CHAPTER 1

INTRODUCTION TO EDUCATIONAL RESEARCH

OBJECTIVES

After reading Chapter 1, you should be able to do the following:

1. List and briefly describe the major steps involved in conducting a research study.
2. Given a published article, identify and state the
   a. Problem or topic chosen to study
   b. Procedures employed to conduct the study
   c. Method of analyzing collected data
   d. Description of the major conclusion of the study
3. Briefly define and state the major characteristics of a variety of research approaches.
4. For each research approach, describe briefly two appropriate research studies.

   Example:

   Experimental—A study to determine the effect of peer tutoring on the computational skill of third graders.

After you have read Chapter 1, you should be able to perform the following tasks.

TASKS 1-A, 1-B

Given reprints of two research studies, for each study identify and briefly state:

1. the topic (purpose of the study)
2. the procedures
3. the method of analysis
4. the major conclusions

(See Performance Criteria, p. 22.)

TASK 1-C

Classify given research studies based on their characteristics and purposes. (See Performance Criteria, p. 22.)

EDUCATIONAL RESEARCH: SCIENTIFIC AND DISCIPLINED INQUIRY

Research is the formal, systematic application of the scientific and disciplined inquiry approach to the study of problems. **Educational research** is the systematic application of a family of methods employed to provide trustworthy information about educational problems, issues, and topics. Most researchers, including educational researchers, undertake inquiry to gain understanding about some problem or topic that they don't fully comprehend. Having a stake in the outcome of the research makes conducting it more interesting, useful, and satisfying for the researcher. Once research topics or problems are explained or understood, many secondary purposes of research come into play, such as helping others understand the research results, using results to improve teaching and learning, and raising new topics or questions to study. Rarely, however, does a single research study produce the certainty needed to assume that the same results will apply in all or most settings. Rather,

research is usually an ongoing process, based on accumulated understandings and explanations that, when taken together, lead to generalizations about educational issues and practice, and ultimately, to the development of theories.

We humans go about understanding things in a variety of ways. At times we rely on tradition: This is the way we've always done things; why change now? At other times we rely on the opinions of people who are viewed as experts: A leading expert in the field says that this is what we should do. Our own personal experiences and our ability to generalize and make predictions based on these experiences provide us with much of our understanding. Often we use inductive and deductive reasoning to help us come to an understanding of something.

Inductive reasoning is based on developing generalizations from a limited number of related observations or experiences.

> *Example:* You examine the tables of contents of four research books, all of which contain a chapter on sampling (limited observation).
> Therefore, you conclude that all research methods books contain a chapter on sampling (generalization).

Deductive reasoning is based on developing specific predictions from general principles, observations, or experiences.

> *Example:* All research texts contain a chapter on sampling (generalization).
> This book is a research text.
> Therefore, this book contains a chapter on sampling (specific conclusion). (By the way, does it?)

Inductive and deductive approaches represent two ways to conduct research. Inductive research starts with a limited number of observations and seeks to form them into a generalization. Deductive research starts with a general statement or hypothesis and forms it into a specific conclusion. An inductive research approach is typically qualitative in nature, while a deductive research approach is typically quantitative in nature.

Although commonly used, each of these approaches to understanding has limitations. Relying on tradition inhibits change in one's perspective, thus stifling exploration and eliminating potentially new and fruitful understandings. As for depending solely on experts, even experts are not infallible. Personal experience can produce idiosyncratic interpretations and even prejudices. Moreover, most of us have relatively limited experience of many of the issues we might seek to understand.

Consider the limitations of relying on experts and personal experience illustrated by this story about Aristotle. According to the story, one day Aristotle caught a fly and carefully counted and recounted the legs. He then announced that flies have five legs. No one questioned the word of Aristotle. For years his finding was uncritically accepted. Of course, the fly that Aristotle caught just happened to be missing a leg! Whether or not you believe the story, it does illustrate the limitations of relying on personal experience and experts as sources of understanding. This story also says something about inductive reasoning. The quality of inductive reasoning (specific to general) is highly dependent on the number and representativeness of the specific observations used to make the generalization. Inductive reasoning provides no guide for this. Selecting too few or atypical examples undermines the logic of inductive reasoning. As for deductive reasoning (general to specific), it depends on the truth of the generalizations it uses as a basis for its logic. That is, if the generalization is not true, its extension to specific instances will not always be accurate. For example, if one accepts the generalization that professors are boring, extending this generalization to specific professors will not always be true for at least *some* of the professorate. Although inductive and deductive reasoning are of limited value when used individually, when combined they can be very important.

Scientific and disciplined inquiry is based on a systematic approach to examining educational issues and questions. It combines features of inductive and deductive reasoning with other characteristics to produce an approach to understanding that, though sometimes fallible, is generally more viable than relying on tradition, experts, personal experience, or inductive or deductive reasoning alone. Nonetheless, it is extremely difficult to totally remove the biases and beliefs in any research study. We can lessen but rarely eliminate errors in research studies that arise from the complexity and variability of humans and the contexts in which they act. Even the most extensive study cannot examine *all* the human and contextual factors that might influence a researcher's findings. Although the scientific and disciplined inquiry approach cannot guarantee error-free research results, it does incorporate checks and balances to help minimize the likelihood that the researcher's emotions or biases will influence research conclusions.

One very important characteristic distinguishes scientific and disciplined inquiry from other ways of understanding. The researcher is expected to describe in detail the procedures used to conduct the research study and its conclusions, thus providing a basis for examining and verifying the research results. These checks and balances permit others to examine, understand, and critique the research in ways not available by tradition, experts, personal experience, or inductive or deductive reasoning alone.

At the heart of scientific and disciplined inquiry is an orderly process that, at a minimum, involves four basic steps:

1. *Recognize and identify a topic to study.* A **topic** is a question, issue, or problem related to education that can be examined or answered through collecting and analyzing data.
2. *Describe and execute procedures to collect information about the topic being studied.* The procedures include identifying the research participants, the strategies to collect data related to the topic, and the activities describing how, when, and from whom the data will be collected. The nature of the research topic influences the research method applied, for example, the choice of a deductive or inductive approach.
3. *Analyze the collected data.* Analysis of the collected data is also related to the nature of the topic studied and to the data collected. Some research topics are best analyzed using quantitative, numerical data and a variety of statistical approaches. Other research topics are more qualitative in form and rely on data in the form of narratives, tape recordings, and field notes. Qualitative data are usually analyzed using interpretive rather than statistical analysis. Regardless of the kind of data collected, some form of analysis is necessary.
4. *State the results or implications based on analysis of the data.* Conclusions reached in the research study should relate back to the original research topic. What can be concluded about this topic based on the results of the study?

We mentioned that these are conceptually the four basic steps of research. As you begin to do research in later chapters, you will see that there are smaller steps and tasks within each of these four general groupings.

RESEARCH TOPICS: DEFINING PURPOSE AND METHODS

Consider the many questions about educational processes, activities, and topics that can be asked and systematically examined through research. Read the following research topics.

1. Do students learn more from our new social studies book than from the prior one?
2. What is the effect of positive versus negative reinforcement on elementary students' attitudes toward school?
3. How do teachers in our school district rate the quality of our teacher evaluation program?
4. What do high school principals consider to be their most pressing administrative problems?

5. Is there a relationship between middle school students' grades and their self-confidence in science and mathematics?
6. Do students' scores on an anxiety test relate to the scores they get on the Scholastic Assessment Test?
7. What factors led to the development of standardized achievement tests from 1900 to 1930?
8. What were the effects of the GI Bill on state colleges in the Midwest in the 1950s?
9. How do special needs students adapt to the culture of junior high school when transitioning from a strongly child-centered elementary school?
10. How do the first 5 weeks of school in Ms. Foley's classroom influence activities and interactions in succeeding months?

Consider the differences among these questions. For example, note the purpose of the topics posed. Questions 1 and 2 are concerned with *comparing* two things: the new versus the old social studies program and positive versus negative reinforcement. Questions 3 and 4 are concerned with *describing* teachers' ratings of their school district's teacher evaluation procedure and administrators' listing of their most pressing problems. Questions 5 and 6 are concerned with *relating* two things, grades to self-confidence and anxiety level to math and science performance. Questions 7 and 8 focus on events in the past, and are concerned with describing the *history* about each question. Questions 9 and 10 are concerned with using long-term, *in-depth observation* to obtain information about the adaptation of special needs students in a new culture (junior high school) and the impact of how one begins the school year on later classroom interactions.

Logically, if there are differences in the purposes of research topics, there also should be differences in the strategies and methods for investigating these topics. Some questions require selection of a large sample of people to provide data (e.g., question 2). Others focus in depth on the performance or activities of a small number of people to obtain data (e.g., question 9). Still others may not gather data from people at all, relying instead on artifacts, documents, pictures, and the like to provide needed data (questions 7 and 8). The way data are collected and analyzed also differs among research topics. Some methods rely heavily on formal tests and questionnaires to collect data (questions 1–6). Others rely heavily on in-depth personal observation, interviews, and tape recordings to collect data (questions 9–10). Methods that emphasize the use of tests and measurements typically are analyzed with statistical procedures (questions 1–6). These are *quantitative* research topics. Methods based on observation, interviews, and the like rarely employ statistical analysis, relying instead on the researcher's interpretive skills to analyze, integrate, and make sense of the data collected (questions 7–10). These are *qualitative* research topics.

Although there are a number of different questions, methods, and analyses related to conducting educational research, the threads that unite these differences are the four basic steps in the scientific and disciplined inquiry approach. Regardless of the nature of a research study, sections of it will be devoted to the purpose of the research, the methods used to carry out the research, the procedures used to analyze the collected data, and the interpretations or conclusions of the study.

This text focuses on a range of research methods exemplified by the questions just discussed. Research methods can be classified by the degree of direct applicability of the research to educational practice or settings (basic or applied research), or by the methods the researcher uses to conduct the study (quantitative or qualitative research). The intent of this book is to provide you with basic insights and understandings about a variety of research methods and strategies. It seeks to help you think about and critique your own and other people's research studies. To this end, it focuses on issues of finding research topics, selecting appropriate and ethical procedures for collecting data, applying meaningful methods to analyze data, and presenting research outcomes and implications. Make a list of a few research questions or topics you might wish to study and think of how you would carry out your research.

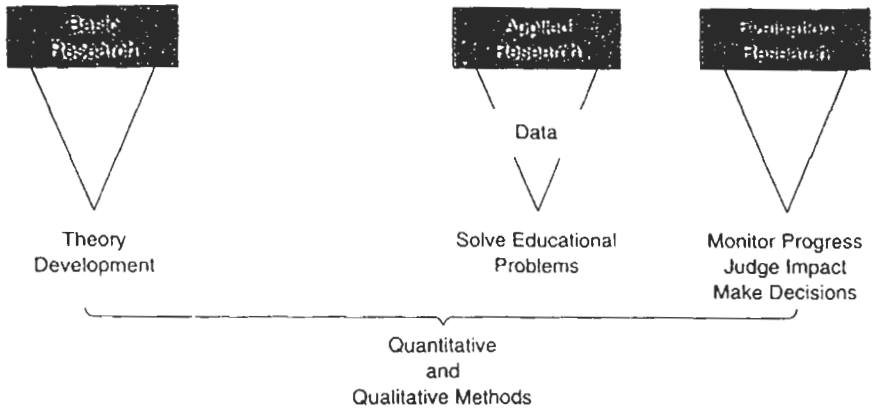

FIGURE 1.1 The education research continuum.

BASIC AND APPLIED RESEARCH

It is difficult to discuss basic and applied research separately because they are on a single continuum. Classification of a given study along the basic–applied continuum is made primarily on the degree to which the findings have direct applicability and the degree to which they generalize to other educational settings. **Basic research** involves the process of collecting and analyzing information to develop or enhance a theory. Theory development is a conceptual process that requires many research studies conducted over time. Basic researchers may not be concerned with the immediate utility of their findings, since it might be years before basic research leads to a practical educational application. The early work of Skinner on reinforcement with birds and Piaget on cognitive development with his two children were basic research efforts that subsequently led to important educational applications.

