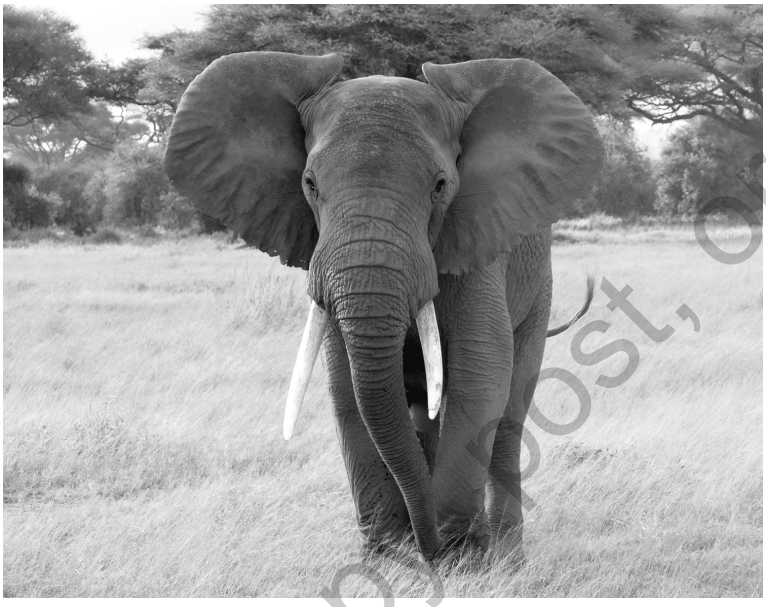
Quantitative, Qualitative, and Mixed Research

2

Research in Real Life Paradigms and Perspectives



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This chapter is about the three major research paradigms in educational research. Each of these paradigms tends to bring a slightly different view or perspective to what we study. It seems appropriate to start this chapter with an age-old poem (written by the Persian poet/philosopher Rumi) that tells us that different perspectives can all have truth value and that, when we put those perspectives together, we can come away with a fuller picture of what we are studying. We use the poem to support our view of the importance of using all three major research paradigms in educational research.

ELEPHANT IN THE DARK

Some Hindus have an elephant to show.

No one here has ever seen an elephant.

They bring it at night to a dark room.

One by one, we go in the dark and come out

saying how we experience the animal.

LEARNING OBJECTIVES

After reading this chapter, you should be able to

- Describe the characteristics of quantitative research.
- List and define Patton's 12 major characteristics of qualitative research.
- List and explain the different types of variables used in quantitative research.
- Explain the difference between experimental and nonexperimental quantitative research.
- Explain the concept of a correlation coefficient.
- Describe the characteristics of qualitative research.
- List and explain the differences among the different types of qualitative research introduced in this chapter.
- Describe the characteristics of mixed research.
- Explain when each of the three major research paradigms (quantitative, qualitative, and mixed) would be appropriate to use.

Visit **edge.sagepub.com/rbjohnson7e** *for an interactive concept map.*

One of us happens to touch the trunk.

"A water-pipe kind of creature."

Another, the ear. "A very strong, always moving

back and forth, fan-animal."

Another, the leg. "I find it still,

like a column on a temple."

Another touches the curved back.

"A leathery throne."

Another, the cleverest, feels the tusk.

"A rounded sword made of porcelain."

He's proud of his description.

Each of us touches one place

and understands the whole in that way.

The palm and the fingers feeling in the dark are

how the senses explore the reality of the elephant.

If each of us held a candle there,

and if we went in together,

we could see it.

Source: From Jelaluddin Rumi, *The Essential Rumi*, trans. & ed. by Coleman Barks, 1995, San Francisco, CA: Castle Books, 1995. p. 252. © Coleman Barks.

Research paradigm
A worldview or perspective held by a community of researchers that is based on a set of shared assumptions, concepts, values, and practices

A **research paradigm** is a worldview or perspective about research held by a community of researchers that is based on a set of shared assumptions, concepts, values, and practices. More simply, it is an approach to thinking about and doing research and, therefore, producing knowledge. In this chapter we introduce you to the three major educational research paradigms or approaches: *quantitative research, qualitative research*, and *mixed research*. Mixed research also is commonly called *mixed methods research*, but we generally use the simpler term *mixed research* in this book. Not only is the label *mixed research* simpler than the label *mixed methods research*, but it also is more accurate because the quantitative, qualitative, and mixed research debates are about much more than just methods. Nonetheless, please remember that "mixed methods research" is a synonym for what we call mixed research. You can use either term!

Quantitative research was the generally accepted research paradigm in educational research until the early 1980s, when the "paradigm wars" between advocates of quantitative and qualitative research reached a new peak (Guba, 1990; Tashakkori & Teddlie, 1998). During the 1980s, many quantitative and qualitative researchers argued that their approach was superior. Some of these researchers were "purists," in the sense that they argued that the two approaches could not be used together because of differences in the worldviews or philosophies associated with the two approaches.

This either-or position (i.e., one must use quantitative or qualitative research but not both) is called the **incompatibility thesis**. The problem with the incompatibility thesis is its failure to recognize that creative and *thoughtful* mixing of assumptions, ideas, and methods can be very helpful and offers a third paradigm. The mixing of ideas and approaches has been present throughout history because mixing or combining builds upon what we know and offers new ways to understand and study our world. In short, in addition to the excellent and very important research paradigms of quantitative and quantitative research, mixed research offers an additional and exciting third way of conducting educational research.

Incompatibility thesis
The proposition that one cannot mix quantitative and qualitative research

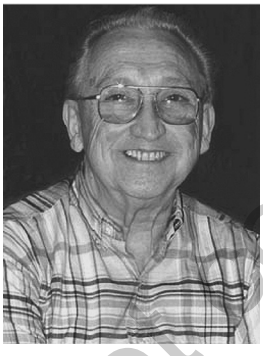
The purpose of this chapter is to show you the "big picture" of educational research. Here, we briefly overview the three major kinds of research or "research paradigms." The following chapters in this book will provide you with more depth. For now, please try to focus on the big picture and the related big ideas, which will help you a lot as you move on to the later chapters.

Exhibit 2.1 shows one of the leading figures in the paradigm dialogue that had become a worldwide phenomenon by the 1990s and continues to play an important part in educational research today.

Starting in the 1990s, many researchers rejected the incompatibility thesis and started advocating the pragmatic position that says that both quantitative and qualitative research are very important and often should be thoughtfully mixed in single research studies. According to **pragmatism**, what is ultimately important and justified or "valid" is what solves our problems and what works in particular situations in practice and what promotes social justice. Pragmatism is focused on the ends that we value. According to pragmatism, your research design should be planned and conducted based on what will best help you answer your research questions;

Pragmatism
The philosophical position that what works in particular situations is what is important and justified or "valid"

Exhibit 2.1 Egon G. Guba (1924–2008)



During the 1970s, 1980s, and early 1990s, Egon Guba helped initiate the "paradigm dialogue" between quantitative research and the "new" research paradigm of qualitative research. Guba emphasized that research paradigms are characterized by their distinctive **ontology**—"What is the nature of the knowable? Or what is the nature of reality?"; **epistemology**—"What is the relationship between the knower (the inquirer) and the known (or knowable)?" or What is the paradigm's theory of knowledge?; and **methodology**—"How should the inquirer go about finding out knowledge?" or, more specifically, What methods should be used in research? (quotes are from Guba, 1990). Later, two more dimensions of paradigms were added: **axiology**—What is the role of values in the inquiry process? and **rhetoric**—What kind of language and communication should be used in writing and discussing research? The differences among quantitative, qualitative, and mixed research on these and additional dimensions are found in Table 2.1 and in the section "Characteristics of the Three Research Paradigms." Guba was author of many important books, chapters, and articles on qualitative research and evaluation (e.g., Guba, 1990, 1992; Lincoln & Guba, 1985).

Exhibit definitions:

- **Ontology**—the branch of philosophy dealing with the nature of reality and truth
- **Epistemology**—the branch of philosophy dealing with knowledge and its justification
- **Methodology**—the identification, study, and justification of research methods
- **Axiology**—the branch of philosophy dealing with values and ethics
- **Rhetoric**—the art or science of language and oral and written communication and argument

the result is *pragmatic knowledge.* Pragmatism says that theories or programs or actions that are demonstrated to work for particular groups of people are the ones that we should view as currently being the most valid for those people. We specifically call our much expanded version of pragmatism "*dialectical pluralism*" (Johnson, 2017) because a philosophy for mixed research should carefully listen to ideas, assumptions, and approaches found in qualitative and quantitative research and in any other relevant domain (e.g., perspectives found in different academic disciplines, viewpoints of different stakeholder and social groups). The word *dialectical* is intended to imply a dynamic back-and-forth listening to multiple perspectives and multiple forms of data. Although mixed (methods) research is still the "new kid on the block," the list of researchers identifying with this approach is increasing rapidly.

You can see in Figure 2.1 that the three major research approaches can be viewed as falling on a research continuum with qualitative research on the left side, quantitative research on the right side, and mixed research in the center of the continuum. In other words, research can be *fully qualitative* or mixed with an emphasis on qualitative, *fully quantitative* or mixed with an emphasis on quantitative, or *mixed* with an equal emphasis on qualitative and quantitative. A particular research study would fall at a particular point on the continuum.

We now compare the characteristics or tenets of the three research paradigms in their pure forms. Later in the chapter, we will introduce you to some ideas and terminology associated with each of the research paradigms.

