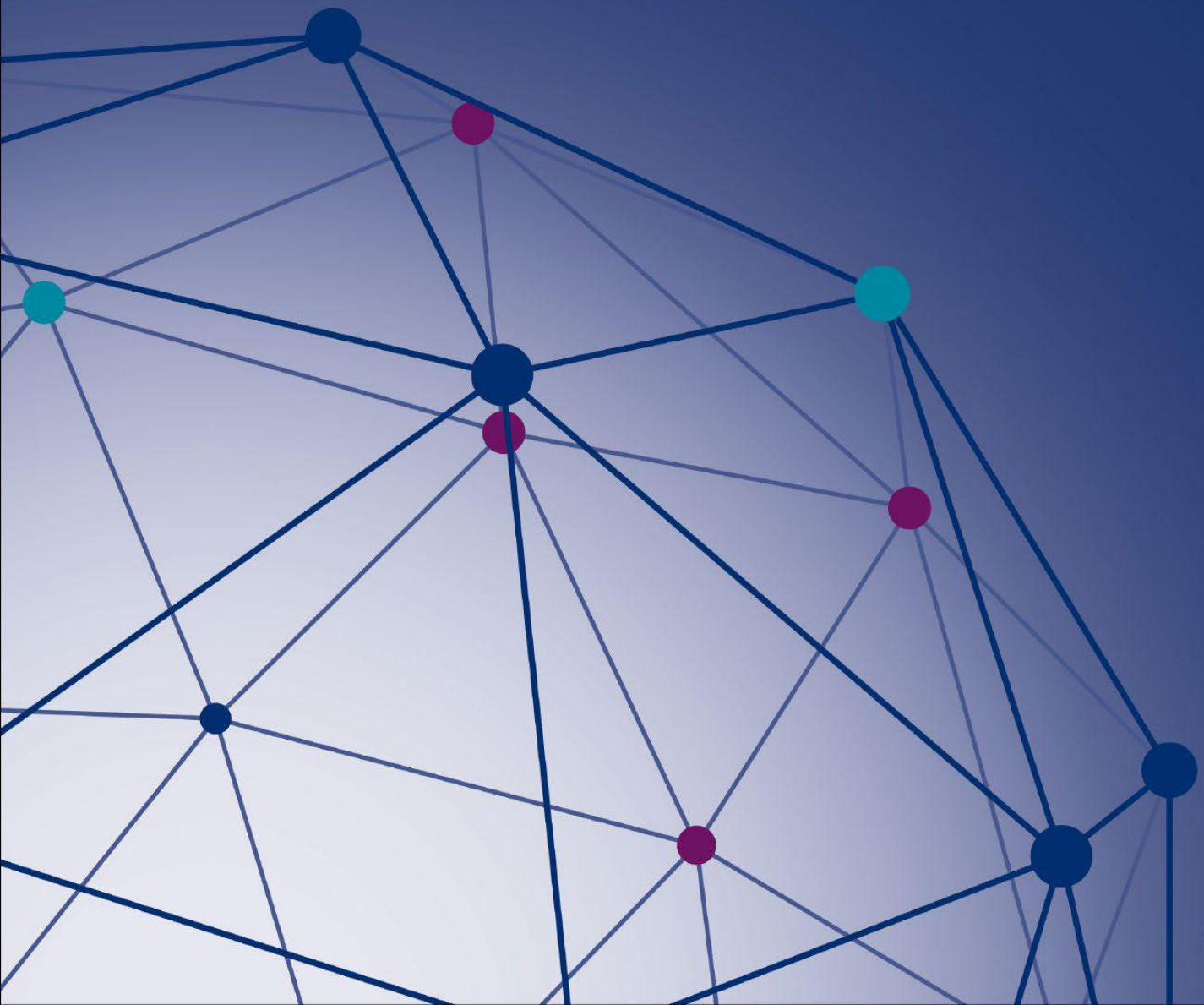
R. Burke Johnson | Larry Christensen

EDUCATIONAL RESEARCH 7e

Quantitative, Qualitative, and Mixed Approaches



Educational Research

Seventh Edition

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Seventh Edition

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SAGE

Los Angeles | London | New Delhi
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Section B. Qualitative Research Methods: Five Major Approaches

Preface

Welcome to the seventh edition of *Educational Research: Quantitative, Qualitative, and Mixed Approaches*. This text is written for the introductory research methods course that is required in most colleges in the United States. We assume no prior knowledge of research methods on the part of our readers. Our book can be used as a first text for undergraduate- or graduate-level courses. Instructors should be able to cover most or all of the material in one semester. Instructors also can choose to emphasize some material over the other.

PURPOSE

We had several purposes in writing this textbook. The first was a desire to write an introductory research methods book that was accurate and up-to-date. We come from interdisciplinary backgrounds and have attempted to incorporate our respective insights into this book. Dr. Johnson is an educational research methodologist and program evaluator, with additional graduate training in psychology, public policy, and sociology; Dr. Christensen is a psychological research methodologist and the author of a highly successful book titled *Experimental Methodology* (now in its 13th edition under the revised title *Research Methods, Design, and Analysis*). We have kept up with the changes taking place in the field of research methods in our disciplines, and we continue to incorporate the latest information in this textbook, including references that allow interested readers to further examine original sources.

Second, we have tried to write a research methods textbook that takes an evenhanded approach to the different types of educational research. Whereas many texts emphasize one method at the expense of others, we believe that all major approaches to research discussed in this text have merit when they are employed carefully and properly! We show the strengths and appropriateness of each method and demonstrate how the experts in each area conduct high-quality research and how they view their approach to research.

Third, we have tried to make our textbook highly readable and to make learning about research fun. Believe it or not, learning about research methods can be exciting. We are excited about research methods, and we share our enthusiasm with you without losing the necessary rigor.

Finally, we have tried to enable readers to become critical consumers of research and users of research. We suspect that most readers of this text will be called on at some point in their careers to summarize research literature, write a research proposal, construct a questionnaire, or test an idea empirically. *Educational Research*, seventh edition, will help prepare you for these activities and will help you become adept at reading, understanding, critiquing, and building on published empirical research articles.

ORGANIZATION OF THE BOOK

We have organized the seventh edition of *Educational Research* to follow the major components or steps involved in the research process.

Part I. Introduction

In this section we introduce you to the field of educational research. We begin by defining science in an inclusive way and explaining the general research process. We discuss inductive

and deductive reasoning, and we describe the exploratory (knowledge-generation) and confirmatory (knowledge-testing) components of the research wheel. We outline some general areas of research, such as basic research, applied research, action research, evaluation research, and orientational research. We examine the three major research paradigms: (1) quantitative research, (2) qualitative research, and (3) mixed research. Last, we include a chapter on action research to engage students in thinking about and applying the ideas discussed in this book. Each of the remaining 18 chapters ends with a section titled "Action Research Reflection"—the purpose of this section is to help students reflect on the chapter material and relate it to their lives and places of work.

Part II. Planning the Research Study

In this section we carefully explain how to come up with a research idea, conduct a review of the research literature, write research questions and hypotheses, and organize and write a research proposal. We also explain the importance of ethics in educational research and how to write an informed consent form. Upon completion of this section, students will be ready to begin writing a research proposal.