Applied research is conducted to evaluate its usefulness in solving practical educational problems. A teacher who asks, "Will the theory of multiple intelligence help improve my students' learning?" is seeking an answer to a practical classroom question. The teacher is not interested in building a new theory or even generalizing beyond her classroom, but instead is seeking specific helpful information. Letting teachers try out two methods of covering study hall and then having them decide which one results in greater student attentiveness is another example of applied research. Using portfolios in a classroom to see whether writing improves is also applied research.

Educators and researchers disagree about which end of the basic–applied research continuum should be emphasized. In its purest form, basic research is conducted solely for the purpose of theory development; it most closely resembles laboratory conditions and controls usually associated with scientific research. Applied educational research is conducted to solve current educational problems. Many educational research studies would be located on the applied end of the continuum; they are more focused on "what works best" than on finding out "why" it works as it does. Studies located in the middle of the basic–applied continuum seek to integrate both approaches. Both basic and applied research are necessary and, to a point, interdependent. Basic research provides the theory that produces the concepts for examining educational problems. Applied research provides data that can help support, guide, and revise the development of theory. Figure 1.1 illustrates the education research continuum.

EVALUATION RESEARCH

At the far end of applied research is evaluation, an important, widely used, and explicitly practical form of research. **Evaluation research** is concerned with making decisions about the

quality, effectiveness, merit, or value of educational programs, products, or practices. Unlike other forms of research that seek new knowledge or understanding, evaluation focuses mainly on decision making, a highly applied and practical purpose. Although the methods of evaluation research are not different from the methods of other forms of research, evaluation is distinguished by its decision-making purpose.

Typical evaluation research questions are, "Is this special science program worth its costs?" "Is the new reading curriculum better than the old one?" "Did students reach the objectives of the diversity sensitivity program?" and "Is the new geography meeting the teachers' needs?"

Evaluations come in various forms and have different purposes.[1] Two of their main purposes are to monitor the ongoing progress of a program or product and subsequently to judge the overall impact of it. Evaluators monitor an ongoing program or product to identify weaknesses that can be remedied during implementation. This evaluation purpose is called *formative evaluation* because its function is to form and improve what is being evaluated while it is being developed. Evaluators also make decisions about the program or product at its completion in order to make a decision about the overall quality or worth of the program or product. This approach is called *summative evaluation* because its function is to make a decision that sums up the overall quality or worth of the program or product.

QUANTITATIVE AND QUALITATIVE RESEARCH

We have noted that the fundamental purpose of educational research is to increase our understanding of educational processes, practices, topics, and issues. For much of the history of educational research, there were well-defined, widely accepted procedures for stating research topics, carrying out the research process, analyzing the resulting data, and verifying the quality of the study and its conclusions. For the most part, these research procedures were based on a quantitative approach to conducting and obtaining educational understandings. **Quantitative research** methods are based on the collection and analysis of numerical data, usually obtained from questionnaires, tests, checklists, and other formal paper-and-pencil instruments. But a quantitative research approach entails more than just the use of numerical data. It also involves stating both the hypotheses to be examined and the research procedures that will be carried out in the study. The quantitative approach also calls for maintaining control over contextual factors that might interfere with the data collected, and using large samples of participants to provide statistically meaningful data. It employs data analyses that rely on statistical procedures. Quantitative researchers generally have little personal interaction with the participants they study, since most data are gathered using paper-and-pencil, noninteractive instruments.

Underlying quantitative research methods is the belief or assumption that we inhabit a relatively stable, uniform, and coherent world that we can measure, understand, and generalize about. This view, which the field of education adopted from the natural sciences, implies that the world and the laws that govern it are relatively stable and predictable, and can be understood by scientific research and examination. In this quantitative—also called *positivist*—perspective, claims about the world are not considered meaningful unless they can be verified through direct observation.

However, in recent years, other, nonquantitative approaches to educational research have emerged and attracted many advocates. Generally called *qualitative* research methods, these are based on the collection and analysis of nonnumerical data such as observations, interviews,

[1] Stufflebeam, D., Madaus, G., Kellaghan, T. (2000). *Evaluation models, viewpoints on educational and human services evaluation*. Norwell, MA: Kluwer Academic Publishers; Gridler, M. (1996). *Program evaluation*. Upper Saddle River, NJ. Prentice Hall; Joint committee on standards for educational evaluation. (1994). *The program evaluation standards: How to assess evaluation of educational programs*, 2nd ed., Thousand Oaks: CA, Sage.

focus groups, and videotaping. **Qualitative research** methods are based on different beliefs and purposes than quantitative research methods. For example, qualitative researchers do not accept the view of a stable, coherent, uniform world. They argue that all meaning is situated in a particular perspective or context, and, since different people and groups often have different perspectives and contexts, there are many different meanings in the world, none of which is necessarily more valid or true than another.

Some fundamental differences in how quantitative and qualitative research are conducted reflect their different perspectives on meaning and how one can approach it. For example, qualitative research tends not to state hypotheses before data are collected. However, qualitative research problems and methods tend to evolve as understanding of the research context and participants deepens, an inductive strategy. In qualitative research, context is not controlled or manipulated by the researcher as in most quantitative research studies. Additionally, in qualitative research the number of participants tends to be small, in part because of time-intensive data collection methods such as interviews and observations. Qualitative researchers analyze data interpretively by synthesizing, categorizing, and organizing data into patterns that produce a descriptive, narrative synthesis. Conversely, quantitative analysis involves statistical procedures. Finally, because of the data collection methods and the effort to understand the participants' own perspective, researchers using qualitative methods often interact extensively with participants during the study. Quantitative researchers strive to control context and rarely interact with study participants.

Despite the differences between them, you should not consider quantitative and qualitative research to be oppositional. Taken together, they represent the full range of educational research methods. The terms *quantitative* and *qualitative* are used to conveniently differentiate one approach from the other. If you see yourself as a positivist, that does not mean you cannot use or learn from qualitative research methods. The same holds true for nonpositivist quantitative researchers. Depending on the nature of the question or topic to be investigated, one of these approaches will generally be more appropriate than the other. Note, however, that this does not preclude one approach borrowing from the other when it can enhance the research finding. In fact, both may be utilized in the same studies, as when the administration of a questionnaire (quantitative) is followed up by a small number of detailed interviews (qualitative) to obtain deeper explanations for the numerical data. (See also chapters 3 and 6 for discussions of mixed-method research.) Qualitative and quantitative approaches represent complementary components of the scientific and disciplined inquiry approach; qualitative approaches involve primarily inductive reasoning, while quantitative approaches involve primarily deductive reasoning. If hypotheses are involved, a qualitative study is much more likely to generate them, whereas a quantitative study is much more likely to test them. At an operational level, qualitative approaches are more holistic and process oriented, whereas quantitative approaches are more narrowly focused and outcome oriented. Qualitative research typically studies many variables intensely over an extended time in order to capture the richness of the qualitative context and the personal perspectives of the participants. Conversely, quantitative researchers focuses on a small number of variables and tries to eliminate the influence of contextual factors (e.g., class size, teacher experience, student characteristics). Qualitative researchers might examine in depth the way two or three teachers were acclimating to the use of a new reading textbook over a 6-month period; quantitative researchers might gather evidence from 200 students to compare the self-esteem of two groups, one that was mentored and one that was not.

At this point, you should have a basic sense of the essence of the two approaches. However, to help you broadly understand the field of educational research as a whole, it is useful to make one more level of distinction among types of educational research. So, let's look now at specific types of research that fall under the broad categories of *quantitative* and *qualitative*. In succeeding chapters we will examine these and other of the procedures and underlying beliefs associated with a number of specific quantitative and qualitative research approaches.

Quantitative Approaches

Researchers use quantitative research approaches to describe current conditions, investigate relationships, and study cause–effect phenomena. Studies designed to describe current conditions are called *survey* or *descriptive* research. Studies designed to investigate the relationship between two or more variables are referred to as *correlational* and *causal–comparative* research. Studies that provide information about cause–effect outcomes are called *true experiments*.

Survey Research

Survey research, also called descriptive research, involves collecting data to answer questions about the current status of issues or topics. Note that qualitative research also relies on description, but qualitative description is usually in the form of verbal reports and narratives, while quantitative description is usually in the form of statistics and numbers. Qualitative researchers do use survey research, but typically with less frequency. Surveys are carried out to obtain information about the preferences, attitudes, practices, concerns, or interests of some group of people. A pre-election political poll or a survey about the public's perception of the quality of its local schools are examples. A substantial portion of all the quantitative research carried out is survey research.

Quantitative descriptive research (survey) data are mainly collected from tests and questionnaires that research participants self-administer and fill out. Another common (but slightly more annoying) form of survey data is the telephone interview. Increasingly we are receiving phone calls from organizations or companies that want to obtain our opinions of their organization or product. Usually they read questions and ask us to choose from a limited number of categories: "Select your answer from these choices: highly favorable, favorable, neutral, unfavorable, or highly unfavorable." Usually they seem to call in the middle of supper.

There is considerably more to conducting survey research than just asking questions and reporting answers. Because researchers are often asking questions that have not been asked before, they must develop instruments to suit each specific descriptive study. Instrument development requires clarity, consistency, and tact in constructing questions for the intended respondents. (We address instrument development in Chapter 5.) Other major problems that face survey researchers are participants' failure to return questionnaires, to agree to be surveyed over the phone, and to attend scheduled data collection sessions. Researchers depend on the chosen participants to care enough to make time to provide the sought information. If the response rate is low, researchers cannot draw valid conclusions about the issues studied. For example, suppose you were doing a study to determine attitudes of principals toward research in their schools. You send a questionnaire to 100 principals and ask the question, "Do you usually cooperate if your school is asked to participate in a research study?" Forty principals respond and they all answer "Yes." Could you then conclude that principals in general cooperate with researchers? No! Even though all those who responded said yes, 60 principals did not respond to your questionnaire. They may never cooperate with researchers. After all, they didn't cooperate with you! Without more responses it is not possible to generalize about how all principals feel about research in their schools.

The following are examples of topics investigated by quantitative survey (descriptive) research studies:

- *How do second-grade teachers spend their teaching time?* Categories of teaching time would be identified (e.g., lecture, discussion, asking and answering questions, individual student help). Second-grade teachers would be asked to fill out a questionnaire and results would probably be presented as percentages (e.g., 50% of their time is spent lecturing, 20% asking or answering questions, 20% discussion, and 10% individual student help).
- *How will citizens of Yourtown vote in the next presidential election?* A survey sample of Yourtown citizens would complete a questionnaire or interview, and results would likely be

presented as percentages (e.g., 70% indicated they will vote for Peter Pure, 20% for George Graft, and 10% are undecided).

Correlational Research

Correlational research seeks to determine whether, and to what degree, a statistical relationship exists between two or more variables. A **variable** is a concept that can assume any one of a range of values, for example, intelligence, height, test score, and the like. Correlations either establish relationships or use existing relationships to make predictions. A **correlation** is a quantitative measure of the degree of correspondence between two or more variables. For example, a college admissions director might be interested in answering the question "How does the performance of high school seniors on the SAT correspond to their first semester's college grades?" Is there a high relationship between students' SAT scores and their freshman year of college, suggesting that SAT scores might be useful in predicting how students will perform in their first year of college? Or is there a low correlation between the two variables, suggesting that SAT scores likely will not be useful? The degree of correspondence between correlational variables is measured by a **correlation coefficient**, which is a number between -1.00 and $+1.00$. Two variables that are not related will have a correlation coefficient near .00. Two variables that are highly correlated will have a correlation coefficient near -1.00 or $+1.00$. A correlation that is *positive* (near $+1.00$) means that as one variable increases, the other variable also increases. A coefficient that is *negative* (near -1.00) means that when one variable increases the other variable decreases. Since very few pairs of variables are perfectly correlated, predictions based on them are rarely perfectly positive or negative. At a minimum, correlation research requires information about at least two variables obtained from a *single group* of participants.

It is very important to note that correlational studies do not establish cause–effect relations between variables. Thus, the fact that there is a high correlation between, for example, self-concept and achievement does not imply that self-concept "causes" achievement or that achievement "causes" self-concept. The correlation only indicates that students with higher self-concepts tend to have higher levels of achievement and that students with lower self-concepts tend to have lower levels of achievement. We cannot conclude that one variable is the cause of the other. There may be a third factor, such as the amount of encouragement and support parents give their children, that underlies both variables and influences high or low achievement and self-concept.