FIGURE 2.1
The Research Continuum

CHARACTERISTICS OF THE THREE RESEARCH PARADIGMS

Quantitative research
Research that relies primarily on the collection of quantitative data

Qualitative research
Research that relies primarily on the collection of qualitative data

Mixed research
Research that involves the mixing of quantitative and qualitative methods or other paradigm characteristics

We want to emphasize that quantitative, qualitative, and mixed research are all very exciting kinds of research and all are equally important in educational research. Pure **quantitative research** relies on the collection of quantitative data (i.e., numerical data) and follows the other characteristics of the quantitative research paradigm shown in Table 2.1. Pure **qualitative research** relies on the collection of qualitative data (i.e., nonnumerical data such as words and pictures) and follows the other characteristics of the qualitative research paradigm shown in Table 2.1. **Mixed research** (or mixed methods research) involves the mixing of quantitative and qualitative research methods, approaches, or other paradigm characteristics. The exact mixture that is considered appropriate will depend on the research questions and the situational and practical issues facing a researcher. All three research paradigms are important as we attempt to solve the manifold and complex problems facing us in the field of education. Take a moment now to examine Table 2.1 and then read the following discussion of the key differences among the three approaches.

First, the quantitative research approach primarily follows the confirmatory scientific method (discussed in Chapter 1) because its focus is on hypothesis testing and theory testing. Quantitative researchers consider it to be of primary importance to state one's hypotheses and then test those hypotheses with empirical data to see if they are supported. On the other hand, qualitative research primarily follows the exploratory scientific method (also discussed in Chapter 1). Qualitative research is used to describe what is seen locally and sometimes to come up with or generate new hypotheses and theories. Qualitative research is used when little is known about a topic or phenomenon and when one wants to discover or learn more about it.

TABLE 2.1
Emphases of Quantitative, Mixed, and Qualitative Research

	Quantitative Research	Mixed Research	Qualitative Research
Scientific method	Confirmatory or "top-down"—the researcher *tests* hypotheses and theory with data	Confirmatory and exploratory	Exploratory or "bottom-up"—The researcher *generates* or *constructs* knowledge, hypotheses, and grounded theory from data collected during fieldwork
Ontology (i.e., nature of reality/truth)	Objective, material, structural, agreed-upon	Pluralism; appreciation of objective, subjective, and intersubjective realities and their interrelations	Subjective, mental, personal, and constructed
Epistemology (i.e., theory of knowledge)	Scientific realism; search for Truth; justification by empirical confirmation of hypotheses; universal scientific standards	Dialectical pluralism; pragmatic justification (what works for whom in specific contexts); mixture of universal (e.g., *always* be ethical) and community-specific needs-based standards	Relativism; individual and group justification; varying standards
View of human thought and behavior	Regular and predictable	Dynamic, complex, and partially predictable—multiple influences include environment/nurture, biology/nature, free will/agency, and chance/fortuity	Situational, social, contextual, personal, and unpredictable
Most common research objectives	Quantitative/numerical description, causal explanation, and prediction	Multiple objectives; provide complex and fuller explanation and understanding; understand multiple perspectives	Qualitative/subjective description, empathetic understanding, and exploration
Interest	Identify general scientific laws; inform national policy	Connect theory and practice; understand multiple causation, nomothetic (i.e., general) causation, and idiographic (i.e., local, particular, individual) causation; connect national and local interests and policy	Understand and appreciate particular groups and individuals; inform local policy
"Focus"	Narrow-angle lens, testing specific hypotheses	Multilens focus	Wide-angle and "deep-angle" lens, examining the breadth and depth of phenomena to learn more about them
Nature of observation	Study behavior under controlled conditions; isolate the causal effect of single variables	Study multiple contexts, perspectives, or conditions; study multiple factors as they operate together	Study groups and individuals in natural settings; attempt to understand insiders' views, meanings, and perspectives
Form of data collected	Collect quantitative data based on precise measurement using structured and validated data-collection instruments	Collect multiple kinds of data	Collect qualitative data such as in-depth interviews, participant observations, field notes, and open-ended questions. The researcher is the primary data-collection instrument

(Continued)

TABLE 2.1
(Continued)

	Quantitative Research	Mixed Research	Qualitative Research
Nature of data	Variables	Mixture of variables, words, categories, and images	Words, images, categories
Data analysis	Identify statistical relationships among variables	Quantitative and qualitative analysis used separately and in combination	Use descriptive data; search for local patterns, themes, and holistic features; and appreciate and articulate differences/variation
Results	Generalizable findings providing representation of objective outsider viewpoint of populations	Provision of "subjective insider" and "objective outsider" viewpoints; presentation and integration of multiple dimensions and perspectives	Particularistic findings; provision of insider viewpoints
Form of final report	Formal statistical report (e.g., with correlations, comparisons of means, and reporting of statistical significance of findings)	Mixture of numbers and narrative	Less formal narrative report with rich contextual description and direct quotations from research participants

Qualitative research is commonly used to understand people's experiences and to express their perspectives. Researchers advocating mixed research argue that it is important to use both the exploratory and the confirmatory methods in one's research (Johnson & Onwuegbuzie, 2004).

Most researchers use inductive *and* deductive reasoning when they conduct research. For example, they use inductive reasoning when they search for patterns in their particular data, when they make generalizations (e.g., from samples to populations), and when they make inferences as to the best explanation. Ultimately, the logic of confirmation is inductive because we do not get conclusive proof from empirical research (see principle of evidence in Chapter 1). Researchers use deductive reasoning when they deduce from their hypotheses the observable consequences that should occur with new empirical data *if* their hypotheses are true. Researchers also use deductive reasoning if they conclude that a theory is false. If they draw this conclusion, they will then move on to generate and test new ideas and new theories.

Determinism
Assumption that all events have causes

Probabilistic cause
A cause that usually produces an outcome; changes in variable A tend to produce changes in variable B

Quantitative and qualitative research are also distinguished by different views of human behavior. In quantitative research, it is assumed that cognition and behavior are highly predictable and explainable. Traditionally, the assumption of **determinism**, which means that all events are fully determined by one or more causes, was made in quantitative research (Salmon, 2007). For example, the process by which children learn to read is determined by one or more causes. Because quantitative research has not identified any universal or unerring laws of human behavior, most contemporary quantitative researchers search for **probabilistic causes** (Humphreys, 1989). A probabilistic statement might go like this: "Adolescents who become involved with drugs and alcohol are more likely to drop out of high school than are adolescents who do not become involved with drugs and alcohol." The point is that most quantitative researchers try to identify cause-and-effect relationships that enable them to make probabilistic predictions and generalizations.

On the other hand, qualitative researchers often view human behavior as being fluid, dynamic, and changing over time and place, and they usually are *not interested in generalizing* beyond the particular people who are studied. In qualitative research, different groups are said to construct their different realities or perspectives, and these social constructions, reciprocally, influence how they "see" or understand their worlds, what they see as normal and abnormal, and how they should act.

Mixed researchers see positive value in both the quantitative *and* the qualitative views of human behavior. They view the use of only quantitative research or only qualitative research as limiting and incomplete for many research problems. As can be seen by examining the middle column in Table 2.1, mixed researchers use a combination of quantitative and qualitative concepts and approaches to understand the world more fully.

Quantitative research often uses what might be called a "narrow-angle lens" because the focus is on only one or a few causal factors at the same time. Quantitative researchers attempt to hold constant the factors that are not being studied. This is often accomplished under laboratory conditions in which an experimenter randomly assigns participants to groups, manipulates only one factor, and then examines the outcome. For example, a researcher might first randomly assign research volunteers to two groups. Random assignment makes the two groups very similar. Then the researcher might expose one group to a new teaching method and another group to a different teaching method, treating the two groups similarly during the study except for the research-manipulated difference in teaching method. The researcher then examines which group learns the most and attributes the difference in learning to the teaching method received. The researcher is able to make a causal attribution because the two groups were similar at the start of the experiment and the only factor they differed on was which teaching method they received.

Qualitative research uses a wide- and deep-angle lens, examining human choice and behavior as it occurs naturally in all of its detail. Qualitative researchers do not want to intervene in the natural flow of behavior. Qualitative researchers study behavior naturalistically and holistically. They try to understand multiple dimensions and layers of reality, such as the types of people in a group, how they think, how they interact, what kinds of agreements or norms are present, and how these dimensions come together holistically to describe the group. For example, perhaps a qualitative researcher wants to study the social climate and culture of a highly successful school. The researcher would spend a great deal of time studying the many aspects of the school to come up with an analysis of how the school operates and for whom and why it is successful. Depending on the research questions, a researcher using the mixed approach would spend part of his or her time in each of the different focus modes, moving back and forth between wide-angle, narrow-angle, and deep-angle viewpoints.

Quantitative researchers attempt to operate under the assumption of objectivity. They assume that there is a reality to be observed and that rational observers who look at the same phenomenon will basically agree on its existence and its characteristics. They try to remain as neutral or value-free as they can, and they attempt to avoid human bias whenever possible. In a sense, quantitative researchers attempt to study the phenomena that are of interest to them "from a distance." For example, standardized questionnaires and other quantitative measuring tools are often used to measure carefully what is observed. In experiments, researchers frequently use random assignment to place participants into different groups to eliminate the possibility of human bias while constructing the comparison groups. In judging results, statistical criteria are used to form many conclusions.

Qualitative researchers generally contend that "reality is socially constructed" (e.g., Guba, 1990). For example, social behavior follows socially constructed norms. Language also has an important influence on our views of the world. For example, it has been suggested that the Inuit "see" many types of snow, whereas the average American probably only sees a few types. Inuits' local languages might allow them to see distinctions that you do not notice; this idea is known as the **linguistic-relativity hypothesis**.

