The Basics of Educational Research

In Part Two, we introduce or expand on many of the basic ideas involved in educational research. These include concepts such as hypotheses, variables, sampling, measurement validity, reliability, and many others. We also begin to supply you with certain skills that will enhance your ability to understand and master the research process. These include such things as how to select a research problem, formulate a hypothesis, conduct a literature search, choose a sample, define words and phrases clearly, develop a valid instrument, plus many others. Regardless of the methodology a researcher uses, all of these skills are important to master. We also discuss the ethical implications involved in the conduct of research itself.
The Research Problem

OBJECTIVES  Studying this chapter should enable you to:

- Give some examples of potential research problems in education.
- Formulate a research question.
- Distinguish between researchable and nonresearchable questions.
- Name five characteristics that good research questions possess.
- Describe three ways to clarify unclear research questions.
- Give an example of an operational definition and explain how such definitions differ from other kinds of definitions.
- Explain what is meant, in research, by the term "relationship" and give an example of a research question that involves a relationship.
Robert Adams, a high school teacher in Omaha, Nebraska, wants to investigate whether the inquiry method will increase the interest of his eleventh-grade students in history. Phyllis Gomez, a physical education teacher in an elementary school in Phoenix, Arizona, wants to find out how her sixth-grade students feel about the new exercise program recently mandated by the school district. Tami Mendoza, a counselor in a large inner-city high school in San Francisco, wonders whether a client-centered approach might help ease the hostility that many of her students display during counseling sessions. Each of these examples presents a problem that could serve as a basis for research. Research problems—the focus of a research investigation—are what this chapter is about.

What Is a Research Problem?

A research problem is exactly that—a problem that someone would like to research. A problem can be anything that a person finds unsatisfactory or unsettling, a difficulty of some sort, a state of affairs that needs to be changed, anything that is not working as well as it might. Problems involve areas of concern to researchers, conditions they want to improve, difficulties they want to eliminate, questions for which they seek answers.

Research Questions

Usually a research problem is initially posed as a question, which serves as the focus of the researcher’s investigation. The following examples of possible research questions in education are not sufficiently developed for actual use in a research project but would be suitable during the early stage of formulating a research question. An appropriate methodology (in parentheses) is provided for each question. Although there are other possible methodologies that might be used, we consider those given here as particularly suitable.

- Does client-centered therapy produce more satisfaction in clients than traditional therapy? (traditional experimental research)
- Does behavior modification reduce aggression in autistic children? (single-subject experimental research)
- Are the descriptions of people in social studies discussions biased? (grounded theory research)
- What goes on in an elementary school classroom during an average week? (ethnographic research)
- Do teachers behave differently toward students of different genders? (causal-comparative research)
- How can we predict which students might have trouble learning certain kinds of subject matter? (correlational research)
- How do parents feel about the school counseling program? (survey research)
- How can a principal improve faculty morale? (interview research)

What all these questions have in common is that we can collect data of some sort to answer them (at least in
part). That’s what makes them researchable. For example, a researcher can measure the satisfaction levels of clients who receive different methods of therapy. Or researchers can observe and interview in order to describe the functioning of an elementary school classroom. To repeat, then, what makes these questions researchable is that some sort of information can be collected to answer them.

There are other kinds of questions, however, that cannot be answered by collecting and analyzing data. Here are two examples:

- Should philosophy be included in the high school curriculum?
- What is the meaning of life?

Why can’t these questions be researched? What about them prevents us from collecting information to answer them? The reason is both simple and straightforward: There is no way to collect information to answer either question. Both questions are, in the final analysis, not researchable.

The first question is a question of value—it implies notions of right and wrong, proper and improper—and therefore does not have any empirical (or observable) referents. There is no way to deal, empirically, with the verb should. How can we empirically determine whether or not something “should” be done? What data could we collect? There is no way for us to proceed. However, if the question is changed to “Do people think philosophy should be included in the high school curriculum?” it becomes researchable. Why? Because now we can collect data to help us answer the question.

The second question is metaphysical in nature—that is, beyond the physical, transcendental. Answers to this sort of question lie beyond the accumulation of information.

Here are more ideas for research questions. Which ones (if any) do you think are researchable?

1. Is God good?
2. Are children happier when taught by a teacher of the same gender?
3. Does high school achievement influence the academic achievement of university students?
4. What is the best way to teach grammar?
5. What would schools be like today if World War II had not occurred?

We hope you identified questions 2 and 3 as the two that are researchable. Questions 1, 4, and 5, as stated, cannot be researched. Question 1 is another metaphysical question and, as such, does not lend itself to empirical research (we could ask people if they believe God is good, but that would be another question). Question 4 asks for the “best” way to do something. Think about this one for a moment. Is there any way we can determine the best way to do anything? To be able to determine this, we must examine every possible alternative, and a moment’s reflection brings us to the realization that this can never be accomplished. How would we ever be sure that all possible alternatives have been examined? Question 5 requires the creation of impossible conditions. We can, of course, investigate what people think schools would be like. Figure 2.1 illustrates the difference between researchable and nonresearchable questions.