The following are examples of correlational studies:

- *The correlation between intelligence and self-esteem.* Scores on an intelligence test and a measure of self-esteem would be acquired from each member of a given group. The two sets of scores would be correlated and the resulting coefficient would indicate the degree of relationship between intelligence and self-esteem.
- *Use of an aptitude test to predict success in an algebra course.* Scores on an algebra aptitude test would be correlated with success in algebra measured by algebra final exam scores. If the resulting correlation were high, the aptitude test might be a good predictor of participants' future grades in algebra.

Causal–Comparative Research

Causal–comparative research, also called **ex post facto research** (after the fact), explores relationships among variables that cannot meet the stringent criteria for true experimental research. In most situations, causal–comparative research fails to meet the criterion for random assignment of participants from a single pool. In a causal–comparative study (note, the word is *causal*, not *casual*), the **independent variable**, or cause, has already occurred or cannot be manipulated, so the researcher has no control over it. For this reason, causal–comparative

research is also called ex post facto research. The independent variables in causal–comparative studies either cannot be manipulated (e.g., gender, height, or year in school) or should not be manipulated (e.g., smoking, prenatal care). In causal–comparative research, at least two different groups are compared on some **dependent variable** (the effect).

For example, a causal–comparative study might involve the independent or causal variable "heavy smoking," with a comparison between a group of long-time smokers and a group of nonsmokers. The dependent variable (the effect) might be the comparative frequency of lung cancer diagnoses in the two groups. In this example and in causal–comparative research in general, the researcher does not have control over the independent variable. That is, the smokers and nonsmokers had already formed themselves into groups *before* the researcher began the study. The researcher has to select research participants from two different, preexisting groups, heavy smokers and nonsmokers. This potentially creates problems. Suppose, for example, that unknown to the researcher, a large number of the long-time smokers selected had lived in a smoggy, urban environment and that only a few of the nonsmoking group did. Due to the lack of control over the selection of study participants, attempts to draw cause–effect conclusions in the study would be at best tenuous and tentative. Is it smoking that causes higher rates of lung cancer? Is it living in a smoggy, urban environment? Is it some unknown combination of smoking and environment? A clear cause–effect link cannot be obtained from this study because the researcher did not have complete control of the selection of the participants and their characteristics.

Although causal–comparative research produces limited cause–effect information, it is an important form of educational research because in many cases, seeking true cause–effect relationships would be inappropriate or unethical to research. Our smoking study is an example of the need for causal–comparative methods. To conduct the study as an experiment so that causal statements about smoking and lung cancer could be obtained would require the researcher to select a large group of participants who had never smoked and divide them into two groups, one forced to become heavy smokers and one forbidden to smoke. Obviously such a study would be unethical because of the potential harm to those forced to become heavy smokers. The only reasonable option is to conduct a causal–comparative study that approximates cause–effect results without harming the participants. Thus, like most survey and correlational studies, causal–comparative research also does not produce true experimental research outcomes, although such research sometimes leads to more rigorous experimental studies designed to either confirm or refute specific findings.

The following are examples of causal–comparative studies:

- *The effect of preschool attendance on social maturity at the end of the first grade.* The independent variable, or cause, is preschool attendance (students attending preschool and students not attending); the dependent variable, or effect, is social maturity at the end of the first grade. Two groups of first graders would be identified, one group who had attended preschool and one group who had not. The social maturity of the two groups would be compared at the end of grade one.
- *The effect of having a working mother on school absenteeism.* The independent variable is the employment status of the mother (the mother works or does not work); the dependent variable is absenteeism, or number of days absent. Two groups of students would be identified—one group who had working mothers and one group who did not. The absenteeism of the two groups would be compared.

Experimental Research

True **experimental research** allows researchers to make cause–effect statements about their research studies. Cause-and-effect research outcomes provide the strongest results of any of the quantitative research approaches. To establish that one variable causes another provides

strong evidence for linking variables. To obtain cause–effect research results it is necessary to adhere to a stringent set of criteria.

The major difference between causal–comparative and experimental research is that in the experiment the researcher can control the independent variable. In fact, the experiment is the quantitative approach that provides the greatest degree of control over the research procedures. True experimental researchers control the selection of participants for the study, divide the selected participants into two or more groups that have similar characteristics at the start of the research experiment, then apply different treatments to the selected groups. They also control the condition in the research setting, such as when the treatments will be applied, by whom, for how long, and under what conditions. Finally, researchers select tests or measurements to collect data about the effects of the research groups. It is the selection of participants from a *single pool* of participants and the ability to apply different treatments or programs to participants with similar initial characteristics that permit true experimental research to provide cause–effect research results. The essence of experimentation is control, although in many education settings it is not possible or feasible to meet the stringent control conditions required by experimental research.

The following are examples of experimental studies:

- *The comparative effectiveness on computational skills of personalized instruction from a teacher versus computer instruction.* The independent variable is type of instruction (personalized teacher instruction versus computer instruction); the dependent variable is computational skills. A group of students who had never experienced either personalized teacher instruction or computer instruction would be selected and randomly divided into two groups, each taught by one of the methods. After a predetermined time, the students' computational skills would be measured and compared to determine which, if either, treatment produced higher skill levels.
- *The effect of positive reinforcement on attitude toward school.* The independent variable is type of reinforcement (e.g., positive, negative, and no reinforcement); the dependent variable is attitude toward school. In this example three groups will be studied, randomly formed from a single large group of students. One group would receive positive reinforcement, another negative reinforcement, and the third no reinforcement. After the treatments were applied for a predetermined time, student attitudes toward school would be measured and compared for each of the three groups.

QUALITATIVE APPROACHES

Qualitative research seeks to probe deeply into the research setting to obtain in-depth understandings about the way things are, *why* they are that way, and *how* the participants in the context perceive them. As with quantitative research, qualitative research encompasses many research methods. Qualitative researchers are not concerned simply with describing the way things are, they also wish to provide insights into what people believe and feel about the way things are and how they got to be the way they are. To achieve the detailed understandings they seek, qualitative researchers must undertake sustained in-depth, in-context research that allows them to uncover subtle, less overt, personal understandings. Thus, qualitative researchers typically maintain a lengthy physical presence in the chosen setting. In these settings they can assume a range of involvement, from an observer to an interviewer to a participant observer. (Only very experienced researchers should become active participants in the setting.) These levels of involvement lead to different levels of understanding.

Although the amount of time qualitative researchers spend immersed in the contexts they study varies, it is typically measured in months, not days. The researcher often strives to enter the setting with no preconceived notions about the context, participants, or data desired, letting the purpose of the study emerge as she observes and understands the setting and

participants. To tell the "story" of the participants and their context requires both spending substantial time in the natural setting and collecting a great deal of data. Data are gathered from **fieldwork**, that is, from spending lengthy periods of time in the setting where participants normally spend their time. Types of data commonly collected include records of formal and informal conversations, observations, documents, audio- and videotapes, and interviews. For the most part, though not exclusively, the data collected are open ended and nonnumerical.

Data analysis is ongoing; as initial information is collected, the researcher analyzes and codes it to discover the nuances of the context and the perspectives and beliefs of the participants. As more data are collected, the researcher refines prior analyses and understandings. Thus, data collection, analysis, and interpretation occur throughout the study rather than at its end, as is common with quantitative research. Think of qualitative research as collecting waves of data; each successive wave provides information that further focuses the nature of the study until the researcher gradually zeros in on the important and recurring themes of the setting and its participants. The ongoing collection and analysis of data is important because the relationship between the researcher and participants changes as they become more familiar with each other. The final product of the study is a rich description or narrative of the essential aspects of the topic as viewed by the participants. The main focus of the qualitative study is to use language to paint a rich picture of the setting and its participants.

We describe here four qualitative research examples. Action research is used by one or more educators to work on solving their own problems, especially in classrooms. Historical methods entail collecting and interpreting information about important persons and events. Ethnography is the study of research participants' in their own natural setting or culture. Grounded theory, also called the constant comparison method, is a method for identifying patterns in quantitative research methods.

Action Research

Action research is mainly used to find and solve one or more educators' problems in their own institutions. The aims of action research are to help an educator or group of educators to change or improve a practice or to help them understand issues and problems for themselves. Thus, the focus is on solving practical issues of importance to educators. (We discuss action research in depth in Chapter 9.) In most cases, the educators themselves carry out the research, giving them a sense of "ownership" of the process and findings, unlike most other research methods. Action researchers engage in a democratic, equitable, liberating, and enabling activity; one or more teachers and/or administrators work to solve or improve a local problem or situation. Note that the insular nature of action research means that it is less rigorous than most quantitative and qualitative research methods.

As with most qualitative research, the research is carried out in a cyclical manner. Initial information is reexamined and sharpened, reexamined and sharpened again, and the process continues until there is consensus or until additional cycles fail to generate significant new information. The four basic steps of scientific and disciplined inquiry guide the process of action research: (1) identifying a problem or question; (2) group conduct meeting or *brainstorming* to gain information about the problem or question; (3) joint analysis of research data or information; and (4) taking action to rectify the problem or illuminate the question.

The following is an example of action research:

- *How can teachers deal with rude language used by students in three fifth-grade classrooms?* The problem of rude language is the "topic" and affects most students in each of the three classrooms. Acting as a group, the three teachers would brainstorm reasons why students might use rude language and how they might help the students to diminish their rudeness. The teachers would observe the times or circumstances when the rudeness is greatest, talk to colleagues about how they dealt with similar behavior, and search the literature for

strategies to lessen the problem. The teachers would then meet, discuss the information they obtain, and select a remedy to attempt. In one case, three teachers attempting to solve this problem carried out a number of social competency skills with their students: practicing listening to one student without interruption; learning to be nonjudgmental listeners; and picking an interpersonal problem from a "Problem Box" and having students suggest ways to solve the problem. The teachers observed that the incidence of rude language decreased by 30 percent. (Don't be disappointed, the teachers weren't.)

Historical Research Methods

Historical research involves studying, understanding, and interpreting past events. The purpose of historical research is to reach insights or conclusions about past persons or occurrences. Historical research, like all qualitative approaches, entails more than simply compiling and presenting factual information; it also requires interpretation of the information.

Typically, histories focus on particular individuals (e.g., John Dewey, Malcolm X, Margaret Thatcher, Barbara Jordan), important social issues (e.g., school desegregation, the consequences of standardized testing), and links between the old and the new (e.g., comparing teaching methods across generations, examining and explaining reasons for textbook changes in the last six decades). Some historical research is aimed at reinterpreting prior historical work (e.g., why schools foster intolerance, how tracking diminishes incentives); this approach is often termed *revisionist history* because it attempts to revise existing understandings and replace them with new, often politically charged ones.

Historical researchers work with data that are already available, except in those instances when living reporters can provide information. Occasionally a historical researcher may collect quantitative information for a study, as when the researcher investigates a topic that includes information about the number of women graduated from medical school between 1990 and 2000. However, the main emphasis in historical research is on interpretation of documents, diaries, and the like.

Historical data are categorized into primary or secondary sources. **Primary sources** include firsthand information, such as eyewitness reports and original documents. **Secondary sources** include secondhand information, such as a description of an event by someone other than an eyewitness, or a textbook author's explanation of a researcher's theory. If you interview someone who witnessed an accident, that someone is a primary source; if you interview someone who heard about the accident from a friend, that person is a secondary source. Primary sources are admittedly harder to acquire (it would be quite a feat to find an eyewitness to the Boston Tea Party!) but are generally more accurate and preferred by historical researchers. A major problem with much historical research is excessive reliance on secondary sources.

Researchers cannot accept historical data at face value, since many diaries, memoirs, reports, and testimonies are written to enhance the writer's position, stature, or importance. Because of this possibility, historical data have to be examined for their authenticity and truthfulness. Such examination is done through external and internal criticism. **External criticism** assesses the authenticity of the data: was this diary really written by Bonnie Parker; is this her handwriting; is the diary paper and ink of the right age for her time? Questions such as these help determine the authenticity of the data. **Internal criticism** evaluates the worth or truthfulness of the content of the data. Are the writer's statements biased for some reason? Are important pieces of information omitted? Is the writer's description of the event in line with descriptions written by others? Historical researchers care about the value of the data and the degree to which they are accurate and useful.