Linguistic-relativity hypothesis
The idea that people's thoughts and understandings are bound by their particular language (also called the Sapir-Whorf hypothesis)

Qualitative researchers argue that it is important to "get close" to their objects of study through participant observation so that they can experience for themselves the subjective dimensions of the phenomena they study. In qualitative research, the researcher is said to be the "instrument of data collection." Rather than using a standardized instrument or measuring device, the qualitative researcher asks the questions, collects the data, makes interpretations, and records what is observed. The qualitative researcher constantly tries to understand the people he or she is observing from the participants' or "natives'" or "actors'" viewpoints. This is the concept of "empathetic understanding." The famous sociologist Max Weber, writing in the

Verstehen
A method of empathetic understanding of others' viewpoints, meanings, intentions, and cultural beliefs

early 20th century, called this idea of *understanding* something from the *other* person's viewpoint ***verstehen*** (M. Weber, 1968). This is expressed in an American idiom as "putting yourself into someone else's shoes." It is important to remember that qualitative research is focused on understanding the "insider's perspective" of people and their cultures and this requires direct personal and often participatory contact.

According to mixed research, it is important to understand the *subjective* (individual), *intersubjective* (language-based, discursive, cultural), and *objective* (material and causal) realities in our world. Although it is important not to influence or bias what you are observing, it also is important to understand the insiders' meanings and viewpoints. For example, if you were studying the culture of the snake-handling churches in the area where Alabama, Tennessee, and Georgia come together, it might be helpful to collect quantitative data by having the church members fill out standardized instruments measuring their personality and demographic characteristics. It would also be essential to collect qualitative data through in-depth personal interviews and close observations of the members to gain a better understanding (from the insiders' perspectives) of the snake-handling culture. In short, the mixing of methods would add very useful and complementary information.

Quantitative research generally reduces measurement to numbers. In survey research, for example, attitudes are usually measured by using *rating scales*. The following 5-point agreement scale is an example:

Strongly Disagree	Disagree	Neutral	Agree	Strongly Agree
1	2	3	4	5

The interviewer or questionnaire provides a statement, and the respondents reply with one of the five allowable response categories. After all respondents have provided their answers, the researcher typically calculates and reports an average for the group of respondents. Let us say, for example, that a researcher asks a group of teachers for their degree of agreement with the following statement: "Teachers need more training in the area of child psychopathology." The researcher might then calculate the average response for the whole group, which might be 4.15 based on a 5-point scale. The researcher might also determine whether the ratings vary by years of teaching experience. Perhaps the average agreement for new teachers is 4.5, and the average for teachers with 5 or more years of experience is 3.9. As you might guess, quantitative data are usually analyzed by using statistical analysis programs on a computer.

On the other hand, qualitative researchers do not usually collect data in the form of numbers. Rather, they conduct observations and in-depth interviews, and the data are usually in the form of words. For example, a qualitative researcher might conduct a focus group discussion with six or seven new teachers to discuss the adequacy of their undergraduate educational programs in preparing them to deal with real-world problems that they face in schools. The facilitator of the focus group would probably videotape the group and tape-record what was said. Later, the recording would be transcribed into words, which would then be analyzed by using the techniques of qualitative data analysis (see Chapter 20). Also, when a qualitative researcher enters the field and makes observations, the researcher will write down what he or she sees, as well as relevant insights and thoughts. The data are again in the form of words. During qualitative data analysis, the researcher will try to identify categories that describe what happened, as well as general themes appearing again and again in the data. The mixed research approach would use a variety of data collection and analysis approaches.

Finally, qualitative, mixed, and quantitative research reports tend to differ. Quantitative reports are commonly reported in journal articles ranging from 10 to 15 pages. The reports include many numbers and results of statistical significance testing (to be explained later). In contrast, qualitative research reports are generally longer, and they are written in narrative form, describing what was found, especially from the insider perspectives of the people in the group

being studied. This report is more interpretative, as the researcher attempts to understand and portray the lives and experiences and language of the research participants. Qualitative journal articles are frequently 15–20 pages long, and the results of qualitative research are often published in the form of books or monographs rather than journal articles. Mixed research might follow the quantitative style or the qualitative style or, more frequently, might use a mixture of the styles.

REVIEW QUESTIONS

2.1 What are the key features of quantitative research?

2.2 What are the key features of qualitative research?

2.3 What are the key features of mixed research?

QUANTITATIVE RESEARCH METHODS: EXPERIMENTAL AND NONEXPERIMENTAL RESEARCH

You now know some of the characteristics of quantitative, qualitative, and mixed research. We next introduce some of the different methods of quantitative research. Before we do that, however, you need to know about variables, because quantitative researchers usually describe the world by using variables and they attempt to explain and predict aspects of the world by demonstrating the relationships among variables. You can see a summary of the types of variables in Table 2.2.

Variables

A **variable** is a condition or characteristic that can take on different values or categories. A much-studied educational variable is intelligence, which varies from low to high for different people. Age is another variable that varies from low to high (e.g., from 1 minute old to 130 years old or so). Another variable is personality type, which might be measured as either introvert or extrovert. To better understand the concept of a variable, it is helpful to compare it with a constant, its opposite. A **constant** is a single value or category of a variable. Here's the idea: Our variable *personality type* is a marker for two constants: introvert and extrovert. The category (i.e., constant) *introvert* is a marker for only one thing; it is one of the two constants forming our variable called personality type. *Personality type* varies, but *introvert* does not vary. Therefore, *personality type* is a variable, and *introvert* is a constant. In the case of the variable *age*, all of the ages make up the values (i.e., constants) of the variable, and each value (e.g., 13 years old) is a constant. If you are still having a hard time with the distinction between a variable and a constant, think of it like this: A variable is like a *set* of things, and a constant is *one* of those things.

Variable
A condition or characteristic that can take on different values or categories

Constant
A single value or category of a variable

The variables that we just used, age and personality type, are actually different types of variables. Age is a quantitative variable, and personality type is a categorical variable. A **quantitative variable** is a variable that varies in degree or amount. It usually involves numbers. A **categorical variable** is a variable that varies in type or kind. It usually involves different groups. Age takes on numbers (e.g., number of years old), and personality type takes on two types or kinds (introvert and extrovert). Now consider the variable *annual income.* How does it vary? It varies in amount, ranging from no income at all to some very large amount of income. Therefore, income is a quantitative variable. If you think about how much money you made last year, you can determine your value on the variable annual income. Now think about the variable religion. How does this variable vary? It varies in kind or type. For instance, it can take on any of the categories standing for the different world religions (e.g., Christianity, Judaism, Islam). For practice identifying quantitative and categorical variables, take a look at the examples in Table 2.3.

Quantitative variable
A variable that varies in degree or amount

Categorical variable
A variable that varies by type or kind

TABLE 2.2
Common Types of Variables Classified by Level of Measurement and by Role of Variable

Variable Type	Key Characteristic	Example
Level of Measurement		
Categorical variable	A variable that varies in kind; it is made up of different types or categories of a phenomenon	One popular measure of the variable *personality type* is made up of the categories of introvert and extrovert.
Quantitative variable	A variable that varies in degree or amount of a phenomenon	The variable *annual income* varies from zero income to a very high income level.
Role Taken by the Variable		
Independent variable (symbolized as IV)	A variable that is presumed to cause changes to occur in another variable; a causal variable	Amount of studying (IV) affects test grades (DV).
Dependent variable (symbolized as DV)	A variable that changes because of another variable; the effect or outcome variable	Amount of studying (IV) affects test grades (DV).
Mediating variable (also called an intervening variable)	A variable that comes in between other variables, helping delineate the process through which variables affect one another	Amount of studying (IV) leads to input and organization of knowledge in long-term memory (mediating variable), which affects test grades (DV). IV→mediating variable→DV
Moderator variable	A variable that delineates how a relationship of interest changes under different conditions or circumstances	Perhaps the relationship between studying (IV) and test grades (DV) changes according to the different levels of use of a drug such as Ritalin (moderator).
Extraneous variable	A variable that may compete with the independent variable in explaining an outcome	Perhaps an observed relationship between coffee drinking (IV) and cancer (DV) is actually due to smoking cigarettes.

Independent variable
A variable that is presumed to cause a change in another variable

Dependent variable
A variable that is presumed to be influenced by one or more independent variables

Cause-and-effect relationship
Relationship in which one variable affects another variable

Yet another categorization scheme for variables is to speak of independent and dependent variables. An **independent variable** is a variable that is presumed to cause a change to occur in another variable. Sometimes the independent variable is manipulated by the researcher (i.e., the researcher determines the value of the independent variable); at other times, the independent variable is studied by the researcher but is not directly manipulated (i.e., the researcher studies what happens when an independent variable changes naturally). The independent variable is an antecedent variable because it must come before another variable if it is to produce a change in it. A **dependent variable** is the variable that is presumed to be influenced by one or more independent variables. The dependent variable is the variable that is "dependent on" the independent (i.e., antecedent) variable(s). A **cause-and-effect relationship** between an independent variable and a dependent variable is present when changes in the independent variable tend to cause changes in the dependent variable. Sometimes researchers call the dependent variable an *outcome variable* or a *response variable* because it is used to measure the effect of one or more independent variables.

Here is a simple example of a cause-and-effect relationship. Think about the US Surgeon General's warning printed on cigarette packages: "Smoking Causes Lung Cancer, Heart Disease, Emphysema, and May Complicate Pregnancy." Can you identify the independent and dependent variables in this relationship? It is smoking that is presumed to cause lung cancer and several other diseases. (You should be aware that extensive research beyond simply

TABLE 2.3
Examples of Quantitative and Categorical Variables

Quantitative Variables	Categorical Variables
Height	Personality type
Weight	Religion
Temperature	Ethnicity
Annual income	Method of therapy
Most aptitude tests	College major
Most achievement tests	Political party identification
School size	Type of school
Class size	Marital status of parents
Self-esteem level	Student retention (retained or not)
Grade point average	Type of teacher expectation
Teacher–pupil ratio	Native language
Time spent on homework	Teaching method
Age	Biological sex
Anxiety level	Learning style
Job satisfaction score	Type of feedback
Number of behavioral outbursts	Computer use (or not)
Reading performance	Type of reading instruction
Spelling accuracy	Inclusion (or not)
Number of performance errors	Problem-solving strategy used
Rate of cognitive processing	Memory strategy used
Dropout rate	Social class

observing that smoking and lung cancer were associated was conducted to establish that the link between smoking and cancer was causal.) In this example, *smoking* is the independent variable (the values corresponding to the number of cigarettes smoked a day), and *presence of lung cancer* is the dependent variable (the values being *lung cancer present* and *lung cancer not present*).