Part III. Foundations of Research

In Part III we cover concepts that researchers must master before fully understanding or conducting a research study. We begin with an introduction to measurement. Without reliable and valid measurement, nothing else really matters because poor data quality cannot be fixed. Next we discuss the six major methods of data collection: tests; questionnaires; interviews; focus groups; observations; and constructed, secondary, and existing data. Next, we provide a full chapter teaching you how to construct a questionnaire, if the need ever arises. We then explain the procedures for selecting samples of people to participate in quantitative, qualitative, or mixed research studies. Finally, we discuss the importance of research validity (or trustworthiness or legitimation) in quantitative, qualitative, and mixed research, showing the primary threats to good research and providing specific techniques used to prevent mistakes.

Part IV. Selecting a Research Method

In Part IV we provide extensive discussion of the major methods of research or "research methods" and demonstrate how to match the appropriate research design with various research questions. We divide Part IV into three sections. In Section A we explain the five major approaches to quantitative research—strong experimental research, quasi-experimental research, weak experimental research, single-case research, and nonexperimental quantitative research. In Section B we explain the five major approaches to qualitative research—narrative inquiry, case study research, phenomenology, ethnography, and grounded theory. In Section C we explain mixed methods research, which includes many approaches and possibilities.

Part V. Analyzing the Data

In this section we provide two chapters on quantitative data analysis (descriptive and inferential statistics) and one chapter on how to analyze qualitative and mixed research data.

Part VI. Writing the Research Report

In this final part, we explain how to prepare research manuscripts in a format that can be submitted to an academic journal for publication. We explain how to use the guidelines from the sixth edition of the *Publication Manual of the American Psychological Association* (2010), the guidelines required by the majority of journals in education and psychology.

A Note on Organization

We have integrated the discussion of quantitative, qualitative, and mixed methods research throughout this book. We believe this works best because it is directly linked to the different phases in the research process, and it provides a continuous and comparative approach to the components of the research process. However, if you would like to examine the quantitative, qualitative, and mixed materials separately, we've provided a list of the relevant chapters/sections. (We would recommend starting with either the quantitative or the qualitative approach, and not with mixed research that builds on and "integrates" both quantitative and qualitative approaches.)

Quantitative Research

Chapter 1

Chapter 2 (section on quantitative research)

Chapters 3–7

Chapter 8 (pay special attention to the quantitative versions of the six major methods of data collection)

Chapter 9

Chapter 10 (quantitative sampling sections)

Chapter 11 (quantitative validity sections)

Chapters 12–14

Chapters 18 and 19

Chapter 21 (exclude the parts on writing qualitative and mixed research reports)

Qualitative Research

Chapter 1

Chapter 2 (section on qualitative research)

Chapters 3–6

Chapter 8 (pay special attention to the qualitative versions of the six major methods of data collection)

Chapter 9 (emphasize the parts on qualitative and open-ended questionnaires)

Chapter 10 (qualitative sampling section)

Chapter 11 (qualitative validity/trustworthiness section)

Chapters 15 and 16

Chapter 20 (cover all of chapter except the part on mixed data analysis)

Chapter 21 (emphasize the part on writing qualitative research reports, but the APA sections are probably still relevant)

Mixed Methods Research

Chapter 1

Chapter 2 (section on mixed research)

Chapters 3–6

Chapter 8 (pay special attention to the mixed versions of the six major methods of data collection)

Chapter 9 (pay special attention to the idea of a mixed questionnaire)

Chapter 10 (mixed research sampling section)

Chapter 11 (mixed research validity/legitimation)

Chapter 17

Chapter 20 (cover the section on mixed data analysis)

Chapter 21 (emphasize the part on writing mixed research reports)

FEATURES OF THE TEXT

We have included several features in the seventh edition of *Educational Research* to make the task of learning about research easier for students.

Each of the six parts of the book now includes an overview to inform readers about the big ideas that are coming in the chapters in that part.

Each chapter starts with an **opening vignette** that connects the chapter with current events. This is followed by a list of **objectives** to get students thinking about what they are going to learn.

Within the chapters, several learning aids assist with reviewing key concepts. These include margin definitions of all the **key terms,** multiple **examples** of concepts from published research studies, **review questions** at the end of major sections, and **marginal signals** to connect the reader to journal articles and tools and tips provided at the book's companion website.

Each chapter ends with a full **chapter summary**, a list of the **key terms** used in the chapter, **discussion questions, research exercises**, relevant **Internet sites**, and **recommended reading**.

NEW TO THE SEVENTH EDITION

While keeping the majority of the book intact for long-term users, we have made multiple changes in the seventh edition to better reflect the latest advances in educational research and to improve the student learning experience. The following are of particular note:

- The majority of the opening vignettes have been rewritten to better reflect current events.
- Each of the six parts to the book now includes an overview of the part. This is important reading material because it helps students see and connect the big ideas.
- References throughout the book have been updated to newer publications.
- All of the chapters include revisions to clarify and simplify the material.
- We've updated the journal articles connected to each chapter and indicated each article in the chapter message "See Journal Article (number) on the Student Study Site."
- For several chapters, we edited the "Discussion Questions" listed at the end of the chapter.
- We've extensively updated the "Relevant Internet Sites" and the "Recommended Reading" sections listed at the end of each chapter.

Additional chapter-specific changes are as follows:

- Chapter 1: Added a formal definition of research; updated Table 1.1; added new abstracts under "Examples of Educational Research"; added an additional paragraph on program evaluation including definitions of theory failure and implementation failure; pointed out that action research is a type of applied research; added additional reasons why science cannot provide answers to all questions; added three sentences about the Reproducibility Project by the Open Science Collaboration; added a new section titled "Critical/Scientific Reasoning Versus Pseudoscience"; added definitions of pseudoscience and anonymous peer review; added new Table 1.5 titled "Strategies Used in Pseudoscience"; and added a new section titled "Dispositions of a Good Researcher."
- Chapter 2: Emphasized that this is an overview and "big picture" chapter comparing the three major research approaches or paradigms; and shifted the table titled "Twelve Major Characteristics of Qualitative Research" from Chapter 15 to this chapter (it's now Table 2.4).
- Chapter 4: Made a slight change in the chapter title; added one new objective; modified Figure 4.1 to become a funnel diagram moving from general to more specific; moved and revised Tables 4.4, 4.5, and 4.6 to an earlier place in the chapter to emphasize early how to critically evaluate the quality of journal articles; also revised these tables to end with a final overall judgment about the quality of the article being reviewed; stated more clearly that methods and methodologies follow from one's research questions and mentioned the later chapters that are especially relevant for each type of research question; and added material on mixed methods research questions.
- Chapter 5: Mentioned, for the different sections of a research proposal, what material in later chapters is highly relevant; and added a new section titled "Strategies for Evaluating Your Research Proposal."
- Chapter 6: Mentioned the importance of the use of Turnitin.com free software for checking for plagiarism.
- Chapter 7: Decreased the overuse of the supposedly dichotomous variable "gender" in this and all other chapters. The variable *sex* (for biological sex) is used for male vs. female, and current recommendations about *gender identification* are explained in Chapter 21.
- Chapter 8: This was Chapter 9 in the previous edition. In multiple places we better explain and illustrate that one can conceptualize qualitative, quantitative, and mixed versions of each of the major methods of data collection. Added more information about survey research (including a margin definition) as a nonexperimental research method that relies on questionnaires and interviews; directed readers to see the tables on the strengths and weaknesses of each of the six major methods of data collection; added several more tips for conducting an effective one-on-one interview (Table 8.2); referred more directly to interview protocols in Table 8.3; and the "sixth" major method of data collection is now called "Constructed, Secondary, and Existing Data."
- Chapter 9: This was Chapter 8 in the previous edition. Added an example of a fully open-ended questionnaire; added a statement that questionnaires measuring constructs must meet the psychometric properties of reliability and validity discussed in Chapter 7; and updated the question about gender in the questionnaire shown in Exhibit 9.4.