The following is an example of historical research:

- *Trends in elementary school reading instruction, 1940–2000.* The researcher would narrow the focus of the historical study to the period 1940–2000 and to the topic "elementary school

reading." The researcher would examine a number of potential sources: reading textbooks of the selected period, educational movements that affected reading methods (e.g., back to basics movement; whole language approach), students' reading achievement (quantitative data), professional development opportunities for reading teachers, and articles in major reading publications. The researcher would keep copious and detailed notes related to these sources, and apply both external and internal criticism to the data. Finally, the researcher would apply interpretive and writing skills to present a coherent, logically presented report about the nature and reasons for elementary reading trends between 1940 and 2000.

Ethnography

Ethnography is a qualitative approach that studies participants in their natural culture or setting. The focus of ethnography is on a particular site or sites that provide the researcher with a context in which to study both the setting and the participants who inhabit the setting. An ethnographic setting can be defined as anything from a bowling alley to a neighborhood, from a nomadic group's traveling range to a sixth-grade classroom. The selected context and participants are observed in their naturally occurring activities and in the setting. Because the researcher observes rather than manipulates the participants, the researcher spends much time in the context observing and interacting with the participants. Over time, a tentative research design emerges.

The ethnographic method follows those of other qualitative procedures. The researcher tries not to draw interpretations or conclusions early in the study, and strives not to observe and judge the nature of the context and its relation to the participants who inhabit it too early. The researcher must enter the setting slowly, learning to become accepted by the participants and gaining rapport with them. Then, over time, the researcher collects data in waves, making initial observations and interpretations about the context and participants, then collecting and examining more data in a second wave of refining the initial interpretation, then collecting another wave of data to further refine observations and interpretation, and so on, until the researcher has obtained a deep understanding of both the context and its participants' roles in it. Lengthy engagement in the setting is a key facet of ethnographic and qualitative research. The researcher organizes the collected data and interprets it. The result of the ethnographic study is a holistic description and interpretation that represents the participants' everyday activities, values, and events. The study is written up and presented as a narrative.

The following is an example of an ethnographic approach:

- *Study of the Hispanic student culture in an urban community college.* The study begins with a general research question and a research site in a community college with Hispanic students. The researcher must gain entry to the chosen community college and establish rapport with the participants of the study. This might be a lengthy process, depending on the characteristics of the researcher (e.g., non-Hispanic vs. Hispanic; Spanish speaking vs. non-Spanish speaking). As is common in qualitative approaches, the researcher would simultaneously collect and interpret data to help focus the general research question initially posed. Observations and interviews are common methods of data gathering, perhaps supplemented by actual participation in group activities (depending on the researcher's experience). Throughout data collection, the researcher identifies recurrent themes, integrates them into existing categories, and adds new categories as new themes or topics arise. The success of the study relies heavily on the researcher's skills in analyzing and synthesizing the qualitative data into coherent and meaningful descriptions. The research report would include a holistic description of the culture, the common understandings and beliefs shared by participants, how these relate to life in the culture, and how the findings compare to literature already published about similar groups. In a sense, the researcher seeks to provide guidelines that would enable someone not in the culture to know how to think and behave in the culture.

Grounded Theory

Grounded theory aims at deriving theory from the analysis of multiple stages of data collection and interpretation. The researcher strives to identify patterns, themes, and categories from the qualitative topic and data. However, unlike other forms of qualitative research, which focus mainly on understanding, grounded theory goes beyond to develop a theory that derives from the data.

The grounded theorist starts with a general topic or issue to study and begins gathering information about the topic and the participants. While collecting data from the participants, the researcher applies two analytic strategies: "step back and ask," and "be skeptical." The researcher steps back and asks, "What is going on in this study?" "Can I see any links among the data I'm getting from the participants?" and "Can I find common threads in the participants' responses?" Having identified some commonalities among the participants, the researcher must verify that what he sees is actually real, not wishful thinking. As we've seen in other qualitative methods, data collection and interpretation are ongoing. Using inductive methods, each research cycle narrows the focus of the topic and the key aspects of the grounded theory. Think of an upside-down megaphone that narrows as it moves up. The method of narrowing is called **constant comparison** analysis, and leads increasingly to understanding and integrating the participants' key views of the topic studied. Once the core concept or concepts are identified and integrated, the key aspect of the theory is revealed.

The following is an example of the grounded theory approach:

- *What opinion do teachers at a selected elementary school have of the teacher evaluation practices at this school?* The researcher would begin by selecting a group of teachers to respond to questions designed to elicit their feelings about the teacher evaluation process in their grade. The researcher would identify issues as they emerge, such as evaluations being seen as too time consuming, not necessary, or of little use; respondents who don't trust their administrator; and those who feel that evaluations lack clear feedback; among others. The initial teacher responses would be examined for common responses, positive or negative. Given analysis of the initial data, the researcher would use these responses to form new questions about teacher evaluation. The second analysis would add new responses, such as evaluations being poorly done and outsiders obtaining results. Additional cycles would narrow the focus or "theory" to one or a few key issues that are of concern to the participants. The constant comparison method would be used progressively to narrow the teachers' views. When the data provide little new information about teachers' views of evaluation, it is *saturated* and the researcher would then focus on two key aspects of teacher evaluation practices, such as the infrequency of being evaluated and the lack of feedback after the evaluation. These two foci serve as the basis for theorizing about opinions of teacher evaluation in the school.

GUIDELINES FOR CLASSIFICATION

We have seen that there are many types of educational research. We have noted important features of the different research approaches. Determining which type is appropriate for a given study depends on the way the research topic is defined. The same general topic area can often be investigated by several different types of research. For example, suppose you wanted to do a study in the general area of anxiety and achievement. You might conduct any one of the following different studies:

1. A survey of teachers to determine how and to what degree they believe anxiety affects achievement (descriptive)
2. A study to determine the relationship between scores on an anxiety scale and scores on an achievement measure (correlational)

3. A study to compare the achievement of a group of students classified as high-anxious and a group classified as low-anxious (causal-comparative)
4. A study to compare the achievement of two groups, one group taught in an anxiety-producing environment and one group taught in an anxiety-reducing environment (experimental)
5. A study of the research on the effect of anxiety on achievement from 1900 to 1990 (historical)
6. A study by two teachers who examined ways to lesson the anxiety on SAT scores for their students (action research)
7. A study of six parents on the cultural patterns and perspectives related to how parents view the link between anxiety and achievement (ethnography)
8. A study seeking to develop an underlying theory of the link between anxiety and achievement (grounded theory)

Note that it is the question or problem to be addressed that determines which research approach is appropriate. Method should follow, not precede, the topic or question to be studied. Note also that the general topic must often be narrowed in order to plan the conduct of the study.

Clearly, the more information about a study one has, the easier it is to categorize it. If all one has is the title of the study, words such as *survey, comparison, relationship, historical, descriptive, effect,* and *qualitative* can suggest the type of study. If one has a description of the research strategy used in the study, one can often classify based on features such as large or small samples, qualitative or quantitative data, statistical (correlational, descriptive, comparative) or nonstatistical (interpretive, participants' viewpoint) analysis. Classifying a study by type is the first step in both conducting and reviewing a study, since each type entails different specific procedures and analyses.

The following examples should further clarify the differences among the types. Can you label the type of research for each type? Can you state one characteristic that defines the type?

1. *Teachers' attitudes toward unions.* The study is determining the current attitudes of teachers. Data are probably collected through use of a questionnaire or an interview.
2. *The personal and educational interactions in a group of teachers developing social studies standards for a high school curriculum.* Teachers' interactions during the development of the standards are studied over time.
3. *The relationship of Graduate Record Examination (GRE) scores to graduate student performance.* Participants' GRE scores are compared to their graduate school academic records (e.g., GPA).
4. *Characteristics of the drama-music clique in a suburban high school.* The researcher interviews and observes participants, both members and nonmembers of the clique, to gather information about the beliefs and activities of members of the drama-music group. Participants are interviewed a number of times over the school year, and their behavior is periodically observed over the same time.

LIMITATIONS OF THE SCIENTIFIC AND DISCIPLINED INQUIRY APPROACH

The steps in the scientific and disciplined inquiry approach guide researchers in planning, conducting, and interpreting research studies. However, it is important to recognize some of the limitations of this approach. For example, it cannot provide answers to questions that seek to determine what *should* be done. Questions such as, "Should we adopt a new biology textbook or stay with the current one?" are not answerable by research studies. There is no way to solve such questions as, "Should we legalize euthanasia?" by collecting data, because issues of

philosophy, values, and ethics in addition to data go into making those decisions. Simply put, *should* questions are not researchable.

No research study can capture the full richness of the individuals and sites that they study. Although some research approaches lead to deeper understanding of the research context than others, no approach provides full comprehension of a site and its inhabitants. No matter how many variables one studies or how long one is immersed in a research context, there always will be other variables and aspects of context that were not examined. Thus, all research gives us a simplified version of reality, an abstraction from the whole. Additional variables and on-site understandings could always be added to a research study.

There are limits to our research technologies. Our data collection instruments and the available theories are primitive in comparison to the instruments and theories of, say, medicine. Our measuring instruments always have some degree of error. The variables that we study are often proxies for the real behavior we seek to examine. For example, we use a multiple-choice test to assess a person's values and a 20-minute interview to decide whether to hire a teacher.

Finally, educational research is carried out with the cooperation of participants who agree to provide researchers with data. Because researchers deal with human beings, they must consider a number of ethical concerns and responsibilities to the participants. For example, they must shelter participants from real or potential harm. They must inform participants about the nature of the planned research and address the expectations of the participants.

All of these limitations will be addressed in later sections of this book. For now, bear in mind both the advantages and limitations of adopting the scientific and disciplined inquiry approach as your approach to educational research.

This chapter has provided a general introduction to fundamental aspects of scientific and disciplined inquiry. It provided examples of research methods of both quantitative and qualitative approaches. The chapter serves as an overview of educational research strategies and methods. In succeeding chapters, we will present more specific and detailed features needed to carry out, understand, and conduct useful educational research.

Now go to the Companion Website accompanying this text at www.prenhall.com/gay to check your understanding of chapter concepts in the following modules: Objectives, Practice Quiz, and Applying What You Know. Expand your research skills with Evaluating Articles, Analyzing Qualitative Data, Analyzing Quantitative Data, and Research Tools and Tips. Visit Web Links to broaden your knowledge about research.

SUMMARY

1. Knowledge of educational research methods is important because educators must be able to access, understand, and evaluate the findings of research and the claims of researchers.

Educational Research: Scientific and Disciplined Inquiry

2. Educational research is the application of scientific and disciplined inquiry to the study of educational problems. The primary goal of educational research is to explain or help understand educational issues, questions, and processes.
3. Rarely does any single study produce definitive answers to research questions. Cumulated studies are the basis for research progress and understanding.
4. Compared to other methods of knowing, such as tradition, expert advice, personal experience, and inductive or deductive logic, a scientific and disciplined inquiry approach provides the most unbiased and verifiable understandings.
5. This approach is made up of four main steps:
   - Identify a question or problem to be studied.
   - Describe and execute procedures to collect information about the problem being studied.
   - Analyze the collected information.
   - State results or implications based on the analysis.

Research Topics: Defining Purpose and Methods

6. Educational research encompasses many types of topics, procedures, methods for analyzing data, and formats for reporting conclusions, implications, and findings.

Basic and Applied Research

7. Basic research is conducted to develop or refine theory, not to solve immediate practical problems. Applied research is conducted to find solutions to current practical problems.

Evaluation Research

8. The purpose of evaluation research is to help decision making about educational programs and practices.

Quantitative and Qualitative Research

9. The purpose of quantitative research is to generalize about or control phenomena, while that of qualitative research is to provide in-depth descriptions of settings and people.
10. Because quantitative and qualitative researchers differ in their view of the world, they tend to utilize different methods to seek knowledge.
11. Quantitative and qualitative approaches should be thought of as complementary methods that, when taken together, provide broader options for investigating a range of important educational topics.
12. Quantitative methods involve collecting and analyzing numerical data from tests, questionnaires, checklists, and surveys.
13. Key features of quantitative research are hypotheses that predict the results of the research before the study begins; control of contextual factors that might influence the study; collecting data from samples of participants; and using numerical, statistical approaches to analyze the collected data.
14. The quantitative approach views the world as relatively stable, uniform, and coherent.
15. Qualitative methods involve collecting and analyzing primarily nonnumerical data obtained from observation, interviews, tape recordings, documents, and the like.
16. Key features of qualitative research include defining the problem, but not necessarily at the start of the study; studying contextual factors in the participants' settings; collecting data from a small number of purposely selected participants; and using nonnumerical, interpretive approaches to provide narrative descriptions of the participants and their contexts.
17. An important belief that underlies qualitative research is that the world is neither stable, coherent, nor uniform, and therefore, there are many "truths."