As shorthand, we can use IV to stand for independent variable and DV to stand for dependent variable. We also sometimes use an arrow: IV → DV. The arrow → means "tends to cause changes in" or "affects." In words, this says that the researcher believes "changes in the independent variable tend to cause changes in the dependent variable." In the smoking example, we write Smoking → Onset of Lung Cancer.

Another type of variable is an **intervening variable** (also commonly called a *mediating* or *mediator variable*). An intervening or **mediating variable** occurs between two other variables in a causal chain (Kenny, Kashy, & Bolger, 1998). In the case X → Y, we have only an independent variable and a dependent variable. In the case X → I → Y, we have an intervening variable (I) occurring between the two other variables. In the case of smoking, perhaps an intervening

Intervening or mediating variable
A variable that occurs between two other variables in a causal chain

variable is the development of damaged lung cells. In other words, smoking tends to lead to the development of damaged lung cells, which tends to lead to lung cancer. It is helpful to identify intervening variables because these variables may help explain the process by which an independent variable leads to changes in a dependent variable.

As another example, let X stand for teaching approach (perhaps the levels of this variable are lecture method and cooperative group method), and let Y stand for test score on class exam (varying from 0 to 100 percent correct). Research may show that X → Y; that is, test scores depend on which teaching approach is used. In this case, an intervening variable might be student motivation (varying from low motivation to high motivation). Therefore, the full causal chain is X → I → Y, where X is teaching approach, I is student motivation, and Y is students' test scores; that is, teaching method → student motivation → student test scores.

Moderator variable
A variable that changes the relationship between other variables

The next type of variable is a moderator variable. A **moderator variable** is a variable that changes (i.e., moderates) the relationship between other variables. It's a variable that delineates how a relationship changes under different conditions or contexts or for different kinds of people. For example, you might analyze a set of research data and find little or no difference between the performance scores of students who are taught by using the lecture approach and the scores of students who are taught by using the cooperative learning approach. On further analysis, however, you might learn that cooperative learning works better for extroverted students and that lecture works better for introverted students. In this example, personality type is a moderator variable: The relationship between teaching approach and performance scores depends on the personality type of the student. One thing we commonly find in research on teaching is that what works well depends on the type of student. As you can see, it is helpful to know the important moderator variables so that you can adjust your teaching accordingly.

Experimental Research

The purpose of experimental research is to determine cause-and-effect relationships. The experimental research method enables us to identify causal relationships because it allows us to observe, under controlled conditions, the effects of systematically changing one or more variables. Specifically, in **experimental research**, the researcher *manipulates* the independent variable, actively intervening in the world, and then observes what happens. Thus, **manipulation**, an intervention studied by an experimenter, is the key defining characteristic of experimental research. The use of manipulation in studying cause-and-effect relationships is based on the activity theory of causation (Collingwood, 1940; Cook & Shadish, 1994). Active manipulation is involved only in experimental research. Because of this (and because of experimental control), experimental research provides the strongest evidence of all the research methods about the existence of cause-and-effect relationships.

Experimental research
Research in which the researcher manipulates the independent variable and is interested in showing cause and effect

Manipulation
An intervention studied by an experimenter

In a simple experiment, a researcher will systematically vary an independent variable and assess its effects on a dependent variable. For example, perhaps an educational researcher wants to determine the effect of a new teaching approach on reading achievement. The researcher could perform the new teaching approach with one group of participants and perform the traditional teaching approach with another group of participants. After the treatment, the experimenter would determine which group showed the greater amount of learning (reading achievement). If the group receiving the new teaching approach showed the greater gain, then the researcher would tentatively conclude that the new approach is better than the traditional approach.

Although the type of experiment just described is sometimes done, there is a potential problem with it. What if the two groups of students differed on variables, such as vocabulary, reading ability, and/or age? More specifically, what if the students in the new teaching approach group happened to be older, had better vocabularies, and were better readers than the students in the traditional teaching approach group? Furthermore, suppose the students with better vocabularies, who were older, and who were better readers also tended to learn more quickly than other students. If this were the case, then it is likely that the students in the new teaching

approach group would have learned faster regardless of the teaching approach. In this example, the variables *age, vocabulary*, and *reading ability* are called extraneous variables.

Extraneous variables are variables other than the independent variable of interest (e.g., teaching approach) that may be related to the outcome. When extraneous variables are not controlled for or dealt with in some way, an outside reviewer of the research study may come up with competing explanations for the research findings. The reviewer might argue that the outcome is due to a particular extraneous variable rather than to the independent variable. These competing explanations for the relationship between an independent and a dependent variable are sometimes called *alternative explanations* or *rival hypotheses.* In our example, the researcher cannot know whether the students in the new teaching approach performed better because of the teaching approach or because they had better vocabularies, were older, or were better readers. All these factors are said to be *confounded*; that is, these factors are entangled with the independent variable, and the researcher can't state which is the most important factor. Sometimes we use the term **confounding variables** to refer to extraneous variables that were not controlled for by the researcher and are the reason a particular result occurred.

Extraneous variable
A variable that may compete with the independent variable in explaining the outcome

Confounding variable
An extraneous variable that was not controlled for and is the reason a particular "confounded" result is observed

Because the presence of extraneous variables makes the interpretation of research findings difficult, the effective researcher attempts to control them whenever possible. The best way to control for extraneous variables in an experiment like the one above is to randomly assign research participants to the groups to be compared. Random assignment helps ensure that the people in the groups to be compared are similar before the intervention or manipulation. For example, if the researcher wants to randomly assign 30 people to two groups, then the researcher might put 30 slips of paper, each with one name on it, into a hat and randomly pull out 15 slips. The 15 names that are pulled out will become one of the two groups, and the 15 names remaining in the hat will become the other group. When this is done, the only differences between the groups will be due to chance. In other words, the people in the groups will be *similar* at the start of the experiment. After making the groups similar, the researcher administers the levels of the independent variable, making the groups different only on this variable. Perhaps teaching method is the independent variable, and the levels are cooperative learning and lecture. The administration of the independent variable, or manipulation, would involve exposing one group to cooperative learning and the other group to lecture. Then if the two groups become different after the manipulation, the researcher can conclude that the difference was due to the independent variable.

In summary, (1) the experimenter uses random assignment to *make the groups similar*; (2) the experimenter does something different with the groups; and (3) if the groups then become different, the experimenter concludes that the difference was due to what the experimenter did (i.e., it was due to the independent variable). In later chapters, we will introduce you to additional methods that are used to control for extraneous variables when one is not able to use random assignment. For now, remember that random assignment to groups is the most effective way to make the groups similar and therefore control for extraneous variables.

See Journal Article 2.1 on the Student Study Site.

Nonexperimental Research

In **nonexperimental research**, there is *no manipulation* of an independent variable. There also is no random assignment to groups by the researcher. As a result of these two deficiencies, evidence gathered in support of cause-and-effect relationships in nonexperimental research is more limited and much weaker than evidence gathered in experimental research (especially experimental research designs that include random assignment). If you want to study cause and effect, you should try to conduct an experiment, but sometimes this is not feasible. When important causal research questions need to be answered and an experiment cannot be done, research must still be conducted. In research, we try to do the best we can, and sometimes this means that we must use weaker research methods. For example, during the 1960s, extensive research linking cigarette smoking to lung cancer was conducted. Experimental research with humans was not possible because it would have been unethical. Therefore, in addition

Nonexperimental research
Research in which the independent variable is not manipulated and there is no random assignment to groups

to experimental research with laboratory animals, medical researchers relied on nonexperimental research methods for their extensive study of humans. Please remember that just like experimental research and qualitative research, nonexperimental research is quite important in education. You will learn how to distinguish good/strong nonexperimental research from poor/weak nonexperimental research next and in more depth in Chapter 14.

Causal-comparative research
A form of nonexperimental research in which the primary independent variable of interest is a categorical variable

One type of nonexperimental research is sometimes called *causal-comparative research.* In **causal-comparative research**, the researcher studies the relationship between one or more categorical independent variables and one or more quantitative dependent variables. In the most basic case, there is a single categorical independent variable and a single quantitative dependent variable. Because the independent variable is categorical (e.g., males vs. females, parents vs. nonparents, or public school teachers vs. private school teachers), the different groups' average scores on a dependent variable are compared to determine whether a relationship is present between the independent and dependent variables. For example, if the independent variable is *student retention* (and the categories of the variable are *retained in the first grade* and *not retained in the first grade*) and the dependent variable is *level of achievement*, then the retained students' average achievement would be compared to the nonretained students' average achievement. (Which group do you think would have higher achievements on average: the retained or the nonretained students?) But remember that you must always worry about extraneous/confounding variables. In this case we might want to statistically control (discussed later in book) for prior achievement, parental support, quality of school, quality of teacher, and any other extraneous variable that is believed to affect the dependent variable and systematically vary with the independent variable. Can you think of any other extraneous variables in this case?

To design a basic nonexperimental study with a categorical variable as an exercise, look at Table 2.3 and find a categorical variable that can serve as your independent variable (i.e., one that you would not manipulate) and a quantitative variable that can be your dependent variable. As an example, we can select *retention* as the independent variable and *self-esteem* as a dependent variable. We hypothesize that student retention (retained vs. nonretained) has an influence on self-esteem. More specifically, we predict that, on average, retained students will have lower self-esteem than nonretained students. We would have to go to a school and collect data if we actually wanted to conduct a research study to see whether there is any support for this hypothesis.