![Figure 2.1: Researchable Versus Nonresearchable Questions](image)

**Figure 2.1: Researchable Versus Nonresearchable Questions**

- **No** (Not researchable)
  - Should I put my youngster in preschool?
  - What is the best way to learn to read?
  - Are some people born bad?

- **Yes** (Researchable)
  - Do children enrolled in preschool develop better social skills than children not enrolled?
  - At which age is it better to introduce phonics to children—age 5, age 6, or age 7?
  - Who commits more crimes—poor people or rich people?
Characteristics of Good Research Questions

Once a research question has been formulated, researchers want to turn it into as good a question as possible. Good research questions possess four essential characteristics.

1. The question is feasible (i.e., it can be investigated without an undue amount of time, energy, or money).
2. The question is clear (i.e., most people would agree as to what the key words in the question mean).
3. The question is significant (i.e., it is worth investigating because it will contribute important knowledge about the human condition).
4. The question is ethical (i.e., it will not involve physical or psychological harm or damage to human beings or to the natural or social environment of which they are a part). We will discuss the subject of ethics in detail in Chapter Four.

Let us discuss some of these characteristics in more detail.

Research Questions Should be Feasible

Feasibility is an important issue in designing research studies. A feasible question is one that can be investigated with available resources. Some questions (such as those involving space exploration, for example, or the study of the long-term effects of special programs, such as Head Start) require a great deal of time and money; others require much less. Unfortunately, the field of education, unlike medicine, business, law, agriculture, pharmacology, or the military, has never established an ongoing research effort tied closely to practice. Most of the research that is done in schools or other educational institutions is likely to be done by “outsiders” — often university professors and their students — and usually is funded by temporary grants. Thus, lack of feasibility often seriously limits research efforts. Following are two examples of research questions, one feasible and one not so feasible.

Feasible: How do the students at Oceana High School feel about the new guidance program recently instituted in the district?

Not so feasible: How would giving each student his or her own laptop computer to use for a semester affect achievement?

Research Questions Should be Clear

Because the research question is the focus of a research investigation, it is particularly important that the question be clear. What exactly is being investigated? Let us consider two examples of research questions that are not clear enough.

Example 1. “Is a humanistically oriented classroom effective?” Although the phrase humanistically oriented classroom may seem quite clear, many people may not be sure exactly what it means. If we ask, What is a humanistically oriented classroom? we begin to discover that it is not as easy as we might have thought to describe its essential characteristics. What happens in such classrooms that is different from what happens in other classrooms? Do teachers use certain kinds of strategies? Do they lecture? In what sorts of activities do students participate? What do the classroom look like — how is the seating arranged? Are there some factors that lead to the best classroom arrangements, we might ask. Or is the student’s learning experience of the teacher's ratings? This is the kind of question that is never really answered. Furthermore, is there any evidence that all students in such classrooms learn in such a way? Finally, how many of these conditions would be found in a classroom that we could reasonably call humanistically oriented?

Another term in this question is also ambiguous. What does the term effective mean? Is it the same as results in increased academic proficiency? “Results in more effective teaching” is a common phrase in many educational programs. What do the teachers mean by effective teaching? Are they thinking of more interesting or engaging classes? Are they referring to the use of computers in teaching? Should the students rate the teacher? Are the students rating the teacher? If so, is there any evidence that the teacher is effective? What is the evidence? It seems that the question is asking the teachers to define the term effective teaching. Perhaps this is not the question that we should be asking. Perhaps the question is more specific and asks about the students’ perceptions of the teacher’s effectiveness.

Example 2. “How do teachers feel about special classes for the educationally handicapped?” The first term that needs clarification is teachers. What age group does this involve? What level of experience (i.e., are they teaching classes for, for example, included or are they teaching classes for private schools included?)? Are teachers in both schools teaching in public and private schools included? Are teachers teaching in the nation included, or only those in a specific locality? Does the term refer to teachers who do not teach special classes as well as those who do?

The phrase feel about is also ambiguous. Does it mean opinions? Emotional reactions? Does it suggest actions? or what? The terms special classes and educationally handicapped also need to be clarified. An example of a legal definition of an educationally handicapped student is:

A minor who, by reason of marked learning or behavioral disorders, is unable to adapt to a normal classroom situation. The disorder must be associated with a neurological
handicap or an emotional disturbance and must not be due to mental retardation, cultural deprivation, or foreign language problems.