Quantitative Approaches

18. Quantitative research approaches are intended to describe current conditions, investigate relationships, and study cause–effect phenomena.
19. Survey or descriptive research collects numerical data to answer questions about the current status of the participants of the study. Most descriptive studies obtain information about the preferences, attitudes, practices, concerns, or interests of some group. Data are collected by self-administered instruments or telephone polls.
20. Important and difficult aspects of survey research are that of constructing clear and consistent descriptive instruments and failure of participants to return questionnaires.
21. Correlational research examines the degree of relationship that exists between two or more variables. A *variable* is a measure that can take on different values, such as age, IQ, or height.
22. The degree of relationship is measured by a correlation coefficient. If two variables are highly related, it does not mean that one is the cause of the other; there may be a third factor that "causes" both the related variables.
23. Causal–comparative research seeks to investigate relations between two or more different programs, methods, or groups. The activity thought to make a difference (the program, method, or group) is called the *independent variable, causal factor,* or *treatment.* The effect is called the *dependent variable.*
24. In most causal–comparative research studies the researcher does not have control over the independent variable because it already has occurred or cannot be manipulated. This means that causal–comparative research cannot produce true experimental research.
25. Causal–comparative research is useful in those circumstances when it is impossible or unethical to manipulate the independent variable.
26. True experimental research investigates causal relationships among variables.
27. The experimental researcher controls the selection of participants by choosing them from a single pool and assigning them at random to different causal treatments. The researcher also controls contextual variables that might interfere with the study.
28. Because it randomly selects and assigns participants into different treatments, experimental research permits researchers to make true cause–effect statements.

Qualitative Approaches

29. Qualitative approaches include a number of specific methods, including action research, historical research, ethnography, and grounded theory. The focus of these methods is on deep description of aspects of people's everyday perspectives and context.
30. Qualitative approaches provide field-focused, interpretive, detailed descriptions and interpretations of participants and their settings. The researcher's long-term immersion into the research setting is also a common feature of qualitative approaches because of the belief that participants and contexts are not independent.
31. Common methods of data collection include observation, interviewing, audio and video recording, examining artifacts, and participant observation.
32. Data analysis is based on categorizing and interpreting the observations; conversing with participants; and studying documents, recordings, and interviews collected to provide an explanation of the participants and their experiences.
33. The qualitative researcher writes from the perspective of the participants, not from the researcher's own perspective.

Guidelines for Classification

34. The type of research method needed for a given study depends on the problem to be studied. The same general problem can be investigated using many types of research. Knowing the type of research applied helps one identify the important aspects to examine in evaluating the study.

Limitations of the Scientific and Disciplined Inquiry Approach

35. Four main factors put limitations on the use of a scientific and disciplined inquiry approach: inability to answer "should" questions; inability to capture the full richness of the research site and participants' complexity; limitations of measuring instruments; and the need to address participants' ethical needs and responsibilities.

SK 1 PERFORMANCE CRITERIA

On the following pages two published research reports are reprinted. Following each report, spaces are provided for listing the components required by Task 1-A and Task 1-B. Task 1-C requires classifying research topics according to the specific type of research they represent. If your responses differ greatly from the Suggested Responses in Appendix C, study the article again until you see why you were in error. Additional examples for these and subsequent tasks are included in the *Student Guide* that accompanies this text.

TASKS 1-A, 1-B

Read the articles on pages 23–26 and 28–34. Then, on pages 27 and 35, state the:

1. Topic studied
2. Procedures used to gather data
3. Method of data analysis
4. Major conclusion

One sentence should be sufficient to describe the topic. Six sentences or less will adequately describe the major procedures of most studies. For the procedures used to gather data, briefly describe the participants, instrument(s), and major steps. As with the topic, one or two sentences will usually be sufficient to state the data analysis. You are expected only to identify the analysis, not explain it. The major conclusion that you identify and state (one or two sentences should be sufficient) should directly relate to the original topic. Statements like "more research is needed in this area" do not represent major conclusions.

TASK 1-C

Seven research topic statements follow these instructions. Read each statement and decide whether it represents a survey, correlational, causal–comparative, experimental, historical, ethnography, action research, or grounded theory research approach. State the research approach for each topic statement and indicate why you selected that approach. Your reasons should be related to characteristics that are unique to the type of research you have selected.

1. This study examines changes in the public schools' legal responsibilities regarding students with disabilities during the past 50 years.
2. This study involved a group of teachers investigating ways to determine strategies to engage their students in math.
3. This study administered a questionnaire to determine how social studies teachers felt about teaching world history to fifth graders.
4. This study was conducted to determine whether the Acme Interest Test provided similar results to the Acne Interest Test.
5. This study compared the achievement in reading of fifth graders from single-parent families and those from two-parent families.
6. This study divided fifth-grade students in a school into two groups at random and compared the results of two methods of conflict resolution on students' aggressive behavior.
7. This study examined the culture of recent Armenian emigrants in their new setting.

MOTIVATIONAL EFFECTS ON TEST SCORES OF ELEMENTARY STUDENTS

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ABSTRACT A total of 406 heterogeneously grouped students in Grades 3, 4, 6, 7, and 8 in three K through 8 Chicago public schools were assigned randomly to two conditions, ordinary standardized-test instructions (control) and special instructions, to do as well as possible for themselves, their parents, and their teachers (experimental). On average, students given special instructions did significantly better ($p < .01$) than the control students did on the criterion measure, the mathematics section of the commonly used Iowa Test of Basic Skills. The three schools differed significantly in achievement ($p < .05$), but girls and boys and grade levels did not differ measurably. The motivational effect was constant across grade levels and boys and girls, but differed significantly ($p < .05$) across schools. The average effect was moderately large, .303 standard deviations, which implies that the special instructions raise the typical student's scores from the 50th to the 62nd percentile.

Parents, educators, business people, politicians, and the general public are greatly concerned about U.S. students' poor performance on international comparisons of achievement. Policy makers are planning additional international, state, district, and school comparisons to measure progress in solving the national crisis. Some members of those same groups have also grown concerned about the effects of students' high or low motivational states on how well they score on tests.

One commonly expressed apprehension is that some students worry unduly about tests and suffer debilitating anxiety (Hill, 1980). Another concern is that too much testing causes students to care little about how well they do, especially on standardized tests that have no bearing on their grades. Either case might lead to poorer scores than students would attain under ideal motivational states; such effects might explain, in part, the poor performance of U.S. students relative to those in other countries or in relation to what may be required for college and vocational success.

Experts and practicing educators have expressed a variety of conflicting opinions about motivational effects on learning and test scores (Association for Supervision and Curriculum Development, 1991, p. 7). Given the importance of testing policies, there is surprisingly little research on the topic. The purpose of the present study is to determine the effect of experimentally manipulated motivational conditions on elementary students' mathematical scores.

As conceived in this study, the term *motivation* refers to the commonsense meaning of the term, that is, students' propensity to engage in full, serious, and sustained effort on academic tests. As it has been measured in many previous studies, motivation refers to students' reported efforts to succeed or to excel on academic tasks. It is often associated with self-concept or self-regard in a successful student or test taker. A quantitative synthesis of the correlational studies of motivation and school learning showed that nearly all correlations were positive and averaged about .30 (Uguroglu & Walberg, 1979).

Previous Research

The National Assessment Governing Board (NAGB, 1990) recently characterized the National Assessment of Educational Progress (NAEP) as follows:

> . . . as a survey exam which by law cannot be reported for individual students and schools. NAEP may not be taken seriously enough by students to enlist their best efforts. Because it is given with no incentives for good performance and no opportunity for prior study, NAEP may understate achievement (NAGB, p. 17).

To investigate such questions, NAEP is adding items to ask students how hard they tried in responding to future achievement tests.

Motivation questions can be raised about nearly all standardized commercial tests, as well as state-constructed achievement tests. The content of those tests is often unrelated to specific topics that students have been recently studying; and their performance on such tests ordinarily does not affect their grades, college, or job prospects. Many students know they will not see how well they have done.

Some students admit deficient motivation, but surveys show reasonably favorable attitudes toward tests by most students. Paris, Lawton, and Turner (1991), for example, surveyed 250 students in Grades 4, 7, and 10 about the Michigan Educational Assessment Program. They found that most students reported that they tried hard, thought they did well, felt the test was not difficult or confusing, and saw little or no cheating. However, Karmos and Karmos's (1984) survey of 360 sixth- through ninth-grade student attitudes toward tests showed that 47% thought they were a waste of time, 22% saw no good reason to try to do well, and 21% did not try very hard.

Kellaghan, Madaus, and Arisian (1982) found various small fractions of a sixth-grade Irish sample disaffected by standardized tests, even though they are uncommon in Ireland. When asked

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about their experience with standardized tests, 29% reported feeling nervous; 19%, unconfident; 16%, bored; and 15% uninterested. Twenty-nine percent reported that they did not care whether they took the tests, and 16% said they did not enjoy the experience.

Paris, Lawton, and Turner (1991) speculated that standardized tests may lead both bright and dull students to do poorly: Bright students may feel heightened parental, peer, or self-imposed expectations to do well on tests, which makes them anxious. Slower, disadvantaged students may do poorly, then rationalize that school and tests are unimportant and, consequently, expend less effort preparing for and completing tests. Either case might lead to a self-reinforcing spiral of decelerating achievement.

Surveys, however, cannot establish causality. Poor motivation may cause poor achievement, or vice versa, or both may be caused by other factors such as deficiencies in ability, parental support of academic work, or teaching. To show an independent effect of motivation on achievement requires an experiment, that is, a randomized assignment of students to conditions of eliciting different degrees of motivation. Such was the purpose of our study.

METHOD

Sample

The subjects for the study included students from three K through 8 public schools in Chicago. The student populations of the schools are generally lower-middle, working class, mostly Hispanic and African-American. Two normal heterogeneous classes within the schools were sampled from Grades 3, 4, 6, 7, and 8; because of exigencies, we did not sample Grade 5 classes.

Instrument

We chose Form 7 of the Mathematics Concepts subtest of the Iowa Basic Skills (ITBS) 1978 edition, Levels 9–14, because it is a commonly used, highly reliable test. An earlier-than-contemporary edition was used so it would not interfere with current testing programs. In a review of the 1978 ITBS, Nitko (1985) judged that the reliability of its subtests is generally higher than .85 and that it contains content generally representative of school curriculum in Grades 3 though 9. "The ITBS," he concluded, "is an excellent basic skills battery measuring global skills that are likely to be highly related to the long-term goals of elementary schools" (p. 723).

Procedure

Pairs of classes at each grade level from each school were randomly chosen to participate. Classes were selected for experimental and control conditions by a flip of a coin.

The first author (Brown) met with all participating teachers in each school to explain the instructions from the ITBS test manual (see Appendix A). Then, the experimental teachers were retained for the following further instructions:

> We are conducting a research study to determine the effects of telling students that the test they are going to take is very important. It is extremely important that you read the brief script I have for you today EXACTLY as it is written to your students.

The following script was provided:

> It is really important that you do as WELL as you can on this test. The test score you receive will let others see just how well I am doing in teaching you math this year.
>
> Your scores will be compared to students in other grades here at this school, as well as to those in other schools in Chicago.
>
> That is why it is extremely important to do the VERY BEST that you can. Do it for YOURSELF, YOUR PARENTS, and ME.
>
> (Now read the instructions for the test.)

Following the administration of the test, teachers and the first author asked students for their reactions to the script that was read to them.

Analysis

An analysis of variance was run to test the effects of the experimental and normal conditions; the differences among the three schools and five grades; between boys and girls; and the interactions among the factors.

RESULTS

The analysis of variance showed a highly significant effect of experimental condition ($F = 10.59$, $p < .01$), a significant effect of school ($F = 3.35$, $p < .05$), and an interaction between condition and school ($F = 5.01$, $p < .05$). No other effects, including grade level, were significant. The means and standard deviations of selected factors are shown in Table 1.