Correlational research
A form of nonexperimental research in which the primary independent variable of interest is a quantitative variable

Another nonexperimental research method is called correlational research. As in causal-comparative research, there is no manipulation of an independent variable. In **correlational research**, the researcher studies the relationship between one or more quantitative independent variables and one or more quantitative dependent variables; in correlational research, the independent and dependent variables are quantitative. In this chapter, we introduce the basic case in which the researcher has a single quantitative independent variable and a single quantitative dependent variable. To understand how to study the relationship between two variables when both variables are quantitative, you need a basic understanding of a correlation coefficient.

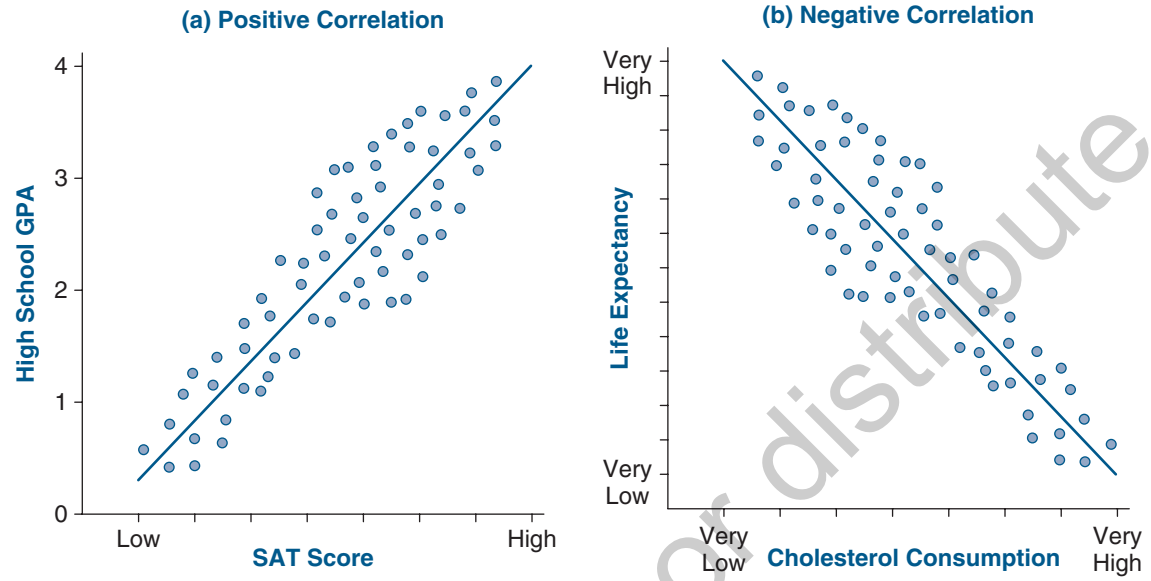
Correlation coefficient
A numerical index that indicates the strength and direction of the relationship between two variables

A **correlation coefficient** is a numerical index that provides information about the strength and direction of the relationship between two variables. It provides information about how two variables are associated. More specifically, a correlation coefficient is a number that can range from –1 to 1, with zero standing for no correlation at all. If the number is greater than zero, there is a positive correlation. If the number is less than zero, there is a negative correlation. If the number is equal to zero, then there is no correlation between the two variables being correlated. If the number is equal to +1.00 or equal to –1.00, the correlation is called perfect; that is, it is as strong as possible. Now we provide an explanation of these points.

Positive correlation
The situation when scores on two variables tend to move in the same direction

A **positive correlation** is present when scores on two variables tend to move in the same direction. For example, consider the variables high school GPA and SAT (the college entrance exam). How do you think scores on these two variables are related? A diagram of this relationship is shown in Figure 2.2a. As you can see there, the students who have high GPAs tend also to have high scores on the SAT, and students who have low GPAs tend to have low scores on the SAT. That's the relationship. We say that GPA and SAT are positively correlated because as SAT scores increase, GPAs also tend to increase (i.e., the variables move in the same direction).

FIGURE 2.2
Examples of Positive and Negative Correlation



Because of this relationship, researchers can use SAT scores to help make predictions about GPAs. However, because the correlation is not perfect, the prediction is also far from perfect.

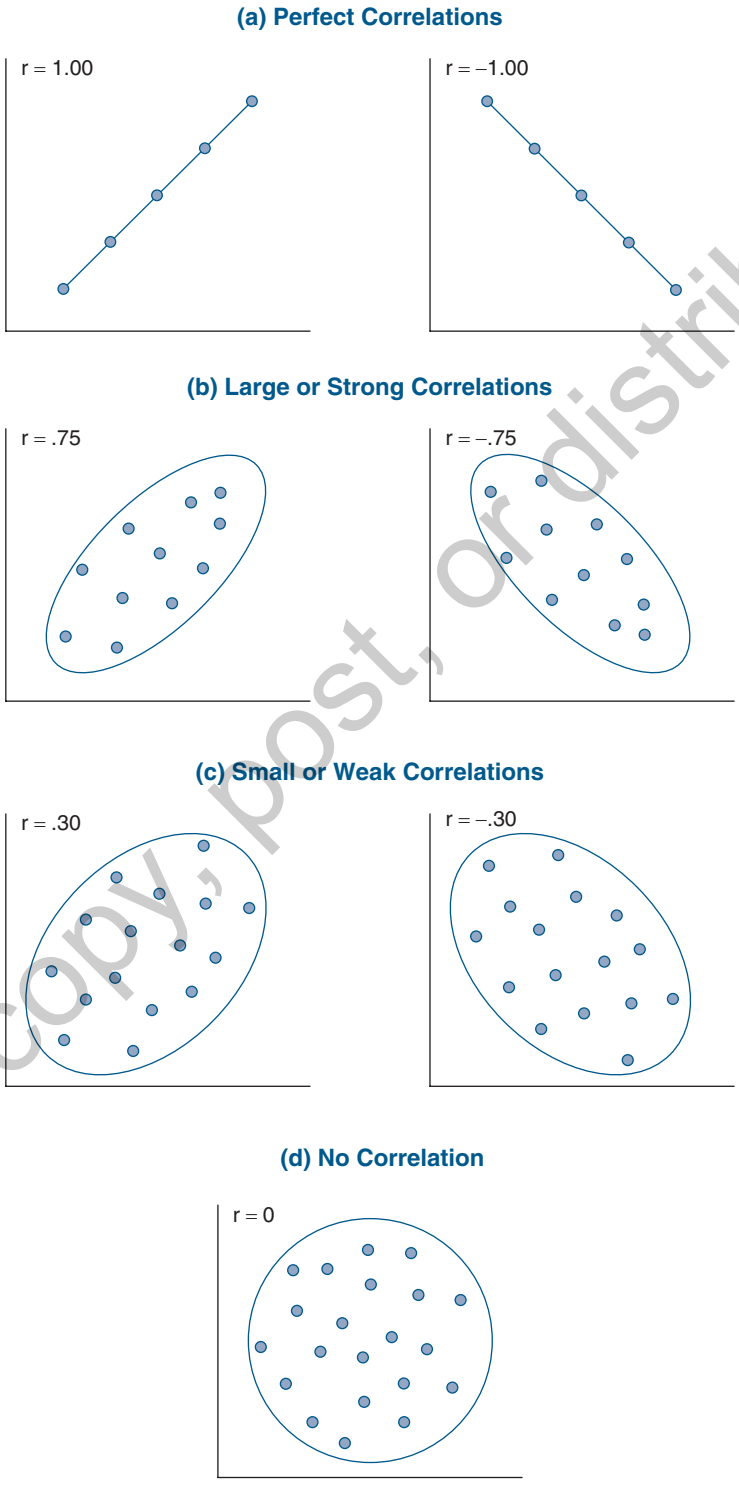
A **negative correlation** is present when the scores on two variables tend to move in opposite directions—as one variable goes up, the other tends to go down, and vice versa. For example, consider these variables: amount of daily cholesterol consumption and life expectancy. How do you think these variables are related? Do you think the relationship meets the definition of a negative correlation? A diagram of this relationship is shown in Figure 2.2b. You can see that as daily cholesterol consumption increases, life expectancy tends to decrease. That is, the variables move in opposite directions. Therefore, researchers can use information about cholesterol consumption to help predict life expectancies. High values on one variable are associated with low values on the other variable, and vice versa. This is what we mean by a negative correlation.

Negative correlation
The situation when scores on two variables tend to move in opposite directions

At this point, you know the difference between a positive correlation (the variables move in the same direction) and a negative correlation (the variables move in opposite directions). There is, however, one more point about a correlation coefficient that you need to know. In addition to the direction of a correlation (positive or negative), we are interested in the strength of the correlation. By *strength*, we mean "How strong is the relationship?" Remember this point: Zero means no relationship at all, and +1.00 and −1.00 mean that the relationship is as strong as possible.

The higher the number (the negative sign is ignored), the stronger the relationship is. For example, if you have a correlation of −.5, then ignore the negative sign and you have .5, which shows the strength of the correlation. Therefore, a correlation of −.5 and a correlation of +.5 have the same strength. The only difference between the two is the direction of the relationship (−.5 is a negative correlation, and +.5 is a positive correlation). When you are interested in its strength, it does not matter whether a correlation is positive or negative. The strength of a correlation operates like this: Zero stands for no correlation at all (i.e., it is the smallest possible strength), and +1.00 and −1.00 are both as strong as a correlation can ever be. That is, +1.00 and −1.00 are equally strong; in research jargon, we say that both +1.00 and −1.00 are *perfect correlations.* The only difference between +1.00 and −1.00 is the direction of the relationship, not the strength. You can see some diagrams of correlations of different strengths and directions in Figure 2.3.