- Chapter 10: Clarified the differences in purposive sampling in quantitative and qualitative research; and added theoretical sampling as a type of sampling in qualitative research.
- Chapter 11: Improved the definition of naturalistic generalization; improved the definition of member checking; added discussion and definition of theoretical generalization; changed "sociopolitical legitimation in mixed research" to "multiple stakeholder legitimation" (sociopolitical legitimation is now listed as a synonym for multiple stakeholder legitimation); changed "inside-outside legitimation" to "emic-etic legitimation" (inside-outside legitimation is now listed as a synonym for emic-etic legitimation); and added brief discussion of causal process tracing for studying local causation.
- Chapter 12: Added a new figure (Figure 12.7) showing the continuum of the strength of the different types of experimental research for addressing causation (weak, quasi, strong).
- Chapter 14: Emphasized that longitudinal data are superior to cross-sectional data because longitudinal data help to address the temporal order of the variables.
- Chapter 15: Explained the concept of "emergent design" as it is commonly used in qualitative research; and pointed out that research methods or methodologies are often called "theoretical frameworks" in qualitative research.
- Chapter 16: Added an additional sentence clarifying the constant comparative method.
- Chapter 17: Added more named designs in a section titled "Types of Mixed Research Designs" and emphasized that one can easily construct new designs using the notation provided; explained that equal-status designs are becoming increasingly popular; and showed that another popular way to construct a mixed design is to transform a traditional quantitative methodology (e.g., experimental research) or a traditional qualitative methodology into a "mixed methodology."
- Chapter 18: Added a section on correlation coefficients in the section titled "Examining Relationships Among Variables."
- Chapter 19: Added new Table 19.7 ("Total Number of Participants Recommended for Different Statistical Tests") in the new Chapter 19 Appendix; mentioned the free software G*Power for determining sample size needed for different statistical tests; and in the section on "Hypothesis Testing in Practice," added an APA-style write-up of the results for each of the significance tests discussed.
- Chapter 20: Added a brief review of the constant comparative method of analysis.
- Chapter 21: Updated the explanation of the difference between sex (biological) and gender identification; and pointed out that future tense is used in proposals, but past tense is used in full reports when providing the research results.

DIGITAL RESOURCES FOR INSTRUCTORS AND STUDENTS

Additional digital resources further support and enhance the learning goals of the seventh edition of *Educational Research: Quantitative, Qualitative, and Mixed Approaches*. These digital resources include the following:

Password-Protected Instructor Teaching Site

edge.sagepub.com/rbjohnson7e

This password-protected site offers instructors a variety of resources that supplement the book material, including the following:

- A **test bank** offers a very large and diverse set of test questions and answers for each chapter of the book. Multiple-choice, true/false, and essay questions are included for every chapter to aid instructors in assessing students' progress and understanding.
- **PowerPoint presentations** are designed to assist with lecture and review, highlighting essential content, features, and artwork from the book.
- Carefully selected, updated web-based **video resources** feature relevant content for use in independent and classroom-based exploration of key topics.
- **Teaching tips** are designed to help instructors conceptualize their overall teaching plan for each chapter.
- **Lecture notes** summarize key concepts on a chapter-by-chapter basis to assist in preparing for lecture and class discussion.
- Lively and stimulating ideas for **class activities** in and out of the classroom are provided. These are designed to reinforce active learning.
- Links to relevant **web resources** direct instructors to additional tools for further research on important chapter topics.
- Downloadable versions of the tables, figures, and worksheets are provided.
- The authors have provided **suggested answers to the review questions** that are found throughout each chapter.

Open-Access Student Study Site

edge.sagepub.com/rbjohnson7e

This web-based student study site provides a variety of additional resources to enhance students' understanding of the book's content and take their learning one step further. The site includes the following for each chapter:

- **Self-quizzes** allow students to independently assess their progress in learning course material.
- **Suggested answers to review questions** to help students study and learn the chapter material.
- **Concept maps** to show students links among the concepts and see the "big picture."
- **Lecture notes** are here for students to print out and bring to class.
- **eFlashcards** are study tools that reinforce student understanding and learning of the key terms and concepts outlined in the chapters.
- Carefully selected, web-based **video links** feature relevant content for use in independent and classroom-based exploration of key topics.
- Links to relevant **web resources** direct students to additional tools for further research on important chapter topics.
- Links to multiple **SAGE journal articles**, providing examples and discussion of ideas explained in the book.

Look for this icon in the margins, which will guide you to these additional materials found on the student study site:

- Interactive and expandable **concept maps** for each chapter. These downward-branching maps present each chapter's content in a hierarchical structure so that students can visualize the relationships among different concepts.
- Full-text **SAGE journal articles** are provided throughout each chapter in the text, so that students can read published examples the key topics covered.
- Author-created **tools and tips** including an SPSS data set of the quantitative data used in Chapters 18 and 19.

NOTE TO STUDENTS

You are probably wondering how best to study research methods. When studying, first and foremost, use the book's companion website, which has been developed to help you learn the material. As you read the book, we suggest that you begin each chapter by reading the learning objectives and the chapter summary. This will give you an overview of the material. Then look at the chapter concept map included at the book's companion website. This will give you the "big picture." Next, read the chapter carefully. After finishing the chapter, answer the study questions and make sure you understand each concept shown in the concept map. Also, read the lecture notes provided at the companion website, where we touch on most of the major points of each chapter; this will be quick reading after having read the chapter. On the companion website, we also include a number of videos that you can use when you want to hear an additional person explain some of the big ideas in the chapter. To get practice doing research and to learn by doing, complete at least one of the research exercises at the end of each chapter and consider completing the action research activities. As you prepare for tests, make sure that you know the definitions of all the key terms because these are the building blocks and the vocabulary of the research "language." Don't get lost in the details! Continue to use the concept maps to remind yourself of the big picture. Finally, browse or read as many of the companion website journal articles as you can, because one of the best ways to learn how to understand, design, and conduct educational research is to read many high-quality, published research articles in your research area. If you do these things, you can become an expert consumer and producer of research, as well as get an A in your class!

NOTE TO INSTRUCTORS

To help keep the length and price of the textbook low for students, we have placed the 85 supporting research articles on the companion website (rather than including them in the textbook). Your students can easily print out these journal articles. Also, you will find many helpful teaching tips and materials at the Instructor Teaching Site described above. You also will find the student companion website very useful, especially the lectures and the concept maps. One effective in-class teaching strategy would be to connect to the concept maps (via the Internet) during class and discuss these in class. Another strategy is to have your students print out the lectures and then discuss the lectures in class. Yet another strategy is to use the PowerPoint presentations provided at the Instructor Teaching Site. Please note that we have removed the chapter on historical research from this edition, to help shorten the book, but SAGE will provide you with a link to this chapter upon your request. This text also works very well in online courses; the lectures on the companion website were developed by Burke

Johnson specifically for his online research course. In the Instructor's Material on the website, we provide the threaded discussion questions that Burke used in one of his online research methods classes. Our goal is always to provide you with the most up-to-date and useful book and the best set of supplements available. Please contact us if you have any questions or suggestions.