The mean normal curve equivalent test score of the 214 students in the experimental group was 41.37 ($SD = 15.41$), and the mean of the control group was 36.25 ($SD = 16.89$). The motiva-

TABLE 1. Normal Curve Equivalent Means and Standard Deviations

Grade	Condition	*M*	*SD*
3	Control	32.77	19.57
	Experimental	42.55*	16.59
4	Control	33.07	13.93
	Experimental	39.42*	13.12
6	Control	40.84	17.77
	Experimental	39.64	14.66
7	Control	43.21	16.07
	Experimental	41.21	16.48
8	Control	31.12	14.06
	Experimental	44.66**	15.94

*$p < .01$.
**$p < .001$.

tional effect is moderately large, .303 standard deviations, which implies that the special instructions raised the typical student's scores from the 50th to the 62nd percentile. The special instructions are comparable to the effects of better (though not the best) instructional practices over conventional classroom instruction (Walberg, 1986). If American students' average achievement in mathematics and science could be raised that much, it would be more comparable to that of students in other economically advanced countries.

The motivational effect was the same for boys and girls and constant across grade levels, but it differed among schools. Figure 1 shows a very large effect at School A, a large effect at School C, and the control group somewhat higher than the experimental group at School B.

Only 62 students (15% of the total sample) were tested at School B, which may account for the lack of effect in this school. At any rate, although the overall effect is moderately large and constant across grade levels and for boys and girls, the size of the effect varies from school to school. Such differences may depend on test-taking attitudes of teachers and students in the schools, motivational and cultural differences in the student populations, variations in conditions of administration, and other factors.

Several comments made by students and teachers during debriefing sessions illuminate the statistical findings. Student Comments 1, 2, and 3 illustrate students' motivation to do well to please their parents and teachers. Teacher Comments 1 and 2 also confirm the reasons for the effect. The last student and teacher comment, however, illustrate motivational states and conditions that diminish or vitiate the effect. When students are unthoughtful or when teachers keep constant pressures on for testing, special instructions may have little effect.

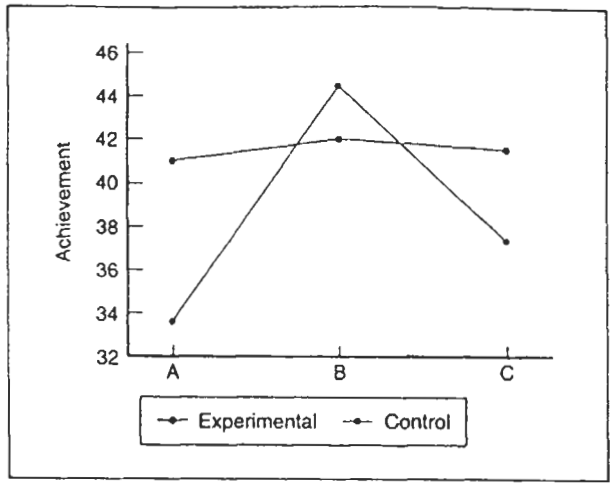

FIGURE 1. Means by condition and school

CONCLUSION

The results show that motivation can make a substantial difference in test scores. Students asked to try especially hard did considerably better than those who were given the usual standardized test instructions. The special conditions raised the typical student's score .303 standard deviation units, corresponding to a 12 percentile-point gain from the 50th to the 62nd percentile. Although the effect was the same for boys and girls and for students in different grade levels, it varied in magnitude among the three schools.

The results suggest that standardized commercial and state-constructed tests that have no bearing on students' grades may be underestimating U.S. students' real knowledge, understanding, skills, and other aspects of achievement. To the extent that motivation varies from school to school, moreover, achievement levels of some schools are considerably more underestimated than in others. Such motivational differences would tend to diminish the validity of comparisons of schools and districts.

We would be heartened to conclude that U.S. students' poor performance on achievement relative to students in other countries is attributable to the test-motivation effect. That conclusion is overly optimistic, however, because the effect may also operate to a greater or lesser extent in other countries. Further research is obviously in order.

The motivation effect might be reduced in several ways. Highly motivating instructions could be given to all students. The content of school lessons and standardized tests could be brought into closer correspondence, making the tests more plausible to students, and perhaps justifying their use in grading. Some students, moreover, may be unmotivated because they never see the results. Providing timely, specific, and useful feedback to students, parents, and teachers on how well they have done might lead students to try harder.

APPENDIX A

Directions for Administering the Mathematics Concepts Subtest of the Iowa Test of Basic Skills (1979)

Now we are ready for the first mathematics test. Open your test booklets to page 73. (Pause) Find the section of your answer sheet for Test M-1: Mathematics Concepts. (Pause) Read the directions on page 73 silently while I read them aloud.

This is a test of how well you understand the number system and the terms and operations used in mathematics. Four answers are given for each exercise, but only one of the answers is right. You are to choose the one answer that you think is better than the others. Then, on the answer sheet, find the row of the answer numbered the same as the exercise. Fill in the answer space for the best answer.

Do not make any marks on the test booklet. Use your scratch paper for figuring. You will have 25 minutes for this test. If you finish early, recheck your work. Don't look at the other tests in the booklet. If you have questions, raise your hand, and I will help you after the others have begun. Now find your place to begin. (Pause)

Does everyone have the correct place? (Pause) Ready, BEGIN.

APPENDIX B

Selected Anecdotal Comments

Students

1. Third-Grade Girl: My teacher always tells us to get good scores on tests. I wanted to make her happy and my parents happy.
2. Fourth-Grade Boy: I think I did well. My teacher works hard with us. I also want my school to be the best.
3. Eighth-Grade Boy: I wanted to do really well for my teacher. She does a great job and I didn't want to let her down.
4. Seventh-Grade Girl: I just took the test, and really didn't think much about the instructions she gave.

Teachers

1. I don't know what the results will show but my gut feeling is that students in the experimental groups will do better. I think it's probably because of motivational reasons.
2. The script gives me a feeling of *family*. I think if we told students just how much we want them to do well, and that it will not only benefit themselves but the whole school, they will probably do better.
3. I think all the students (control and experimental) will probably do equally well, because we always stress how important the tests are.

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Motivational Effects on Test Scores of Elementary Students

SELF-TEST FOR TASK 1-A

The Topic

The Procedures

The Method of Analysis

The Major Conclusion(s)

TASK 1-B QUALITATIVE EXAMPLE

A Really Good Art Teacher Would Be Like You, Mrs. C.: A Qualitative Study of a Teacher and Her Artistically Gifted Middle School Students

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ABSTRACT In this paper, I examine the experiences of a teacher and her artistically gifted middle school students over the course of a school year in an attempt to add to the definition of effective teaching for that population. Identified as artistically gifted through a formal, multimethod process, the students experienced a five-phase curriculum rhythm (a construct devised to describe the chronology of the class content). The phases—image flood, reflection, art work, critique, and exhibition—enabled the veteran teacher to "translate" meaning in both the student world and the adult art world. The translation process influenced students' self-identification as artists and their abilities to reflect and to be more articulate about their art. Possible ramifications of this study include further exploration of the themes of curriculum rhythm and translation as components of art teacher effectiveness with artistically gifted and other student populations.

> A really good art teacher would be like you, Mrs. C. She would do neat projects, like this mural. And we would learn all that stuff, like mixing colors. She would be funny, too. Oh yea, she'd let us drink cokes during class, too. (Kelly, transcript; December 9, 1993)[1]

This quote by a seventh-grade participant in an artistically gifted program presents his simplified view of an area infrequently addressed in research: definitions of excellent or effective teaching relevant to the needs of artistically gifted students. Within his statement, Kelly addresses both pedagogical actions (high-interest projects, technical instruction) and personal attributes (flexibility and a sense of humor), which are mentioned in the literature as central to art teacher effectiveness (Clark & Zimmerman, 1995; Saunders, 1989).

In education literature, extensive effort has been expended to describe or define excellence and/or effectiveness (Amidon & Flanders, 1967). Long lists of qualities are proffered as characteristics of effective teachers (Langlois & Zales, 1991). In art education, studies disclose teacher traits such as artistic competence (Bradley, 1984; Hathaway, 1980; Saunders, 1989; Zimmerman, 1991, 1992), and the concomitant ability to share that capability with students as important to art teacher effectiveness. Assuming a variety of roles, valuing art education, having organizational and evaluative skills, and being aware of student developmental and emotional needs exemplify the types of skills, knowledge, and behaviors that excellent art teachers exhibit (Capet, 1986; May, 1993; Saunders, 1989; Stokrocki, 1991; Thomas, 1992).

With the exception of two studies (Zimmerman, 1991, 1992), Clark and Zimmerman's (1984) statement that the "question of ideal teacher characteristics for students with superior abilities in the arts is virtually unexplored and unanswered at this time" (p. 94), still holds true. In learning more about effectiveness, there is a need to go beyond the "armchair lists" (Clark & Zimmerman, 1984) of teacher behaviors and characteristics. For example, what does artistic competence imply (Bradley, 1984; Hathaway, 1980; Saunders, 1989; Zimmerman, 1991)? How does a teacher use that competence with students?

Zimmerman (1991, 1992) studied painting instructors working with middle and high school artistically gifted students in a summer enrichment program. She noted one instructor who used storytelling to impart art history or technique information, allowing the reader a sense of the students' and teacher's intensity and learning atmosphere in the short-term program. However, no similar narratives of in-school artistically gifted programs and teachers exist. In this study, I explore what a group of artistically gifted students are doing, talking about, or thinking as their teacher plans and executes lessons directed toward their differentiated needs. Discerning how the teacher's and students' actions and reactions evolve as a year progresses has the potential to expand comprehension of teacher effectiveness beyond the listing of teachers' skills and characteristics.

RESEARCH FRAMEWORK

The theoretical framework of most qualitative research depends on the issues to be explored, the types of guiding questions asked by the researcher, the roles assumed by the researcher, and ways in which the study is written (Bresler, 1994; Ettinger, 1987; Jacob, 1987; Patton, 1990). Instead of generating hypotheses, as is common in quantitative research, broad-based open-ended guiding questions are developed for qualitative research. In this study such questions pertain to the teacher's role as instructional leader, the ways in which the teacher and students interact to construct meaning (or learn together), and the effects of the wider context

[1] Material which came directly from the collected data, such as Kelly's quote, is cited by type of data and date of data collection. The three types of data used were field notes, video notes, and transcripts. As unpublished raw data, these are not listed in the reference section.

(school, peers, family, and community) on learning. These questions reflect the broad-based focus of qualitative research. My intent in this study is to enhance the broad descriptive term *effectiveness* through the in-depth study of a teacher and her artistically gifted students.

Blumer's (1967) social interaction theory, which describes meaning-making as a social interactionary process modified through self and social interpretation, forms the theoretical basis of the study. Blumer posits that one learns through social interaction combined with internal dialogue and interpretation. In this study, I concentrated on the interactions between the teacher and students, between students and teacher and student, as well as students' internal dialogue revealed in their art work.

THE SETTING AND PARTICIPANTS

Criteria for site selection included conditions such as the presence of an ongoing artistically gifted program and a school district with administrative and community history of support for gifted and talented programming. The researcher selected the school district because it was one of the first in the state to act as a model site for gifted programs, initiating artistically gifted programs along with academic ones. The selected program began in 1987 as a pilot program for the school district.

The Community

The selected school is a largely middle-class community of 43,764 inhabitants (Department of Commerce, 1990) across the river from a university town of 25,907. With a low (3.8%) unemployment rate, the city has a varied economic base with 88% of the adults employed in manufacturing, service, government, and retail (Indiana Department of Work Force Development, 1993). The school district has one large high school (grades 9–12), two middle schools (grades 6–8), and 11 elementary schools (grades K–5). There are also 9 religion-based schools. A modest art museum, a historical museum, a performing and visual arts center, a library, a community orchestra, and the variety of offerings typical to a large university community provide opportunity for community arts involvement.

The School

Although school selection criteria were auxiliary to the teacher selection, administrative support for the artistically gifted program was central to the school site selection. The district and middle school administration supply the teacher with procedural aid in the gifted identification process, scheduling assistance, and funding for the teacher's inservice growth.