FIGURE 2.3
Correlations of Different Strengths and Directions



If you found the previous paragraph a little hard to understand, here is a different way to determine how strong a correlation is. Simply check to see how far away the number is from zero. The farther the number is from zero, the stronger the correlation is. A correlation of .9 is stronger than a correlation of .2 because it is farther from zero. Likewise, a correlation of −.9 is stronger than a correlation of −.2 because it, too, is farther from zero. Now for a trick question: Which correlation do you believe is stronger: −.90 or +.80? The answer is −.90 because −.90 is farther from zero than +.80. (I think you've got it!)

This is only a brief introduction to the idea of a correlation coefficient. You will become more comfortable with the concept the more you use it, and we will be using the concept often in later chapters. For now, you should clearly understand that you can have positive and negative correlations or no correlation at all and that some correlations are stronger than other correlations. You have learned more already than you thought you would, haven't you?

In the most basic form of correlational research, the researcher examines the correlation between two quantitative variables, and oftentimes researchers attempt to statistically control for worrisome extraneous variables in the study (explained in Chapter 14 under the heading "Statistical Control"). For a simple example, perhaps an educational psychologist has a theory stating that global self-esteem (which is a relatively stable personality trait) should predict class performance. More specifically, the educational psychologist predicts that students entering a particular history class with high self-esteem will tend to do better than students entering the class with low self-esteem, and vice versa. To test this hypothesis, the researcher could collect the relevant data and calculate the correlation between self-esteem and performance on the class examinations. We would expect a positive correlation (i.e., the higher the self-esteem, the higher the performance on the history exam). In our hypothetical example, let's say that the correlation was +.5. That is a medium-size positive correlation, and it would support our hypothesis of a positive correlation.

In our example of self-esteem and class performance, however, the researcher would be able to say virtually nothing about cause and effect based on the correlation of .5. All that one can claim is that there is a predictive relationship between self-esteem and class performance: The higher the self-esteem, the higher class performance tends to be. This is the same problem that we experienced in the basic case of causal-comparative research in which there is one independent variable and one dependent variable and no control variables (i.e., ability to make a claim of *causation*). In our correlation example of self-esteem and class performance, some worrisome extraneous variables that would need to be "controlled for" are prior achievement, intelligence, self-efficacy, motivation, and any other extraneous variables that worry *you*.

There are three key problems with the basic (two-variable and no controls) cases of correlational and causal-comparative research described in this chapter:

1. There is no manipulation of the independent variable by the researcher.
2. It can be difficult to determine the temporal order of the variables (i.e., which of the variables occurs first).
3. There are usually too many other reasons why we might observe the relationship (i.e., the correlation or the difference between groups); that is, there are usually too many extraneous variables that are left unexplained and act as rival or alternative explanations for why something occurs in the world. (Note: In good research, the researcher identifies plausible extraneous/confounding variables, measures them, and controls for them using techniques discussed later in this book [e.g., statistical control and matching discussed in Chapter 14].)

Remember this important point: *You must not jump to a conclusion about cause and effect in a nonexperimental research study* in which the researcher has examined only the relationship between two variables, such as examining a correlation coefficient in correlational research or

comparing two group means in causal-comparative research. Simply finding a relationship between self-esteem and class performance (correlational research) or between personality type and class performance (causal-comparative research) is *not* sufficient evidence for concluding that the relationship is causal. Therefore, *you* must not jump to that conclusion. Note that the word "causal" is somewhat misleading in the term "causal comparative" because this kind of research has the same problems as "correlational research" in dealing with the issue of causation (Johnson, 2001). We will carefully discuss the issue of cause and effect more in later chapters. Note that we have hinted at a way to improve the simple cases of nonexperimental research—attempt to control for worrisome extraneous variables. Even when you control for variables in nonexperimental research, however, the evidence is still weaker than the evidence of causation provided by experimental research because of the lack of manipulation of the independent variable in nonexperimental research. For now, make sure you remember this key point: *Experimental research with random assignment is the single best research method for determining cause-and-effect relationships, and nonexperimental research methods are much weaker.*

See Journal Article 2.2 on the Student Study Site.

REVIEW QUESTIONS

2.4 What is the difference between a categorical variable and a quantitative variable? Think of an example of each.

2.5 Why is experimental research more effective than nonexperimental research when a researcher is interested in studying cause and effect?

2.6 What are the three main problems with the simple cases of causal-comparative and correlational research?

2.7 What are two variables that you believe are positively correlated?

2.8 What are two variables that you believe are negatively correlated?

QUALITATIVE RESEARCH METHODS

As you saw in Table 2.1, qualitative research is based on qualitative data and tends to follow the exploratory mode of the scientific method. For more information about qualitative research as a general approach, we include Patton's (2014) list of the 12 major characteristics of qualitative research in Table 2.4. Please take a moment to read that table because Patton did a good job of succinctly summarizing the key characteristics of qualitative research, and his list will be helpful as you learn about qualitative research. Although not all qualitative research studies have all of the characteristics mentioned by us and by Patton, these characteristics are very typical of qualitative research. This is a good set of characteristics to remember if you are ever asked the general question, "What is qualitative research?"

In this book, we will not just focus on qualitative research as a single kind of research. We will also be discussing the following five specific types of qualitative research: phenomenology, ethnography, narrative inquiry, case study research, and grounded theory research. Each of these qualitative research methods or "theoretical frameworks" has a slightly different emphasis and set of strengths. Chapters 15 and 16 provide detailed discussions of these five kinds of research; now we introduce you to the key ideas of each of these research methods to foreshadow our later, in-depth discussions of these methods.

TABLE 2.4
Twelve Major Characteristics of Qualitative Research

Design Strategies
1. *Naturalistic inquiry*—The researcher studies real-world situations as they unfold naturally in a nonmanipulative and noncontrolling way, being open to whatever emerges (lack of predetermined constraints on findings).
2. *Emergent design flexibility*—With openness to adapting the inquiry as understanding deepens and/or situations change, the researcher avoids getting locked into rigid designs that eliminate responsiveness and pursues new paths of discovery as they emerge.
3. *Purposeful sampling*—Cases for study (e.g., people, organizations, communities, cultures, events, critical incidences) are selected because they are "information rich" and illuminative; that is, they offer useful manifestations of the phenomenon of interest. Sampling, then, is aimed at insight about the phenomenon, not empirical generalization from a sample to a population.
Data-Collection and Fieldwork Strategies
4. *Qualitative data*—Consist of observations that yield detailed, thick description; inquiry in depth; interviews that capture direct quotations about people's personal perspectives and experiences; case studies; and careful document review.
5. *Personal experience and engagement*—The researcher has direct contact with and gets close to the people, situation, and phenomenon under study. The researcher's personal experiences and insights are an important part of the inquiry and critical to understanding the phenomenon.
6. *Empathic neutrality and mindfulness*—Researcher adopts an empathic stance in interviewing and seeks vicarious understanding without judgment (neutrality) by showing openness, sensitivity, respect, awareness, and responsiveness. In observation this means being fully present (mindful).
7. *Dynamic systems*—Attention is paid to process. Researcher assumes change is ongoing whether the focus is on an individual, an organization, a community, or an entire culture; therefore, the researcher is mindful of—and attentive to—system and situation dynamics.
Analysis Strategies
8. *Unique case orientation*—The researcher assumes that each case is special and unique. The first level of analysis is being true to, respecting, and capturing the details of the individual cases being studied; cross-case analysis follows from—and depends on—the quality of individual case studies.
9. *Inductive analysis and creative synthesis*—Researcher seeks immersion in the details and specifics of the data to discover important patterns, themes, and interrelationships. Begins by exploring, then confirming; is guided by analytical principles rather than rules. Study ends with a creative synthesis.
10. *Holistic perspective*—The whole phenomenon under study is understood as a complex system that is more than the sum of its parts. The focus is on complex interdependencies and system dynamics that cannot meaningfully be reduced to a few discrete variables and linear, cause-effect relationships.
11. *Context sensitivity*—Researcher places findings in a social, historical, and temporal context and is careful about, even dubious of, the possibility or meaningfulness of generalizations across time and space. Emphasizes instead careful comparative case analyses and extrapolating patterns for possible transferability to and adaptation in new settings.
12. *Voice, perspective, and reflexivity*—The qualitative analyst owns and is reflective about her or his own voice and perspective; a credible voice conveys authenticity and trustworthiness. Complete objectivity being impossible and pure subjectivity undermining credibility, the researcher's focus is on balance—understanding and depicting the world authentically in all its complexity while being self-analytical, politically aware, and reflexive in consciousness.

Source: Based on M. Q. Patton, *Qualitative Research and Evaluation Methods* (3rd ed.), pp. 40–41. Copyright © 2014 by SAGE Publications, Inc., Thousand Oaks, CA. Reproduced with permission of the publisher.

Phenomenology

Phenomenology
A form of qualitative research in which the researcher attempts to understand how one or more individuals experience a particular phenomenon

The first major type of qualitative research is **phenomenology**. When conducting a phenomenological research study, a researcher attempts to understand how one or more individuals *experience* a phenomenon. For example, you might conduct a phenomenological study of elementary school students who have lost a parent to describe the elements and whole of the experience of parental loss. The key element of a phenomenological research study is that the researcher attempts to understand how people experience a phenomenon from each person's own perspective. Your goal is to enter the inner world of each participant to understand his or her perspective and experience. Phenomenological researchers have studied many phenomena, such as what it is like to participate in a religious group that handles serpents as part of the worship service (Williamson, Pollio, & Hood, 2000), the experience of grief (Bailley, Dunham, & Kral, 2000), the experience of learning to become a music teacher (Devries, 2000), the experience of living with alcoholism (B. A. Smith, 1998), the meaning of age for young and old adults (Adams-Price, Henley, & Hale, 1998), and elementary school children's experiences of stress (Omizo & Omizo, 1990).