COMMENTS

We hope that you (students and instructors) will send your comments to us so that we can continually improve our textbook and the companion website. Larry Christensen has retired, but you can continue to contact Burke Johnson at the following email address: bjohnson@southalabama.edu. He often replies the same day a message is sent.

Acknowledgments

First and foremost, Burke Johnson would like to thank his wife, Dr. Lisa A. Turner, for putting up with the many long days and for being the first reviewer of everything he wrote. Second, we offer our sincere and special thanks to Steve Scoble (our editor), Chelsea Neve (our content development editor), and Elizabeth You (editorial assistant). Thanks also go to our outstanding copy editor, Christina West, and our production editor, Tracy Buyan, who meticulously worked with us to get the manuscript into its "perfect" final form. In short, we thank the entire SAGE team for their professionalism, friendliness, emphasis on high-quality work, and openness to innovation—everyone at SAGE was always ready to provide ideas and help when it was needed.

We thank Dr. D. Jean Clandinin, a prominent researcher and writer in the field of narrative inquiry, for writing the material on narrative inquiry for the fifth edition. That material is still largely intact as she envisioned it. We also thank Dr. Jim Van Haneghan, a longtime expert on research methods, for revising the **Research in Real Life** vignettes at the beginning of the chapters.

We also offer our gratitude and thanks to our students and to our expert reviewers for their many insights and useful comments. Our reviewers are as follows:

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PART I

Introduction

Brief Overview of Part I: Introduction (Chapters 1–3)

In Part I we provide an overview of science and educational research, give you a bird's-eye view (big picture) of the three major approaches to research, and explain how to make (action) research part of your life.

Chapter 1. Introduction to Educational Research

Here you will learn what educational research is and what science is and how they go together to produce trustworthy knowledge. We also introduce you to the idea of critical thinking. An emphasis on critical thinking about research will continue in all remaining chapters so that you can be a good consumer and producer of educational research when the need arises.

Chapter 2. Quantitative, Qualitative, and Mixed Research

Here we provide a general overview of the major approaches to educational research (or the three big "research paradigms"): quantitative, qualitative, and mixed research. This chapter is important because it introduces terminology and provides you with the "big picture" that we elaborate on in the remaining chapters in the book. It is important that you remember the big picture because you don't want to get lost in the details of the later chapters. In other words, as you read this book, try to be aware of the forest ("the big picture") and the trees in the forest ("the details"). One last point: we explain the idea of a correlation coefficient in Chapter 2, but you will need to remember this "specific" idea in later chapters when we talk about correlations among variables.

Chapter 3. Action Research for Lifelong Learning

Here we explain how you can build "research thinking" into your everyday life. We specifically introduce you to action research, which is an applied form of research and is something you can do, for example, every day at your workplace as you try to grow and become a better professional over time. Action research is a way of life, where you continually explore and experiment with new ways to find solutions to the problems that you face. At the end of all the remaining chapters in this book, we include a section on "Action Research Reflection" to help you think about how the chapter materials might apply to you as a lifelong learner.

Introduction to Educational Research

Research in Real Life
Research Aids Decision Making

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It is 6:45 AM and 16-year-old Ethan is still in bed. School starts at 7:30 and his dad makes the trek upstairs to wake him for the third time this week. Ethan is tired and it is a struggle to wake him. The experience with Ethan is not unlike one that many other parents have with their adolescent children. What lies behind this phenomenon? Is it more common in one group of adolescents or another? What are the implications of going to school tired and sleep deprived? Research has something to say about this problem. Some researchers have found that adolescents' biological clocks are set differently than other age groups. Wolfson and Carskadon (2003) found that adolescents' bodies wanted them to go to sleep later and wake up later than their required school start time allowed. This kind of finding suggests that sleep deprivation might be negatively influencing adolescents' school success. These researchers suggested that later school start times might ameliorate these negative impacts.

Kirby, Maggi, and D'Angiulli (2011) reviewed the impact of later start times and found relatively strong evidence that later start times had positive impacts on academic success, physical, and mental health. The researchers claimed that this was sufficient evidence to suggest that it would be worthwhile to start school later for adolescents. These research findings and recommendations were published several years ago, but the

LEARNING OBJECTIVES

After reading this chapter, you should be able to

- Explain the importance of educational research.
- List at least five areas of educational research.
- Explain the difference between basic and applied research.
- Describe evaluation research, action research, and orientational research.
- Discuss the different sources of knowledge.
- Explain the scientific approach to knowledge generation.
- Explain how to determine the quality of a theory or explanation.
- List the six objectives of educational research and provide an example of each.

US Centers for Disease Control and Prevention (2018) recently reported that 93% of high schools still started before 8:30 AM in 2014. Not all of the research has been supportive of a change in school starting times. For example, Dunietz et al. (2017) conducted a survey of parents and found that they were split about whether changing the start time was a good idea. However, because of the better student outcomes resulting from later start times, research in this area has led several state legislatures to introduce laws to change school start times.

The evidence of improved outcomes from research informed policymakers that this change could make a net positive difference for students. Policymakers benefit when they examine the findings of educational research studies that compare the outcomes resulting from implementing different ideas and approaches. This can help eliminate personal bias and vested interests in particular approaches by providing evidence of what really works best. In short, research provides an effective and evidentiary way to sort out and resolve differing ideas and opinions on educational issues. Perhaps our most important goal in writing this book is to convince you that it is important and helpful to add the examination and conduct of research to your list of ingredients to use when you make decisions about education.

Research
Systematic investigation using appropriate methodologies to provide justified answers to questions about our world

Welcome to the world of educational research! The word **research** refers to systematic investigation using appropriate methodologies to provide justified answers (that can be trusted) to questions about our world. "Educational research" focuses on education issues, problems, and opportunities for new knowledge, advancements, and continual improvement. Research has been conducted in virtually every area in the field of education. In fact, the research techniques described in this book are used all over the world to help people in many fields advance their knowledge and solve problems. The search for better and better answers to important questions will probably always continue. In this book, we discuss the way in which research is conducted in an attempt to provide answers to important questions. We hope you will enjoy learning about research, and we hope it opens up new ways of thinking for you.

As you read this book, you will learn how to think about research, how to evaluate the quality of published research reports, and how to conduct research on your own. In a sense, you will also be learning a new *language*, the language of researchers, because researchers use a specialized language or jargon. But remember, don't be afraid of new words. The words used in this book have definitions that represent ideas you can understand, and you have been learning new words and ideas all of your life. On the lighter side, perhaps you can use some of the new words to impress your friends. In sum, we welcome you to the world of research and hope that you will enjoy it. Because this is likely to be a required course for you, we begin by discussing a few reasons for taking a course on educational research methods.

WHY STUDY EDUCATIONAL RESEARCH?