Sunnydale Middle School (a pseudonym, as are those of the teacher and students) is a typically midwestern set of brick rectangles, squatting in an "L" shape in an older section of the city. The middle school reflects the community both economically and ethnically. Of the students, 94% are Caucasian, 2% are African American, with the other 4% Hispanic, Asian, or "other." One third of all students receive the free or reduced-price lunch. Compared to students of similar economic constituency, the Sunnydale students score slightly better on the standardized tests than other middle schoolers across the state.

The Teacher

KC (or "Mrs. C." to her students) was selected because of her continuing educational pursuits, gifted and talented training (Feldhusen & Hansen, 1994), her activity in local and state art organizations, and community recognition as an active artist and teacher (Clark & Zimmerman, 1984, 1992; Zimmerman, 1991, 1992). Receiving a fellowship to attend Clark and Zimmerman's Artistically Talented Program in 1992, KC continually seeks ways to keep abreast of educational and artistic developments. She frequently mentors student- and first-year teachers. On the executive board of the state art education association, she is also active in several arts groups in the city.

The Students

All 26 students who participated in the program (called "Challenge Art") were part of the study. The sixth, seventh, and eighth graders were identified through a formal multimethod screening process based on self, teacher, and parent nomination forms, along with three drawing elements from the Clark's Drawing Abilities Test (Clark, 1989). An identification committee consisting of the teacher, the gifted-talented coordinator, and other art teachers rated the drawings and nomination forms, with the highest scoring students being invited to join the Challenge program. In 1993–1994, all of the Challenge Art students were Caucasian, although a few African-American and Asian students enrolled in prior Challenge Art classes. Fifty percent of the 1993–1994 students were also enrolled in one or more academic Challenge courses. First semester of the 1993–1994 year, the 21 students were evenly divided among grades six, seven, and eight. Five students dropped out second semester, and 5 new students were added, leaving a total of 9 seventh and eighth graders and 3 sixth graders. First semester there were 12 girls and 9 boys, while second semester there were 11 girls and 10 boys.

Researcher Role

In anthropology, the participant observer is one who attempts to become part of the target culture (Ettinger, 1987; Maitland-Gholson & Ettinger, 1994; Patton, 1990). Assuming that role, I attempted to blend with the Challenge Art class in order to experience things as they did.

Initially, I participated as a learner, sitting with different student social groups, who seemed to designate certain tables or room areas as their own. I listened, learned, drew, and painted with them, and they watched me struggle with similar decisions and problem solving. I asked their advice, and they reciprocated. As the year progressed, I shifted more into an assistant teacher role, circulating among the students, asking questions, coaching, and talking with participants. I also used that time to informally interview students, take notes, take photographs, and record class interactions on audio and video tape.

Beginning in October, the class met weekly after school for 1 to $2\frac{1}{2}$ hours. I attended 32 hours (95%) of the first semester meetings. Second semester I attended 29 hours (87%) of scheduled meetings. I met a few times with the summer school Challenge Art group, which contained many students who participated during the school year.

Data Sources and Collection

Primary data sources were field notes, taken during or shortly after class, audio or video tapes of observed classes, and interviews, along with slides and photos of student work. The video camera was placed to provide an overview of the entire classroom, while the audio recorder was placed on a table among 4 to 6 students, and moved to different tables each week. Since student social groups seemed to "claim" different areas of the room, or certain tables, moving the audio recorder allowed data collection from different social groups. Transcripts were made from both audio and video tapes, or notes taken while viewing video tapes. Multiple copies of transcripts were made, some of which were cut and placed in color-coded files to reflect analytic categories.

Slides, photos, and videos of art works became important data. These items were analyzed to reflect students' learning processes. Artifacts such as copies of student artwork, handouts, lesson plans, in-school bulletins, notes home, newspaper articles, and tapes of newscasts served as secondary data sources, augmenting the primary sources.

Data Analysis

Focusing on teacher-student, student-teacher, and student-student interactions, I began preliminary analysis within the first month of observation, using the constant comparison method of analysis, which involves combining inductive behavior coding with simultaneous comparison of all observed events (Glaser & Strauss, 1967; Strauss, 1987). The codes, which began as interaction descriptors, began to reveal patterns within the accumulation of coded transcripts. Using the coding system, 7 graduate and undergraduate art education students rated representative interaction behaviors in five video clips. Their coding reflected an inter-rater reliability of .91 with the codes I had assigned the same clips.

Linkages were sought between patterns, usually emerging from theoretical memos written as analysis progressed (Strauss, 1987). These codes, patterns, and linkages were triangulated with interview and secondary data information, and particularly scanned for disconfirming data, causing assertions to be revised to include that data.

CHALLENGE ART DESCRIPTION

The Teacher-Translator

The translation process is a construct the researcher developed to describe the complex phenomena of teacher and student behaviors, interaction patterns, and art work manifestations which reflect the intentional and unintentional classroom curricula in Challenge Art. Similar to Dillon's (1989) teacher as a cultural broker, the teacher-translator bridges the cultures/worlds of the artistically gifted middle school student and the art-world. The students' world includes school, peers, family, and community, while the artworld includes the local, regional, and international art world.

A translator is one who is fluent in more than one language. To translate efficiently, one must be able to clearly understand in one language, and almost simultaneously repeat the thought in another, retaining the same clarity, emphasis, and nuance. KC is a translator. Her "languages" are those of the artworld and the students' world. The artworld language is full of images, galleries, history, critical analyses, contact with other artists, aesthetic discussions, museums, books. The language of the students' world is full of references to the middle school culture of teachers, peers, who did what during lunch, who "likes" whom, who called whom last night, who got in trouble third period. . . .

KC is a veteran teacher. KC is an artist. She melds the two in a life-web which attracts artistically gifted middle school students around her in a bubble of giggly enthusiasm. "I have to do art," she says, and the kids begin to feel the love she has for her field. "My kids . . ." she says, and they know the beginning of trust. One cannot talk to her without hearing about one or the other—her kids, art. The synergy resulting from her dual passions of art and teaching forms the basis for KC's effectiveness as a teacher-translator.

KC's personal time is filled with the vocabulary of the artworld. Travel involves visits to galleries and museums, as she and her spouse deliver and retrieve his paintings from Chicago, or take their works to exhibitions in other Midwestern cities. She reads a number of art magazines regularly, feeling that it is important to be "on the cutting edge of our profession . . . as artists" (Transcript; December 2, 1992).

As part of the school world, KC operates successfully in both adult and student circles. With her colleagues, she serves on school and district committees, helps reading teachers by assisting on a bookmaking unit, is part of a Friday breakfast "club," and uses the Art Club to assist in school decoration and scenery construction for music and drama productions.

As part of the student world, KC interacts with the Challenge Art students as they burst through the door on Thursday afternoons, asking one how he did on an English test, another about a musical audition. Frequently snapping pictures, she tells them that "this one's for the yearbook," or "I want to show other art teachers what you're really like" (Transcript; March 3, 1994). The class milieu is full of energy and laughter. Even her disciplinary statements are humor-laced. "Tank, the Chumpette, forgot to put up his chair again," she says in mock desperation. "Poor Mrs. C." is the response (Video notes; December 9, 1993). The cheerful by-play is the background for the more serious work of artistic teaching-learning conducted through the translation process. This translation is conducted through the medium of KC's curriculum rhythm.

Curriculum Rhythm

Curriculum rhythm is a construct developed by the researcher to reflect what was observed in this classroom over time. KC's teaching has a pattern to it. Reflecting the need for differentiated instruction, the pattern used with her "regular" students is different from the one used with her Challenge Art students. KC gives her regular students a chronological overview of art history, an introduction to critical and aesthetic learning experiences combined with varied media experiences. Highly structured, her regular art classes extend 9 or 12 weeks, depending on grade level.

In Challenge Art, the thematic subject matter differs each semester, yet the pattern of learning and experience remains consistent. The thematic curriculum accommodates in-depth study and extended immersion in student-selected art projects. In Challenge Art, KC provides problem finding and problem solving. For the

★ How did these phases get identified?

regular classes, KC's curriculum rhythm is staccato; for her Challenge Art class, the rhythm resembles a more sustained melody reflecting the differentiated needs of her high-interest students.

The curriculum rhythm is the medium through which KC translates the artworld to the students. Art teachers easily recognize the concept of the rhythm of an art class. If it is a production lesson, the students enter the room, put their backpacks, food, and assorted clothing aside, retrieve what they are working on, and settle down to listen to the teacher, who introduces or demonstrates the day's lesson. The students work on their projects, clean up and leave—a cycle repeated throughout the day for the teacher, throughout the term for the students.

KC employs that familiar rhythm for some Challenge Art classes, but her class rhythms fall within a larger overall pattern consisting of five phases. KC's Challenge Art classes are semester based, as is the duration of her curriculum rhythm cycle. The rhythm cycle is repeated each semester, differing in its thematic content. As the translation vehicle, each of the five phases serves to further meld the student world and the artworld. The five phases are: image flood, reflection, art work, critique, and exhibition. I observed two complete cycles and part of a third during this study. Each semester evidenced all five phases of the rhythmic cycle. Through these rhythmic cycles the translation process occurs as described here.

Phase one: The image flood. KC begins each cycle with a flood of images for her students. Assembling many books, slides, and visuals on the selected topic, she floods her students with visual images. The first semester of the study, KC selected the theme of American Western art for her Challenge Art curriculum. She showed slides and snapshots of a prior trip through the Southwest, had dozens of books and magazines (such as *Arizona Highways*) available to the students, while discussing the physical characteristics of the Southwest. She then showed slides of noted Southwestern artists' work. Some were 19th-century; some were current. She discussed various techniques used, along with color choices. Remington, T. C. Cannon, Victor Higgins, and O'Keeffe illustrate the exemplar variety. Following the slides, the students went to a museum specializing in Western art. Not one to overlook an instructional opportunity, KC distributed many of the books and magazines on Western art to the students on the bus, reiterating technique, subject matter, and style. At the museum, a capable, denim-clad docent discussed artists, painting, and historical context of the works. Finally, the students were allowed to explore. The 18 kids who attended the field trip went nose-close to works of interest, or sprawled on the floor to sketch. A museum patron commented to me about their keen absorption. When informed that they were middle schoolers, she expressed surprise. Informed that they were artistically gifted, she no longer wondered at their intensity (Field notes; October 13, 1993).

Winter semester, which centered on both public art and Victorian architecture, in preparation for painting a mural on a bridge underpass, included a similar image flood phase. Field trips included investigating community public art, visits to the city historical museum and a lovingly restored Victorian home, as well as a bus tour around the historic neighborhood. Experiences were supplemented with slides and with opportunities for students to photograph selected homes or architectural details for future reference. Student sketch books reveal gas lamps, intricate wrought iron fences, and replications of fish scale shingles. Along with visual stimulation, the students heard "stories" about the city founders who populated the neighborhood, providing a visual and verbal picture of 1800s life.

KC explained to a group of fellow art teachers the necessity of the image flood:

> As adults we have built a large store of images. We have looked at a lot of art. My students have limited experience. So it is my job to fill them with a wide variety of images to build up their imagic store. (Field notes, October 29, 1994)

As the students are bombarded with these images, they are also making critical choices in selecting images of interest and recording them either photographically or in their sketch books.

Phase two: Reflection. The second phase of the teaching-learning rhythm begins during the first, as the students select which images to sketch or photograph. This is the reflection phase wherein the students reflect upon what they have seen, and begin generating ideas for further development.

One student, intrigued with a tree seen at the Western art museum, began to sketch it at the museum. Upon returning to the classroom, Ward transferred that sketch to a masonite board as the centerpiece of his Western painting. His sketch book revealed that the texture of the tree was of greatest interest, while the form of the tree was altered and refined as he continued the painting and drawing process. That same semester, another sixth grade boy was drawn to the smooth surface of an O'Keeffe pueblo painting at the museum. Pursuing his interest in O'Keeffe, he found a black-and-white photo of a skull drawing showing an intricate antler structure. Using that as a springboard, Biker also used real bovine skulls as further reference for his drawing (Video notes; November 4, 1993).