See Journal Article 2.3 on the Student Study Site.

Ethnography

Ethnography
A form of qualitative research focused on discovering and describing the culture of a group of people

Culture
A system of shared beliefs, values, practices, perspectives, folk knowledge, language, norms, rituals, and material objects and artifacts that members of a group use in understanding their world and in relating to others

Holistic description
The description of how members of a group interact and how they come together to make up the group as a whole

Ethnography is one of the most popular approaches to qualitative research in education. The word **ethnography** literally means "writing about people." When ethnographers conduct research, they are interested in describing the **culture** of a group of people and learning what it is like to be a member of the group from the perspective of the members of that group. That is, they are interested in documenting things like the shared attitudes, values, norms, practices, patterns of interaction, perspectives, and language of a group of people. They may also be interested in the material things that the group members produce or use, such as clothing styles, ethnic foods, and architectural styles. Ethnographers try to use **holistic descriptions**; that is, they try to describe how the members of a group interact and how they come together to make up the group as a whole. In other words, the group is more than just the sum of its parts. Just a few of the many groups that ethnographers have studied are panhandlers living on the streets of Washington, D.C. (Lankenau, 1999), men with intellectual disabilities living in a group home (Croft, 1999), black and white sorority members (Berkowitz & Padavic, 1999), students in a US history class (Keedy, Fleming, Gentry, & Wheat, 1998), sixth-grade students in science classes (Solot & Arluke, 1997), karaoke bar performers (Drew, 1997), Puerto Rican American parents with children in special education (Harry, 1992), and a group of Native American students who had dropped out of school (Deyhle, 1992). In all of these studies, the researchers were interested in describing some aspect of the culture of the people in the study.

Narrative Inquiry

Narrative inquiry
The study of life experiences as a storied phenomenon

In **narrative inquiry**, participants tell stories of their lived experiences, and then, in relational ways, researchers inquire into and about the experiences. Researchers might share with a participant similar experiences that they have had. In contrast to phenomenology, where the goal is to describe the essence of the experience of a phenomenon, the narrative researcher works with the participant to discern the individual storied experience through narrative threads, narrative tensions, plotlines, narrative coherences, and/or silences and composes a narrative account of the participant's storied experience. Narrative inquirers also inquire into the institutional, social, cultural, familial, and linguistic narratives in which each participant's experiences are embedded and that shape the individual's experience. Multiple data sources, such as conversations, memory box items, photographs, and field notes, among others, are also used.

What all narrative inquiry has in common is that it is the study of experience as a storied phenomenon. For example, in *Composing Lives in Transition* (Clandinin, Steeves, & Caine, 2013), narrative inquirers inquired into the stories told by 11 youth who had left school before graduating. The researchers attended to how the stories each youth told of their experience

of leaving school early shaped their life and how their life shaped their leaving of school. For example, "A Narrative Account of Skye" (Lessard in Clandinin et al.) is a compelling account of a young woman's experiences of composing her life in different places, times, and relationships as she attends school and leaves school early.

Case Study Research

In **case study research**, the researcher provides a detailed account of one or more cases. A **case** is any identifiable bounded system you might see in the world. For example, a case might be an individual (such as a highly successful teacher, counselor, or coach) or a group (such as a particular school, classroom, or sports team). Although case study research usually relies on qualitative data, multiple methods are also used. Case study research can be used to address exploratory, descriptive, and explanatory research questions (Stake, 1995; Yin, 2017). Case study research is more varied than phenomenology, which focuses on individuals' experience of some phenomenon; ethnography, which focuses on some aspect of culture; or grounded theory, which focuses on developing an explanatory theory. What all pure case studies have in common, however, is a focus on each case as a whole unit (i.e., case study research is holistic) as it exists in its real-life context. For example, in "Building Learning Organizations in Engineering Cultures," Ford, Voyer, and Wilkinson (2000) examined how a specific organization changed over time into a learning organization. Although their focus was on a single case, other organizations might be able to learn from the experiences of Ford and colleagues. In "The Journey Through College of Seven Gifted Females: Influences on Their Career Related Decisions," Grant (2000) examined in detail the personal, social, and academic experiences of seven people. After analyzing each case, Grant made cross-case comparisons, searching for similarities and differences.

Case study research
A form of qualitative research that is focused on providing a detailed account of the characteristics and dynamics present in one or more cases

Case
A bounded system

Grounded Theory

Grounded theory research is a qualitative approach to generating and developing a theory from the data you collect in a research study. You will recall from Chapter 1 that a theory is an explanation of how and why something operates. We will explain the details of grounded theory in Chapter 16; for now, remember that grounded theory is an inductive approach for generating theories or explanations. One example of a grounded theory is found in "An Analysis of Factors That Contribute to Parent-School Conflict in Special Education" by Lake and Billingsley (2000). Lake and Billingsley wanted to explain why conflict takes place between the parents of children in special education programs and school officials. The researchers conducted in-depth interviews (lasting an average of 1 hour) with parents, principals, special education program directors, and mediators. They identified several factors as contributing to the escalation of parent-school conflict. The primary or core factor was a discrepancy in views about the child's needs. The other factors were lack of knowledge (e.g., lack of problem-solving knowledge), disagreements over service delivery, the presence of constraints (e.g., the lack of funds to deliver services), differences in how a child is valued, unilateral use of power, poor communication, and lack of trust. In addition to discussing what factors lead to conflict, the authors discussed how conflict can be reduced and how it can be prevented. The authors generated a tentative explanation about conflict based on their data. To strengthen their explanation, they would need to develop their theory further and test it with new empirical data (which would result in a mixed research approach).

Grounded theory research
A qualitative approach to generating and developing a theory from the data that the researcher collects

2.9 What are the different types of qualitative research, and what is the defining feature of each of these?

REVIEW QUESTION

MIXED RESEARCH (OR MIXED METHODS RESEARCH)

In mixed research, the researcher uses a mixture or combination of quantitative and qualitative methods, approaches, or concepts in a single research study or in a set of related studies. To produce a mixed study, you can simply (a) add a qualitative component to any of the quantitative research methods or methodologies, (b) add a quantitative component to any of the qualitative research methods or methodologies, or (c) construct a relatively unique mixed design (see Chapter 17) to answer your research questions that integrates elements of quantitative and qualitative research. In all three cases, however, you must select or construct a mixed design that will enable you to meet the quality criteria explained in Chapter 11. The qualitative and quantitative parts of a research study can be conducted concurrently (conducting both parts at roughly the same time) or sequentially (conducting one part first and the other second) to address a research question or a set of related questions.

For example, let's say that you are interested in studying the phenomenon of living with dyslexia for high school students. You might decide first to conduct a qualitative (exploratory) component of your research study by conducting open-ended or unstructured interviews with 10 or 20 high school students who have dyslexia so that you can directly hear from these students in their own words what it is like to live with dyslexia. On the basis of the data from this phase of your overall study and from your reading of the current research literature, you construct a closed-ended and more structured questionnaire. Next, in the quantitative phase of your study, you ask another group of high school students with dyslexia to rate how descriptive each of the characteristics on the structured questionnaire is of them. For this quantitative phase of your study, you might select a sample of students with dyslexia from several high schools and have these students fill out your questionnaire. You then analyze your questionnaire data and write up your "integrated" findings from the qualitative and quantitative parts of your research study. In this example, the qualitative phase was used to explore the words, categories, and dimensions to include in a structured questionnaire. Then you started testing (or validating) how well the questionnaire operated in the quantitative phase. Together, the qualitative and quantitative approaches produced a superior mixed design.

The Advantages of Mixed Research

Fundamental principle of mixed research
Advises researchers to thoughtfully and strategically mix or combine qualitative and quantitative research methods, approaches, procedures, concepts, and other paradigm characteristics in a way that produces an overall design with multiple (convergent and divergent) and complementary (broadly viewed) strengths and nonoverlapping weaknesses

Complementary strengths
Idea that the whole is greater than the sum of its parts

We view the use of multiple perspectives, theories, and research methods as a strength in educational research. In fact, we view quantitative and qualitative research as complementary. When mixing research or when you read and evaluate research that involved mixing, be sure to consider the **fundamental principle of mixed research**, which says that it is wise to collect multiple sets of data using different research methods, epistemologies, and approaches in such a way that the resulting mixture or combination has multiple (convergent and divergent) and complementary strengths and nonoverlapping weaknesses (Johnson & Turner, 2003). The idea of multiple means that your research can include more than one purpose or a creative mixture of purposes. The idea of **complementary strengths** here means that the whole in a mixed research study is greater than the sum of the parts. The mixed approach helps improve research because the different research approaches provide different sorts of knowledge and they have different strengths and different weaknesses.

By combining two (or more) research methods with different strengths and weaknesses in a research study, you can make it less likely that you will miss something important or make a mistake. The famous qualitative researchers Lincoln and Guba (1985) explained this idea using the metaphor of fish nets. Perhaps a fisherman has several fishing nets, each with one or more holes. To come up with one good net, the fisherman decides to overlap the different fishing nets, forming one overall net. All the nets have holes in them; however, when the nets are put together, there will probably no longer be a hole in the overall net. In the case of research methods, an experimental research study might demonstrate causality well, but it might

be limited in realism because of the confines of the research laboratory. On the other hand, an ethnographic research study might not demonstrate causality especially well, but it can be done in the field, which enables a researcher to observe behavior as it naturally takes place and therefore increases realism. When both methods are used, causality is strong, and realism is no longer a big problem. Although it is sometimes not practical to use more than one research method or strategy in a single research study, you should be aware of the potential benefit of using multiple methods and strategies. Furthermore, even if a researcher does not use multiple approaches or methods in a single research study, the relevant set of published research studies will usually include research based on several different research methods. The research literature is therefore mixed methods. As a result, the mixed methods (or mixed fishing net) advantage will be gained in the overall area of research.