You might have asked, "Why do I have to take a class on educational research?" First of all, research can be more interesting than you might think, and we hope that in time you will find the material and the ways of thinking not only interesting but also beneficial. Second, throughout this book, you will be learning critical thinking skills. Rather than assuming that what is written in a book or what someone says is "fact" or undeniable "truth," you can use the techniques that you will learn for evaluating arguments. In all cases, the question is one of evidence. As a start, we suggest that you take the word *proof* and eliminate it from your vocabulary this semester or quarter when you talk about research results. Proof exists in the realms of mathematics and deductive logic, but in science and research, the best we can do is to provide evidence. Sometimes the evidence is very strong and convincing; at other times, it will not be.

You must use your critical thinking skills to judge the available evidence on any given topic. These critical thinking skills will be helpful to you as long as you live.

Another important reason to study research is to help you better understand discussions of research you hear and see in the media, such as on television and radio, on the Internet, or at professional meetings. Examples of research in our society abound. For example, when you watch a television program, what comes between those short segments of actual programming? Commercials! Do you ever wonder about those "research studies" that claim to "prove" that one laundry detergent is better than another? As you know, the purpose of commercials is to influence what you buy. Advertisers spend millions of dollars each year on marketing research to understand your thinking and behavior. If you watch a sporting event, you will likely see commercials for beer, cars, trucks, food, and tennis shoes. If you watch soap operas in the afternoon, you are likely to see very different commercials. The reason for this variation is that advertisers generally know who is watching what programs at which times. The commercials are developed to appeal to viewers' ways of thinking about what is fun, exciting, and important. And did you know that every major presidential candidate has a research consultant who tries to identify the most effective ways to get your vote and win the election? The point is that other people study you all the time and, in this book, you will learn about the techniques they use. Understanding these techniques should help you be more aware of their efforts.

You will learn here that not all research is created equal. That is, some research studies are more defensible than others. You will learn how to ask the right questions about research studies, and you will find out when to put confidence in a set of research findings. You will learn to ask questions such as these: Was the study an experiment, or was it nonexperimental? Were control groups included in the design? Did the researcher randomly assign participants to the different comparison groups? How did the researchers control for the influence of extraneous variables? How were the participants in the research selected? Did the researcher use techniques that help reduce the effects of human bias?

One day you might need to examine the research on a topic and make an informed judgment about what course of action to take or to recommend to someone else. Therefore, it is important that you understand how to review and evaluate research. Understanding research terminology, the characteristics of the different types of research, and how research can be designed to provide solid evidence will allow you to evaluate research results critically and make informed decisions based on research literatures. A **research literature** is the set of published research studies on a particular topic. A fundamental point to remember is that you should always place more confidence in a research finding when several different researchers in different places and settings have found the same result. You should never treat a single research study as the final word on any topic.

Research literature
A set of published research studies on a particular topic

On a practical level, understanding research techniques might even help you in your career as a student and as a professional teacher, counselor, or coach. Perhaps one day you will be asked to write a proposal to obtain a grant or conduct a research study on your own. If you study the contents of this book, you will learn how to design and conduct a defensible study, and you will learn about the different sections in a research grant proposal. You will learn how to construct a questionnaire and how to write a proposal. Furthermore, if you look at the bibliographies in the books you use in your other education courses, you will see that many of these references are research studies. After learning about research, you will be able to go back and evaluate the research studies on which your textbooks are based. In other words, you will not have to accept something as true just because someone said it was true. You might find that an article with what you believe to be a questionable finding is based on highly questionable research strategies.

REVIEW QUESTION

AREAS OF EDUCATIONAL RESEARCH

To give you a feel for educational research, let's look at some of the areas of research in education. In Table 1.1 you will find a list of the major divisions and the special interest areas in the American Educational Research Association (AERA). (The AERA website is http://aera.net.) The AERA is the largest and most prestigious research association in the field of education, and it has approximately 25,000 members. It is composed of university professors from all areas of education; governmental employees; teachers; and professionals from educational think tanks, consulting firms, and testing companies. Each year, approximately 11,000 of these members and many nonmembers attend a national conference sponsored by the AERA, where many attendees present the results of their latest research.

You can see in Table 1.1 that education is a broad field that includes many research areas. Do you see any areas of research in Table 1.1 that seem especially interesting? If you are writing a research paper, you might pick one of these as your starting point. The areas of research listed in Table 1.1 are still fairly general, however. To see the specific areas and topics of current interest to educational researchers, go to the library and browse through the education journals.

TABLE 1.1
Divisions and Special Interest Groups in the American Educational Research Association, 2018–2019*

Major Divisions in the AERA	
Division A: Administration, Organization, & Leadership	Division E: Counseling & Human Development
Division B: Curriculum Studies	Division F: History & Historiography
Division C: Learning & Instruction	Division G: Social Context of Education
Division D: Measurement & Research Methodologies	Division H: Research, Evaluation, & Assessment in Schools
(Division D now includes four separate "sections": (a) Measurement, Psychometrics, and Assessment, (b) Statistical Theory and Quantitative Methodologies, (c) Qualitative Methodologies, and (d) Multiple and Mixed Methodologies.)	Division I: Education in the Professions
	Division J: Postsecondary Education
	Division K: Teaching & Teacher Education
	Division L: Educational Policy & Politics
Special Interest Groups in the AERA (Called SIGs)	
Accreditation, Assessment, and Program Evaluation in Education Preparation	Middle-Level Education Research
Action Research	Mixed Methods Research
Adolescence and Youth Development	Montessori Education
Adult Literacy and Adult Education	Moral Development and Education
Advanced Studies of National Databases	Motivation in Education
Advanced Technologies for Learning	Multicultural/Multiethnic Education: Research, Theory, and Practice
Arts and Inquiry in the Visual and Performing Arts in Education	Multilevel Modeling
Arts and Learning	Multiple Linear Regression: The General Linear Model
Arts-Based Educational Research	Music Education
Bilingual Education Research	NAEP Studies
Biographical and Documentary Research	Narrative Research
Brain, Neurosciences, and Education	Online Teaching and Learning
	Organizational Theory

Special Interest Groups in the AERA (Called SIGs)

Career and Technical Education
Caribbean and African Studies in Education
Catholic Education
Chaos & Complexity Theories
Charters & School Choice
Classroom Assessment
Classroom Management
Classroom Observation
Cognition and Assessment
Computer and Internet Applications in Education
Conflict Resolution and Violence Prevention
Confucianism, Taoism, Buddhism, and Education
Constructivist Theory, Research, and Practice
Cooperative Learning: Theory, Research, and Practice
Critical Educators for Social Justice
Critical Examination of Race, Ethnicity, Class, and Gender in Education
Critical Issues in Curriculum and Cultural Studies
Critical Perspectives on Early Childhood Education
Cultural Historical Research
Data-Driven Decision Making in Education
Democratic Citizenship in Education
Design and Technology
Dewey Studies
Disability Studies in Education
Districts in Research and Reform
Early Education and Child Development
Educational Change
Educational Statisticians
Elliot Eisner
Environmental Education
Faculty Teaching, Evaluation, and Development
Family, School, Community Partnerships
Fiscal Issues, Policy, and Education Finance
Foucault and Contemporary Theory in Education
Graduate and Postdoctoral Education across the Disciplines
Out-of-School Time
Paulo Freire
Peace Education
Philanthropy and Education
Philosophical Studies in Education
Politics of Education
Portfolios and Reflection in Teaching and Teacher Education
Postcolonial Studies and Education
Problem-Based Education
Professional Development School Research
Professional Licensure and Certification
Professors of Educational Research
Psychometrics in Higher Education Assessment and Accreditation
Qualitative Research
Queer Studies
Rasch Measurement
Religion and Education
Research Focus on Black Education
Research Focus on Education and Sport
Research in Mathematics Education
Research in Reading and Literacy
Research on Evaluation
Research on Giftedness, Creativity, and Talent
Research on Learning and Instruction in Physical Education
Research on Teacher Induction
Research on the Education of Asian and Pacific Americans
Research on the Education of Deaf Persons
Research on the Superintendency
Research on Women and Education
Research Use
Rural Education
School Community, Climate, and Culture
School Effectiveness and School Improvement
School Turnaround and Reform
School/University-Community Collaborative Research
Science Teaching and Learning

