may be deduced, to the current literature in their area of interest, or to noneducation sources. They must evaluate the significance of the proposed problem in terms of specific criteria, asking questions such as "Will the problem contribute to the present body of knowledge?" "Does it have potential for leading to further research?" "Is it testable—that is, can the variables be observed and measured?" "How appropriate is the problem with respect to my interests, experience, and knowledge in the area?" "Do I have access to the data required by the problem, and are instruments available, or could they be constructed, to measure the variables?" and "Can the data be analyzed and interpreted within

the time available?" The question should not directly involve philosophical issues, nor should it be so general that a research undertaking is impossible. A quantitative research question asks about the relationship between certain variables. The statement of the question should identify the population of interest and the variables to be investigated. A qualitative research question indicates the general purpose of the study. The criteria for evaluating qualitative problems are similar to those used for quantitative research problems.

KEY CONCEPTS

criteria for research problems
falsifiability
focus of inquiry
population
problem statement
research problem

EXERCISES

1. The following is an abstract taken from an article in *The Clearing House* (Springer, Pugalee, & Algozzine, 2007):

   In U.S. schools, students must pass statewide competency tests to graduate from high school. In this article, the authors summarize the development and testing of a program implemented to improve the skills of students failing to "make the grade" on these high-stakes tests. District personnel randomly assigned 28 students who previously failed the math test to participate in an experimental (Arizona Instrument to Measure Standards [AIMS]) or to a control math class. The AIMS group used a computerized tool to generate multiple-choice problems for students to practice the content of the state's competency test. Eight AIMS students (57 percent) and two control students (14 percent) passed the retest. The outcomes offer promise for schools looking for evidence-based solutions to problems related to increasing numbers of students experiencing difficulties with high-stakes assessments.

   a. What was the independent variable in this study?
   b. What was the dependent variable?
   c. What was the population?
2. Find a quantitative research report published in a journal, and answer the following questions based on your reading:
   a. What problem is investigated in the study?
   b. What are the independent and dependent variables?
   c. Where did you find the problem stated in the report?
   d. Was the problem stated with sufficient clarity so that you knew exactly what was being investigated in the study?
   e. Did the author suggest further research on this question?
3. Find a qualitative research report published in a journal and identify the
   a. Problem
   b. Methodology
   c. Findings
   d. Conclusions
4. Select a broad area in which you might be interested in doing research and then identify a research problem in that area. State this problem in an acceptable form for research. What was the source of this problem?
5. The following examples are inadequate statements of research problems. Restate each so that it becomes a specific question suitable for research.
   a. A later morning start for the high school
   b. Parental involvement and elementary school achievement
   c. Self-concept of children with learning disabilities
   d. Home-schooled adolescents
   e. Gender differences and logical thinking skills of talented preadolescents
   f. Teaching students with attention deficit/hyperactivity disorder (ADHD)
   g. Predicting achievement in a graduate education program

6. Evaluate the following research problems:
   a. Should learning-disabled students be mainstreamed in middle school English classes?
   b. Has No Child Left Behind legislation been good for U.S. education?
   c. Would it be wise to have a dress code for the city's high schools?
   d. What is the relationship between verbal aptitude scores and reading test scores?
7. State the most likely independent and dependent variables in the following studies:
   a. Peer interactions in children with autism
   b. The effect of participation in school sports on the social skills of mentally challenged adolescents
   c. The effect of an early intervention program on the academic achievement of children from low-income families
   d. The influence of an antismoking program on the attitudes of middle school students toward smoking
8. A principal wants to know if it is beneficial to keep class sizes small in kindergarten to grade 2. Write an appropriate research question designed to answer this question.
9. Classify the following studies as most likely being quantitative or qualitative:
   a. Life of an Adolescent with HIV Infection
   b. High School Principals' Perspectives on Student Expulsion
   c. The Effect of Ability Grouping on Academic Outcomes for Gifted Students
   d. Racial Stereotypes in Middle School Literature Textbooks
   e. Teaching in an Alternative High School
10. There has been an increase in the number of elementary school children diagnosed with attention deficit disorder. Based on your observation and experience, formulate a theory to explain this finding. Evaluate your theory according to the characteristics of a "good" theory. State a research problem based on your theory.

ANSWERS

1. a. Computerized program to practice math content versus control math class
   b. Performance on a repeat of a state math competency test
   c. Students who had failed the math competency test
2. Answers will vary.
3. Answers will vary.
4. Answers will vary.
5. a. What is the effect of a later morning start time on the achievement of students at Eastern High School?
   b. What is the effect of a program to increase parental involvement on the achievement of their elementary school children?
   c. How do children with learning disabilities perceive themselves socially and academically?
   d. How do students who have been home schooled perform academically during the freshman year at Central State U.?
   e. What is the relationship between gender and logical thinking skills in talented preadolescents?
   f. What is it like to teach students with ADHD?
   g. What are the best predictors of achievement in a graduate education program?
6. a. This question involves a value judgment that is impossible to investigate empirically.
   b. This question as stated involves a value judgment and cannot be investigated empirically.
   c. Research cannot answer questions of value; it can only provide information on which decisions can be based.
   d. This question has been thoroughly investigated in previous research; it would not contribute to the body of knowledge.
7. a. *Independent*: having autism; *dependent*: peer interactions
   b. *Independent*: participation in school sports; *dependent*: social skills of mentally challenged adolescents
   c. *Independent*: experiencing an early intervention program or not; *dependent*: academic performance

d. *Independent*: antismoking program; *dependent*: students' attitudes toward smoking

8. What is the effect of class size in grades K–2 on students' academic performance?

9. a. Qualitative
b. Quantitative
c. Quantitative
d. Qualitative
e. Qualitative

10. Answers will vary.

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