2.10 What is mixed research, and what is an example of this kind of research?

REVIEW QUESTION

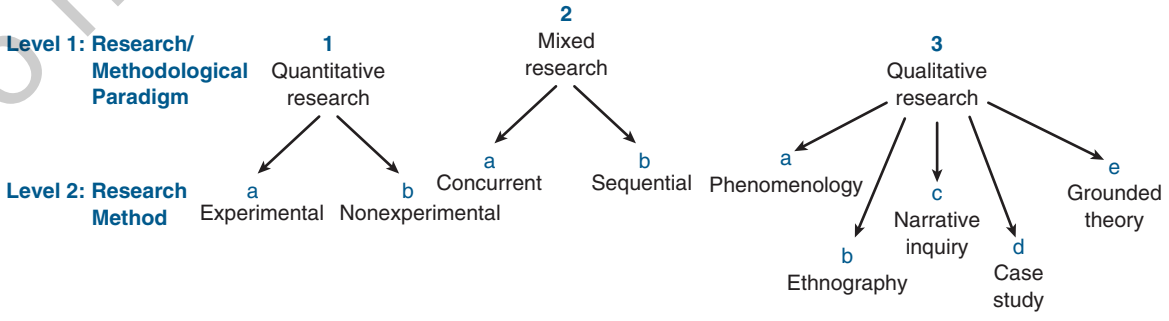
OUR RESEARCH TYPOLOGY

See Journal Article 2.4 on the Student Study Site.

The forms of research that we have covered in this chapter are shown in Figure 2.4. We will discuss each of these types of research in later chapters. It is important to understand that all of the major types of research that we discuss in this textbook have value! It is not uncommon for an educational researcher to use several different types of research at different times. A researcher should always select the appropriate research method on the basis of a consideration of the research question(s) of interest, the objective(s) of the research, time and cost constraints, available populations, the possibility (or not) of the manipulation of an independent variable, and the availability of data. Sometimes a researcher will use more than one research approach within a single study. However, even if researchers never used more than one method in a single study, published research literature would still tend to include articles based on different approaches and methods because of the diversity of the researchers working in the area.

When a research finding has been demonstrated by using more than one type of research, we can place more confidence in it. We say that a finding has been *corroborated* if the same result is found by using different types of research. Conversely, if different data sources or types of research result in conflicting information, then additional research will be needed to explore

FIGURE 2.4
Research Typology. (Later chapters will add a third level to this typology.)



the nature of the phenomenon more completely and to determine the source of conflict. That is, if different types of research result in different findings, then the researcher should study the phenomenon in more depth to determine the exact reason for the conflicting findings. The world is a complex and ever-changing place. As we study it, it is helpful to be equipped with the best methods and approaches currently available. You will probably find that some methods and approaches we discuss will fit your style or personality better than others. However, we hope that you will keep an open mind as you learn about all of the kinds of research. All the research methods can be useful if used properly.

REVIEW QUESTION

2.11 What are the three research/methodological paradigms in education, and what are the major types of research in each of these paradigms? (Hint: See Figure 2.4.)

SUMMARY

The three major research traditions in educational research are qualitative research, quantitative research, and mixed research. All three of these traditions are important and have value. Qualitative research tends to use the exploratory scientific method to generate theory and understand particular people, places, and groups (e.g., in case studies, ethnography, phenomenology, grounded theory, and narrative inquiry). Qualitative researchers typically are not interested in making generalizations. An exception to this lack of interest in generalizing is found in the grounded theory approach to qualitative research. Qualitative research is discovery oriented and is conducted in natural settings. On the other hand, quantitative research is typically done under more tightly controlled conditions and tends to use the confirmatory scientific method, focusing on hypothesis testing and theory testing. Quantitative researchers hope to find common patterns in thought and behavior and to generalize broadly. Mixed research involves mixing and combining qualitative and quantitative research in single research studies. It is based on the philosophy of pragmatism (i.e., solving problems and determining what works should be considered important in answering research questions). In this chapter, two quantitative research types or methods were introduced (experimental and nonexperimental research), five types of qualitative research were introduced (phenomenology, ethnography, case study, narrative research, and grounded theory), and mixed research (which mixes or combines qualitative and quantitative research approaches in single research studies) was introduced. In later chapters, we elaborate on each part of the research typology shown in Figure 2.4.

KEY TERMS

axiology (p. 31)
case (p. 49)
case study research (p. 49)
categorical variable (p. 37)
causal-comparative research (p. 42)
cause-and-effect relationship (p. 38)
complementary strengths (p. 50)
confounding variable (p. 41)
constant (p. 37)
correlation coefficient (p. 42)
correlational research (p. 42)
culture (p. 48)
dependent variable (p. 38)
determinism (p. 34)
epistemology (p. 31)
ethnography (p. 48)
experimental research (p. 40)
extraneous variable (p. 41)
fundamental principle of mixed research (p. 50)
grounded theory research (p. 49)
holistic description (p. 48)
incompatibility thesis (p. 31)
independent variable (p. 38)
intervening variable (p. 39)
linguistic-relativity hypothesis (p. 35)
manipulation (p. 40)
mediating variable (p. 39)
methodology (p. 31)
mixed research (p. 32)
moderator variable (p. 40)

narrative inquiry (p. 48)
negative correlation (p. 43)
nonexperimental research (p. 41)
ontology (p. 31)
phenomenology (p. 48)
positive correlation (p. 42)
pragmatism (p. 31)
probabilistic cause (p. 34)
qualitative research (p. 32)
quantitative research (p. 32)
quantitative variable (p. 37)
research paradigm (p. 30)
rhetoric (p. 31)
variable (p. 37)
verstehen (p. 36)

DISCUSSION QUESTIONS

1. Which of the three research/methodological paradigms do you like the most? Explain why.
2. If you find a statistical relationship between two variables (e.g., income and education, or personality type and grades, or time spent studying and grades) in a nonexperimental research study, should you confidently conclude that one variable is the *cause* of the other variable? Please explain your reason(s).
3. What is an example of a positive correlation? What is an example of a negative correlation?
4. Following are several research questions. For each, list the research method that you believe would be most appropriate to use in answering the question.
   a. How do individuals experience the phenomenon of being one of only a few minority students in a predominantly homogeneous high school?
   b. What is the effect of a new teaching technique on elementary school students' arithmetic performance?
   c. Does cognitive therapy or behavioral therapy work better for treating childhood depression?
   d. What is the culture of the band at a high school in your local community?
   e. What is the relationship between the GRE and student performance in graduate school?
   f. Do males and females have different performance levels in high school English classes?
   g. Does the student-to-teacher ratio have an effect on elementary students' level of performance in the classroom?
   h. Do students perform better on an academic test when they are exposed to a cooperative learning style or a lecture style of teaching?

RESEARCH EXERCISES

1. Go to this book's companion website or to a database on the website of your university library and locate a qualitative research article, a quantitative research article, or a mixed methods research article. Briefly summarize the purpose of the research and the methodology (i.e., how it attempted to answer the research questions). Explain why you classified your article as a qualitative, a quantitative, or a mixed research study.
2. Read the quantitative research study on the companion website (Journal Article 2.1 or 2.2) and write a two-page (typed, double-spaced) summary of the article. Organize your paper into the following three sections:
   (1) Purpose: What was the research study about? What did the researchers hope to learn?
   (2) Methods: How did the researchers carry out their research study? What did they actually do?
   (3) Results: What were the key findings of the research study? Don't worry about the technical jargon in the research article. Just try to understand and clearly communicate its main ideas.
3. Read the qualitative research study on the companion website (Journal Article 2.3) and write a two-page summary of the article. Organize your paper into the three sections described in Exercise 2 (purpose, methods, and results).
4. Read the mixed research study on the companion website (Journal Article 17.2 or 17.3) and write a two-page summary of the article. Organize your paper into the three sections described in Exercise 2 (purpose, methods, and results).

RELEVANT INTERNET SITES

Mixed Methods International Research Association
http://MMIRA.org

Mixed Methods Research Facebook Group
https://www.facebook.com/groups/mmira

Pearson Correlation Coefficient Calculator
http://www.socscistatistics.com/tests/pearson/Default.aspx

QualPage: Resources for Qualitative Research
http://www.qualitativeresearch.uga.edu/QualPage/

Quantitative Research Overview
http://libguides.usc.edu/writingguide/quantitative

STUDENT STUDY SITE

Visit the Student Study Site at **edge.sagepub.com/rbjohnson7e** for these additional learning tools:

- Video Links
- Self-Quizzes
- eFlashcards
- Lecture Notes
- Full-Text SAGE Journal Articles
- Interactive Concept Maps
- Web Resources

RECOMMENDED READING

Baron, R. M., & Kenny, D. A. (1986). The moderator-mediator variable distinction in social psychological research: Conceptual, strategic, and statistical considerations. *Journal of Personality and Social Psychology, 51*(6), 1173–1182.

Christensen, L. B., Johnson, R. B., & Turner, L. A. (2019). *Research methods, design, and analysis* (13th ed.). Boston, NJ: Pearson.

Hesse-Biber, S. N., & Johnson, R. B. (Eds.). (2015). *Oxford handbook of multimethod and mixed methods research inquiry*. New York, NY: Oxford.

Johnson, R. B., Onwuegbuzie, A. J., & Turner, L. A. (2007). Toward a definition of mixed methods research. *Journal of Mixed Methods Research, 1*, 112–133.

Patton, M. Q. (2014). *Qualitative research and evaluation methods* (4th ed.). Thousand Oaks, CA: Sage.

Tashakkori, A., & Teddlie, C. (Eds.). (2010). *Handbook of mixed methods in the social and behavioral sciences*. Thousand Oaks, CA: Sage.