(Continued)

TABLE 1.1
(Continued)

Special Interest Groups in the AERA (Called SIGs)	
Grassroots Community & Youth Organizing for Education Reform	Second Language Research
Hip Hop Theories, Praxis, & Pedagogies	Self-Study of Teacher Education Practices
Hispanic Research Issues	Semiotics in Education: Signs, Meanings, and Multimodality
Holistic Education	Service-Learning & Experiential Education
Inclusion & Accommodation in Educational Assessment	Social and Emotional Learning
Indigenous Peoples of the Americas	Social Studies Research
Indigenous Peoples of the Pacific	Sociology of Education
Informal Learning Environments Research	Special Education Research
Instructional Technology	Spirituality and Education
International Studies	Stress, Coping, and Resilience
Ivan Illich	Structural Equation Modeling
Language and Social Processes	Studying and Self-Regulated Learning
Large Scale Assessment	Supervision and Instructional Leadership
Law and Education	Survey Research in Education
Leadership for School Improvement	Systematic Review and Meta-Analysis
Leadership for Social Justice	Systems Thinking in Education
Learning and Teaching in Educational Leadership	Talent Development of Students Placed at Risk
Learning Environments	Teacher as Researcher
Learning Sciences	Teacher's Work/Teachers Unions
Lesson Study	Teaching Educational Psychology
Literature	Teaching History
Lives of Teachers	Technology as an Agent of Change in Teaching and Learning
Longitudinal Studies	Technology, Instruction, Cognition, and Learning
Marxian Analysis of Society, Schools, and Education	Test Validity Research and Evaluation
Measurement and Assessment in Higher Education	Tracking and Detracking
Media, Culture, and Learning	Urban Learning, Teaching, and Research
Mentorship and Mentoring Practices	Vocabulary
	Workplace Learning
	Writing and Literacies

*For more information about any of these divisions or special interest groups, go to the AERA website at http://aera.net.

EXAMPLES OF EDUCATIONAL RESEARCH

Abstract
A summary of what is in an article; a brief description of the essential characteristics of the study

The majority of journal articles in education include an abstract on the front page of the article. An **abstract** is a brief summary of what is included in the article. We have reproduced the abstracts of several research articles here so that you can get a feel for what is done in an actual research study. Abstracts are helpful because they are short and include the main ideas of the study. You can often decide whether you want to read a journal article by first reading its

abstract. We recommend that you read some full-length research articles as soon as possible to see some full examples of educational research. Throughout this book, you will find a note in the margin telling you to go to the companion website to examine a relevant journal article. You will be able to download the full-length article from the Student Study Site at your convenience.

For the moment, just examine the following three abstracts and see if you can determine (a) the purpose of the study, (b) how the researchers studied the phenomenon, and (c) what the major results were.

I. Middle School Students' Social Media Use, by Florence Martin, Chuang Wang, Teresa Petty, Weichao Wand, and Patti Wilkins (University of North Carolina Charlotte), 2018, from *Educational Technology and Society*, *21*(1), pp. 213–224.

Cyber bullying, digital identity, impact of digital footprints, and use of inappropriate social media are topics that are gaining attention in K–12 schools. As more schools and school districts are implementing 1-1 and "bring your own technology" initiatives, attention to these topics is becoming increasingly important. A total of 593 middle school students were surveyed about digital footprints and concerns about social media. The results show that 17% started using social media at age nine or younger, 40% accepted friend requests from people they do not know, and 40% reported that their parents did not monitor their social media use, which calls for the needs of cybersecurity education. These middle school students reported using social media most often to connect with their friends, share pictures, and find out what others are doing. They indicated that Instagram (27%), SnapChat (25%), and YouTube (25%) were their most used social media sites. These students have concerns about social media due to inappropriate postings, getting hacked, getting their feelings hurt, lack of privacy, inappropriate pictures, bullying, negativity, and stalkers. This study informs teachers, administrators, technology facilitators, and parents on social media use by students.

II. Teacher–Student Relationships and Students' Engagement in High School: Does the Number of Negative and Positive Relationships With Teachers Matter? by Andrew J. Martin and Rebecca J. Collie (University of New South Wales), 2018, from *Journal of Educational Psychology.* doi:10.1037/edu0000317

Teacher–student relationships are an important part of students' interpersonal context at school that impacts their academic development. This study extended prior research into teacher–student relationships by exploring the relative balance of negative and positive teacher–student relationships in high school students' academic lives (in each of English, mathematics, science, history, and geography subjects). Also examined was the role of this relational balance in predicting students' school engagement (operationalized by academic participation, enjoyment, and aspirations). The study involved a longitudinal sample of 2,079 students from 18 high schools. Findings identified a significant linear (main) effect, with an increase in the number of positive relationships (relative to negative relationships) with teachers predicting greater school engagement. This was accompanied by a significant curvilinear effect. Specifically, (a) when the relational balance became predominantly negative, students' engagement was lower, but did not decline with an increasing number of negative teacher–student relationships, and (b) when the relational balance became predominantly positive, students' engagement was higher and became increasingly more so as the number of positive teacher–student relationships outnumbered the negative. We conclude that the enhancing properties of positive teacher–student relationships seem to outweigh the limiting (or narrowing) properties of negative teacher–student relationships. Further, there is cumulative engagement yield through increasing the number of positive teacher–student relationships across students' school subjects.

III. Becoming a Bridge: Collaborative Autoethnography of Four Female Counseling Psychology Student Leaders, by Candice Hargons (University of Kentucky), Melanie Lantz (Louisiana Tech University), Laura Reid Marks (University of Memphis), and

Emily Voelkel (Houston VA Medical Center), 2017, from *The Counseling Psychologist*, *45*(7), pp. 1017–1047.

Women with multiply-marginalized identities remain underrepresented in the American Psychological Association and Society of Counseling Psychology leadership. As early entrants into the leadership pipeline, female student leaders can potentially shift that trend; however, we know little about their leadership emergence processes. In this study, we employed collaborative autoethnography to analyze the positional standpoints of four diverse female counseling psychology leaders. We identified themes in their leadership narratives, which began when they were students. The results focused on factors associated with participants' leadership emergence processes, the role of marginalized identities in participants' leadership emergence, and the interplay between counseling psychology values and leadership through the theoretical framework of bridge leadership. We found themes of (a) Leadership Attributes, including future orientation, determination, and connection, as well as (b) Opportunities and Mentorship. Other themes included counseling psychology values of Advocacy, Social Justice, Inclusion, Multiculturalism, and Enhancing Training. Recommendations for students and trainers are highlighted.