As part of the reflective process, this combining and altering visual references occurred during the second semester as well, with a notable addition, that of written reflection. KC asked the students questions such as "Why did you choose your house or object? What style is it?" (Video notes; February 24, 1994). Sketchbook journaling included information such as chronological data about chosen buildings, architectural style, as well as stories about the object or building. Much of the resource information came from materials KC had photocopied at the historical museum. As work continued on the actual bridge murals, KC asked them to record how they felt about their work and the collaborative nature of the project. She indicated that the students should "have a record of what you did, so you can show your children someday" (Video notes; February 24, 1994). While the students laughed at the vision of their own progeny, the permanence of the project was impressed upon them.

The journals/sketchbooks were not only used in recording interesting images, developing ideas, and writing about personal and historic documentation, but were also used as references in later presentations. As the work on the mural progressed, the students were asked on numerous occasions to discuss their work with interested community groups and community media. The sketchbook material became a resource for those comments.

Phase three: Art work. As the students researched material for their art, using the abundant resources available, some generated ideas almost immediately. Others took more time, beginning with

one idea, abandoning it and exploring another. KC helped them formulate ideas by referring them to the visual resources in the room (the slides, magazines, books, photos) and through technical instruction. Jack, a tall, bright, energetic seventh grader, talked about his Western art idea:

> I want it to represent all those old cowboy pictures. You know the ones where the cowboy rides off into the sunset. Only this is supposed to represent *all* the horses riding off into the sunset in *all* those movies. (Interview transcript; June 16, 1994)

Along with idea generation, two other components were central to the art-work phase, that of technical instruction and problem solving.

KC knew her students "wanted things to look real," so she gave them technique instruction which would aid them (Field notes; March 19, 1994). She used visual resources, demonstrated and repeatedly spoke of changing values to create the illusion of depth. "Those flat colors are a good start, Drake, now add some darker and some lighter right here" (Transcript; December 2, 1993). "See how this artist did that?" (Video notes; April 21, 1994). "Look at how these clouds are really flat on the bottom (referring to a photo), can you do that with yours?" (Transcript; December 9, 1993).

Formal and informal demonstrations were part of the mix. She spent two class periods in November discussing color theory and demonstrating scumbling, blending, and impressionistic paint strokes on her own painting. During the demonstration she discussed how painting was fun "because you can't make a mistake. You can let it dry and paint right over it" (Field notes; October 20 and 28, 1993).

In one-to-one situations, she would mix a bit of paint on the newspaper next to a painting, or add a little to a student's picture. The students seemed to regard this positively, as Elenie indicated: "Mrs. C. will start something on a little part of my painting, and then I get it" (Interview transcript; June 16, 1994). Most students did indeed "get it," demonstrating sophisticated layers of subtle shading in each semester's paintings.

When students encountered difficulty, they usually raised their hands or asked a friend. KC worked around the class clockwise, trying to touch base with each student as work sessions progressed. Students were confident in her help. Asked what they did when they had a problem, most responded, "I ask Mrs. C." If KC was unavailable, most indicated that they would wait until she was (Interview transcripts; June 21 and 22, 1994). Jack, however, admitted that he would "walk around and get noisy" until he figured out what to do (Interview transcript; June 21, 1994). Besides demonstrating, KC frequently referred students to the visual resources. "Why don't you look in . . ." "See if you can find the book where the picture of . . ." was a repeated song in Challenge Art. The book/visual reference table usually had two or three students thumbing through visuals to find their own help.

Informal peer instruction was common. However, it seemed limited to problems like color mixing or texture. "I mixed red and that dark blue and a little brown for this" (Video notes; March 10, 1994). They also sought affirmation from each other: "Clara, what do you think of this?" "It's great, Mildred, but you need some more of that dark stuff there. It's all the same" (Transcript, December 1, 1993). They sought this affirmation in the same tone as they asked about social things like "Do you like my new sweater?" From their friends, they expected positive answers. From KC they expected help.

While giving them tools to help them achieve realism, KC also encouraged individual styles. "Wow, that's surrealistic, Jack" (Transcript; December 21, 1993). "Your clouds have that impressionistic feel, Clara" (Transcript; December 21, 1993). The art history and stylistic references were not accidental; rather, she attempted to reinforce earlier learning along with providing affirmation.

Phase four: The critique. Two sorts of critical activities were evident in the Challenge Art class: in-process assessment and whole class critique. Documented in several studies (Stokrocki, 1991), in-process assessment occurs as a teacher helps a student decide how well he or she is progressing. Adler (1982) refers to the practice of facilitating the fine tuning of student skills as "coaching."

In the Challenge Art class it was difficult to separate the one-on-one technical instruction from in-process assessment, as the instructional and assessment comments were so interwoven. Students sought affirmation and direction at the same time. Clara said: "What do you think, Mrs. C?" KC replied: "Oh, Clara, it's beautiful. The way you have layered those colors is wonderful. Let's put it up there so you can see it from a distance" (Transcript; December 9, 1993). Balancing the painting on the chalk tray, KC and Clara discussed the contrast. Clara could see that her dark colors needed a little light to afford more clarity. Since she seemed to love thickly layered colors, she would happily continue, following KC's gentle suggestions. The chalkboard sessions would also be used to demonstrate a student's successful use of a technique to the class. Elenie's skull and cactus was used as an exemplar of skillful shading. The now familiar "dark-medium-light" exhortation was heard as KC showed how Elenie's highlighting and shading made her cactus seem real enough to prickle (Video notes; December 16, 1993).

At the end of the Western art unit, the students entered the room in a chorus of "oohs and aahs," discovering their paintings carefully balanced on drawers and counters along the north wall. As students perched on tables and chairs, KC announced that they would be "looking for things that work well, and for things that can be improved" (Transcript; December 21, 1993). Pointing out similarities and differences in technique and subject matter, KC had students point out evidences of scumbling, blending, and shading. She contrasted stylistic and color treatments of similar subject matter in discussing the several skull pastels and paintings. The effects of color on mood were tied to those who used Cannon's riotous colors and those who demonstrated "soft, velvety colors" (Transcript; December 21, 1993). Although teacher talk dominated, students were encouraged to voice opinions, make connections, and find further examples of concepts under discussion.

Phase five: Exhibition. The exhibition phase of KC's teaching/learning rhythm brings the students into the adult art-world. KC firmly believes in ensuring that her students' work is seen publicly. She takes slides of all finished work, using some slides to show her other students as exemplars, others for presentations at state and national conferences. Inevitably, she shows the students these slides before a presentation, telling them she is "showing them off to other art teachers" (Transcript; October 9,

1993; March 3, 1994). One major difference between this phase and the others is that it occurs beyond the semester framework. Thus, the work from the fall semester may be exhibited in the spring, depending on exhibition schedules. However, with the number of continuing students, and KC's consistency, each student knows his or her work will be exhibited.

KC organizes a county-wide K–8 art show, inviting friends and family to the opening. Two of the last three such exhibitions have shared space with adult artists. KC feels that this is important, as the arts community can recognize the quality of student work, while the students have the opportunity to interact with adult artists and their patrons (Interview transcript; December 2, 1992). A fall exhibition at a university gallery allowed students to explain how they had devised their sculptures to assembled friends, family, and art educators. Even the quietest students responded with alacrity to professors' questions, with answers like "I just stuffed the gloves with cotton and painted on them" (Video notes; October 30, 1993).

The second semester public art project gave students numerous opportunities to make public statements about their art. The first arose when they spoke to the local historic neighborhood association concerning their proposals for bridge murals. Using their sketch book information, students gave presentations on their drawings of buildings and events in the district, including historical information about the drawings' subjects. Mildred: "I did the circus wagon because they used to have a circus which would play in Murdock Park," followed by a bit she had written about circus day in the late 1800s. Two girls who had worked together on a drawing did a well-rehearsed presentation which included historical fact, architectural preference, and comments on their collaborative process. A blurb on the evening television news about the project was a precursor to other newscasts and newspaper features as the murals progressed. After the first newscast, KC made it a point to steer the reporters to the students, as she noted "they are the ones doing all the work" (Field notes; May 1, 1994).

The exhibitions, presentations, and news coverage had the effect of solidifying students' cognition about both art process and subject matter. The students' historical facts about local residences and events were well researched and accurately delivered. Describing their research and art process to an audience served to increase their identification as "real" artists among themselves, their peers, their families, and the community (Interview transcripts; June 16 and 21, 1994).

DISCUSSION AND IMPLICATIONS FOR FURTHER RESEARCH

Discussion

In this study, I attempted to describe how an effective art teacher and her artistically gifted students learn together over the course of a school year. Such description demonstrates how teacher and learning rhythms can impact a middle school class for artistically gifted students. The rhythm created by KC gave the students a familiarity with several art processes, both as observers and creators, as they absorbed, reflected upon, created, and interpreted art images. Through exhibition and their own explanations to various publics, the artistically gifted middle school students became part of the art world as they helped others interpret and understand their work. Finally, the circular, rhythmic translation process cemented students' self-identification as "real" artists with peers, family, and community.

Clark and Zimmerman (1984, 1988) and Zimmerman (1991, 1992) discussed the importance to artistically gifted students of peer interaction and substantive teaching. KC and her students extend the understanding of what substantive teaching may be.

The nature of qualitative research is a collaboration between researcher and researched, as interpretations are clarified, or transcriptions revisited. The research process itself has helped KC reflect upon her own practice. Discussing and watching the growth of her students, through her own and another's eyes, has made her more aware of the choices she makes as she plans, prepares for, and teaches these students. She recognizes the rhythmic nature of her curriculum. "That's what I do, all right" (Field notes; October 29, 1994). She comprehends the translation concept, linking it with Renzulli's (1977) real products for real audiences (Field notes; October 29, 1994). Reflecting and collaborating allowed KC to perceive the effects of the publicity surrounding the bridge murals from her students' point of view. As a result, she plans to continue community-based projects for her Challenge students. Included in her future plans are a sculpture for the school and murals for a local community center.

Implications for Research

KC and teacher effectiveness definitions. This study began in a quest to understand more about teacher effectiveness in conjunction with artistically gifted students. Reflecting the nature of qualitative study, the results of this research are idiosyncratic. Yet KC does demonstrate some characteristics noted in effective art teachers such as valuing art education, organizational skills, and awareness of students' developmental and social needs (Capet, 1986; May 1993; Saunders, 1989; Stokrocki, 1991; Thomas, 1992). She also meets some of Clark and Zimmerman's (1988, 1992, 1995) recommendations for teaching artistically gifted students: substantive teaching, providing access to professional level visual resources, and solid technical instruction. Evidenced in the discussion of each of the five phases is the way in which KC combines these qualities as she translates student-artworld language making her teaching and the learning of her students effective.

Translation. The translation concept may be potentially significant for those responsible for developing meaningful artistical gifted/talented programming. Teachers and administrators may be able to discern the importance of bringing the outside world to the gifted/talented classroom and vice versa. Particularly at the tumultuous middle-school age, self-identification is an important issue. Clark and Zimmerman (1988) discussed the effects of positive peer interaction in artistically gifted classes. KC's students reflected that positive peer, family, school, and teacher influence. It may be meaningful to continue to monitor the students' self-identification as artists to discern any long-lasting effects.

If teachers and administrators can develop programs that allow students to see themselves as real contributors, artistically gifted students may have a better understanding of the positive ramifications of their special abilities.

Curriculum rhythm. The concept of curricular rhythm has potential as a tool for understanding more about teach-

effectiveness. Although the idea developed as a way of describing the chronology of content in one class, it is a concept with resonance. Research may determine other styles of rhythms which exist in effective art teaching. Patterns of common traits may be found in particularly effective curricular rhythms, or effective rhythms may be found to be idiosyncratic to class or teacher. Rhythm types may link with specific teaching styles or unique populations in effective classrooms. Cross-case analysis, the method by which many qualitative studies are analyzed, may provide more illumination into the possibilities of the rhythm concept and its relationship to teaching effectiveness.

Eisner (1993) called for "fine grained study, description, interpretation, and evaluation of what actually goes on in art classrooms" (p. 54). This paper is an attempt to heed that call. KC is a highly effective teacher, working with her school's "best artists." She demonstrates many qualities cited in research as part of being effective. However, through her unique translation process, involving a carefully developed curriculum rhythm conducted with her gifted students' needs at the forefront, KC has forged her own brand of effectiveness from which we each may take pieces to use in our own practical or theoretical applications.

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