Note that this definition itself contains some ambiguous words, such as marked learning disorders, which lend themselves to a wide variety of interpretations. This is equally true of the term cultural deprivation, which is not only ambiguous but also often offensive to members of ethnic groups to whom it is frequently applied.

As we begin to think about these (or other) questions, it appears that terms which seemed at first glance to be words or phrases that everyone would easily understand are really quite complex and far more difficult to define than we might originally have thought.

This is true of many current educational concepts and methodologies. Consider such terms as core curriculum, client-centered counseling, active learning, and quality management. What do such terms mean? If you were to ask a sample of five or six teachers, counselors, or administrators, you probably would get several different definitions. Although such ambiguity is valuable in some circumstances and for certain purposes, it represents a problem to investigators of a research question. Researchers have no choice but to be specific about the terms used in a research question, to define precisely what is to be studied. In making this effort, researchers gain a clearer picture of how to proceed with an investigation and, in fact, sometimes decide to change the very nature of the research. How, then, might the clarity of a research question be improved?

Defining Terms. There are essentially three ways to clarify important terms in a research question. The first is to use a constitutive definition—that is, to use what is often referred to as the dictionary approach. Researchers simply use other words to say more clearly what is meant. Thus, the term humanistic classroom might be defined as

A classroom in which: (1) the needs and interests of students have the highest priority; (2) students work on their own for a considerable amount of time in each class period; and (3) the teacher acts as a guide and a resource person rather than an informant.

Notice, however, that this definition is still somewhat unclear, since the words being used to explain the term humanistic are themselves ambiguous. What does it mean to say that the “needs and interests of students have the highest priority” or that “students work on their own”? What is a “considerable amount” of each class period? What does a teacher do when acting as a “guide” or a “resource person”? Further clarification is needed.

Students of communication have demonstrated just how difficult it is to be sure that the message sent is the message received. It is probably true that no one ever completely understands the meaning of terms that are used to communicate. That is, we can never be certain that the message we receive is the one the sender intended. Some years ago, one of the leaders in our field was said to have become so depressed by this idea that he quit talking to his colleagues for several weeks. A more constructive approach is simply to do the best we can. We must try to explain our terms to others. While most researchers try to be clear, there is no question that some do a much better job than others.

Another important point to remember is that often it is a compound term or phrase that needs to be defined rather than only a single word. For example, the term nondirective therapy will surely not be clarified by precise definitions of nondirective and therapy, since it has a more specific meaning than the two words defined separately would convey. Similarly, such terms as learning disability, bilingual education, interactive video, and home-centered health care need to be defined as linguistic wholes.

Here are three definitions of the term motivated to learn. Which do you think is the clearest?

1. Works hard
2. Is eager and enthusiastic
3. Sustains attention to a task*

As you have seen, the dictionary approach to clarifying terms has its limitations. A second possibility is to clarify by example. Researchers might think of a few humanistic classrooms with which they are familiar and then try to describe as fully as possible what happens in these classrooms. Usually we suggest that people observe such classrooms to see for themselves how they differ from other classrooms. This approach also has its problems, however, since our descriptions may still not be as clear to others as they would like.

Thus, a third method of clarification is to define important terms operationally. Operational definitions require that researchers specify the actions or operations necessary to measure or identify the term. For example, here are two possible operational definitions of the term humanistic classroom.

*We judge 3 to be the clearest, followed by 1 and then 2.
Key Terms to Define in a Research Study

- Terms necessary to ensure that the research question is sharply focused

The above listing of characteristics and behaviors may be a quite unsatisfactory definition of a humanistic classroom to many people (and perhaps to you). But it is considerably more specific (and thus clearer) than the definition with which we began.* Armed with this definition (and the necessary facilities), researchers could decide quickly whether or not a particular classroom qualified as an example of a humanistic classroom.

Defining terms operationally is a helpful way to clarify their meaning. Operational definitions are useful tools and should be mastered by all students of research. Remember that the operations or activities necessary to measure or identify the term must be specified. Which of the following possible definitions of the term motivated to learn mathematics do you think are operational?

1. As shown by enthusiasm in class
2. As judged by the student’s math teacher using a rating scale she developed
3. As measured by the “Math Interest” questionnaire
4. As shown by attention to math tasks in class
5. As reflected by achievement in mathematics
6. As indicated by records showing enrollment in mathematics electives
7. As shown by effort expended in class
8. As demonstrated by number of optional assignments completed
9. As demonstrated by reading math books outside class
10. As observed by teacher aides using the “Mathematics Interest” observation record†

*This is not to say that this list would not be improved by making the guidelines even more specific. These characteristics, however, do meet the criterion for an operational definition—they specify the actions researchers need to take to measure or identify the variable being defined.
†The operational definitions are 2, 3, 6, 8, and 10. The nonoperational definitions are 1, 4, 5, 7, and 9, because the activities or operations necessary for identifying the behavior have not been specified.