GENERAL KINDS OF RESEARCH

In this section we introduce you to some of the general kinds of research conducted by educational researchers (see Table 1.2). Although these general research types can overlap at times, they have different purposes and are intended for different audiences.

Basic and Applied Research

Research studies can be placed along a continuum with the words *basic research* at one end and the words *applied research* at the other end. The middle area of the continuum represents research that has some characteristics of both basic and applied research. Basic research and applied research are typically conducted by researchers at universities. Basic research and applied research are also conducted by researchers working for think tanks, corporations, government agencies, and foundations. The primary outlet for basic and applied research is academic and professional research journals.

Basic research
Research aimed at generating fundamental knowledge and theoretical understanding about basic human and other natural processes

Basic research is aimed at generating fundamental knowledge and theoretical understanding about basic human and other natural processes. An example of basic research is a study examining the effect of priming in memory. Priming is "an enhancement of the processing of a stimulus as a function of prior exposure" (Anderson, 1995, p. 459). Assume that a researcher asks you to name a fruit and you say, "Pineapple." Then on the second trial, the researcher either asks you to name another type of fruit or asks you to name a type of dog. Which response do you think you could provide more quickly? It turns out that research

TABLE 1.2
Summary of General Kinds of Research

Kind of Research	Key Characteristics
Basic research	Focuses on generating fundamental knowledge.
Applied research	Focuses on real-world questions and applications.
Evaluation research	Focuses on determining the worth, merit, or quality of intervention programs.
Action research	Focuses on solving local problems that practitioners face.
Orientational research	Focuses on reducing inequality and giving voice to the disadvantaged.

participants could name another type of fruit faster than they could name a type of dog when they were asked to name a type of fruit first (Loftus, cited in Anderson). The naming of the fruit on the first trial primed the research participants' mental processing to name another fruit. It is believed that priming operates because the first exposure activates the complex of neurons in long-term memory, where the concept is being stored. Recent priming research (Goodrich & Lonigan, 2018) has extended our understanding of how bilingual children process language. Basic research is usually conducted by using the most rigorous research methods (e.g., experimental) under tightly controlled laboratory conditions. The primary audience includes the other researchers in the research area. The key purpose of basic research is to develop a solid foundation of reliable and fundamental knowledge and theory on which future research can be built.

At the other end of the continuum is applied research. **Applied research** focuses on answering real-world, practical questions to provide relatively immediate solutions. Topics for applied research are often driven by current problems in education and by policymakers' concerns. Applied research is often conducted in more natural settings (i.e., more realistic or real-world settings) than basic research. An applied research study might focus on the effects of retaining low-performing elementary school students in their present grade level or on the relative effectiveness of two approaches to counseling (e.g., behavior therapy versus cognitive therapy). In the former, the results would potentially have practical implications for education policy; in the latter, the results would potentially have implications for practicing counselors. The primary audiences for applied research are other applied researchers (who read the results in educational research journals) as well as policymakers, directors, and managers of programs who also read research journals. Applied research often leads to the development of interventions and programs aimed at improving societal conditions, which leads us to the next type of research.

Applied research
Research focused on answering practical questions to provide relatively immediate solutions

Evaluation Research

When interventions and social or educational programs aimed at improving various conditions are implemented, evaluation research is often carried out to determine how well the programs work in real-world settings and to show how they might be improved. Evaluation research, or, more simply, **evaluation**, specifically involves determining the worth, merit, or quality of an evaluation object, such as an educational program. Evaluation requires evaluators to make value judgments about evaluation objects (e.g., Program XYZ is a good program, and it should be continued; Program ABC is a bad program, and it should be discontinued). An evaluation object (also called the *evaluand*) is the thing being evaluated: a program, a person, or a product (Guba & Lincoln, 1981; Scriven, 1967; Worthen, Sanders, & Fitzpatrick, 1997). An educational program might be an afterschool program for students with behavioral problems or a new curriculum at school. A person might be your new school district superintendent. A product might be a new textbook or a new piece of equipment that a school is considering purchasing.

Evaluation
Determining the worth, merit, or quality of an evaluation object

Evaluation traditionally is subdivided into two types according to the purpose of the evaluation. When the primary purpose of an evaluation is to lead to judgments about how a program can be improved, it is called a **formative evaluation**. Formative evaluation information helps program developers and support staff design, implement, and improve their program so that it works well. When the primary purpose of an evaluation is to lead to judgments about whether a program is effective and whether it should be continued, it is called a **summative evaluation**. Summative evaluation information is important for policymakers and others who commission programs when they make funding decisions and when they have to make choices about which competing programs will be supported and which will be eliminated.

Formative evaluation
Evaluation focused on improving the evaluation object

Summative evaluation
Evaluation focused on determining the overall effectiveness and usefulness of the evaluation object

It is currently popular to divide evaluation into five areas or types (e.g., Rossi, Lipsey, & Freeman, 2004), each of which is based on a fundamental evaluation question:

1. Needs assessment: Is there a need for this type of program?
2. Theory assessment: Is this program conceptualized in a way that it should work?

3. Implementation assessment: Was this program implemented properly and according to the program plan?
4. Impact assessment: Did this program have an impact on its intended targets?
5. Efficiency assessment: Is this program cost-effective?

The first question, about *needs assessment*, tells us that each program must fulfill some important problem or need for particular kinds of people. The second question, about *theory assessment*, tells us that a program must be based on good social, behavioral, or educational science theory (if we are to expect it to be successful). The third question, about *implementation assessment*, tells us to continually collect process data and implementation data to make sure the program is being conducted properly. Note that if a program is found "not to work," this could be due to either **theory failure** (the program is based on a poor theory) or **implementation failure** (the program is not being implementing correctly). The fourth question, about *impact assessment*, tells us that we need to determine if a program causes or produces the intended outcomes; this issue of causation is best answered through the use of experimental research methods (discussed in Chapters 12 and 13). The fifth question, about *efficiency assessment*, tells us that evidence of impact alone is not enough to fully evaluate a program; we also need to determine if the benefits outweigh the costs and, comparatively speaking, whether there is another program with a higher benefit-to-cost ratio.

Theory failure
A program performs poorly because it is based on a weak or faulty program theory

Implementation failure
A program performs poorly because it is not implemented correctly

As you can see, evaluation can provide important information to educators. On the basis of the evidence collected and the recommendations made, program evaluators provide an important voice in decision making about educational and other social programs.

Action Research

In Chapter 3, we devote an entire chapter to action research. Therefore, for the moment, we just want to get the basic idea and a definition into your thinking. **Action research** is a type of applied research that focuses on solving specific problems that local practitioners face in their schools and communities (Lewin, 1946; Stringer, 2013). It views your classroom or other work environment as the place to conduct research. Action research is based on the idea that having a "researcher attitude" is helpful in dealing with your complex and changing environments. This attitude involves continuously identifying new problems that you want to work on and trying new strategies and actions to see what improves your situation. Many practitioners find action research helpful because it helps them to integrate theory and research with practice. We hope all of our readers of this book will take the attitude of the "action researcher" as they go about their professional careers (i.e., think about how research can help you improve your practices and conduct research sometimes to empirically test your ideas).

Action research
Applied research focused on solving practitioners' local problems

Orientational Research

The last general type of research, called **orientational research**, focuses on collecting information to help a researcher advance a specific ideological or political position or orientation that he or she believes will improve some part of our society (e.g., Sandoval, 2000; L. T. Smith, 2008). Orientational research also focuses on "giving voice" and increased power to the disadvantaged in society. Orientational researchers are concerned about such issues as social discrimination and the inequitable distribution of power and wealth in society. Although all orientational researchers are concerned with *reducing* inequality of some form, there are several variants of orientational research. The most common areas of focus are class stratification (i.e., income and wealth inequality), gender inequality, racial and ethnic inequality, sexual orientation inequality, and international inequality (i.e., rich and poor nations).

Orientational research
Research explicitly done for the purpose of advancing an ideological position or orientation

All researchers are ideological to some degree (e.g., in their selection of their research topics, in the recommendations they make), but orientational researchers make their ideology and political agendas very explicit. Orientational research is sometimes called *critical*

theory research (Anyon, 2009). This is appropriate because these researchers often are critical of "mainstream research," which they argue supports the current power structure in society. If orientational research sounds interesting, you will find a wealth of information on the web (using search terms such as *critical theory*, *ethnic studies*, *feminism*, *postcolonialism*, and *queer theory*).

REVIEW QUESTIONS

SOURCES OF KNOWLEDGE

Take a moment now to consider how you have learned about the world around you. Try to identify the source or sources of one of your particular beliefs (e.g., parents, friends, books, tradition, culture, thinking, experiences). For example, consider your political party identification (i.e., Democrat, Republican, independent, or something else). Political scientists have shown that college students' party identification can often be predicted by their parents' party identification. How does your party identification compare with that of your parents? Obviously, many additional influences affect party identification. Can you identify some of them?

In this section, we examine the primary ways in which people relate to the world and how they generate knowledge. The study of knowledge—including its nature, how it is gained or generated, how it is warranted, and the standards that are used to judge its adequacy—is known as **epistemology**. Epistemology sometimes is called the "theory of knowledge." We group the sources of knowledge into the primary areas discussed in the field of epistemology.

Epistemology
The branch of philosophy dealing with knowledge and its justification

Experience

Empiricism is the idea that all knowledge comes from experience. We learn by observing, and when we observe, we rely on our sensory perception. Each day of our lives, we look, feel, hear, smell, and taste so that we can understand our surroundings. According to the philosophical doctrine of empiricism, what we observe with our senses is said to be *true*. John Locke (1632–1704), a proponent of this idea, said that our mind at birth is a *tabula rasa*, a blank slate ready to be written on by our environment. Throughout our lives, our slate is filled up with knowledge based on our experiences. The statement "I know the car is blue because I saw it" is an example of an **empirical statement**: a statement based on observation, experiment, or experience. *Empirical* is a fancy word meaning "based on observation, experiment, or experience." The word *empirical* denotes that a statement is capable of being verified or disproved by observation, experiment, or experience. In the next paragraph, we try to trace some of the sources of experiences you might have had during your lifetime.

Empiricism
The idea that knowledge comes from experience

Empirical statement
A statement based on observation, experiment, or experience

Throughout our lives, we participate in and learn about the world around us. We interact with people and generate our personal knowledge. In the beginning, we are born at a certain time, in a certain place, into a specific family that uses a specific language. When we are young,

our family is the most important source of our knowledge, our attitudes, and our values. As we grow older, other people and social institutions around us—including our peers, our religion, our schools (and libraries), our economy, our government, and the various media we are exposed to or seek out—influence us more and more. We learn the customs, beliefs, and traditions of the people around us. As we learn "how things are," we construct our personal knowledge and viewpoints about our worlds. Over time, many of our actions and beliefs become automatic and unquestioned.

Reasoning

Rationalism
The philosophical idea that reason is the primary source of knowledge

Rationalism is the philosophical idea that reason is the primary source of knowledge. One famous rationalist philosopher was René Descartes (1596–1650). Reason involves thinking about something and developing an understanding of it through reasoning. In its strong form, rationalism means that many truths are knowable independent of observation. In its weaker form, rationalism simply refers to our use of reason in developing understandings about the world. Deductive reasoning and inductive reasoning are the two major kinds of reasoning.

Deductive reasoning
The process of drawing a conclusion that is necessarily true if the premises are true

Deductive reasoning is the process of drawing a conclusion that is necessarily true if the premises are true. One form of deductive reasoning is the syllogism. Here is an example:

Major Premise: All schoolteachers are mortal.

Minor Premise: John is a schoolteacher.

Conclusion: Therefore, John is mortal.

According to this deductive argument, John *necessarily* is a mortal. Keep in mind, however, that reasoning like this depends on the validity of the premises. Just try replacing the word *mortal* with the word *Martian*; you then conclude that John is a Martian. Deductive reasoning is useful as we reason about things in our world, but we must always make sure that our premises are true, and we must use valid argument forms. We need to be careful about what we assume when we draw our conclusions.

Inductive reasoning
The process of drawing a conclusion that is "probably" true

Inductive reasoning is the form of reasoning in which the premises "provide good reasons, but not conclusive reasons to accept the conclusion" (Salmon, 2007, p. 79). We engage in inductive reasoning frequently in our everyday lives when we observe many specific instances of some phenomenon and draw conclusions about it. For example, you have certainly observed all of your life that the sun appears every morning (except on cloudy days). On the basis of your observations, you probably feel comfortable concluding that the sun will make its appearance again tomorrow (if it is not cloudy). In this case, you are indeed likely to be correct. But notice that, when you use inductive reasoning, you are using a **probabilistic** form of reasoning. That is, you are stating what is likely to occur, not what will necessarily occur. Because of this, you are taking a risk (albeit a very small risk in this case) because induction involves making conclusions that go beyond the evidence in the premises (e.g., going from some to more, from the examined to the unexamined, from the observed to the unobserved). This is not necessarily a problem, but you should be aware that it could be one if you expect certainty in your conclusions.

Probabilistic
Stating what is likely to occur, not what will necessarily occur

Problem of induction
The future might not resemble the past

The famous philosopher named David Hume (1711–1776) pointed out what is called the **problem of induction**: Although something might have happened many times in the past, it is still possible that it will not happen in the future. In short, *the future might not resemble the past.* Let's say that every cat you have ever seen had a tail. Using inductive reasoning, you might be led to conclude that all cats have tails. You can see the problem here: One day you might run across a Manx cat, which has no tail. The point is that inductive reasoning is useful in helping us come up with useful conclusions, predictions, and generalizations about the world; however, we must remember that we have not *proven* these to be true. Induction only provides statements of probability.

REVIEW QUESTIONS

THE SCIENTIFIC APPROACH TO KNOWLEDGE GENERATION

Although the word *science* has become a hot-button or loaded word in some circles, the root of the word is the Latin *scientia*, which simply means "knowledge." We define *science* in this book in a way that is inclusive of the different approaches to educational research. We define it as an approach to the generation of knowledge that holds empirical data in high regard and follows certain norms and practices that developed over time because of their usefulness. Many of these norms and effective practices are explained in this book.

Science includes any systematic or carefully done actions that are carried out to answer research questions or meet other needs of a developing research domain (e.g., describing things, exploring, experimenting, explaining, predicting). Science often involves the application of a scientific method; however, as philosophers and historians of science have pointed out, science includes many methods and activities that are carried out by researchers as they attempt to generate scientific knowledge. Science does not accept at face value taken-for-granted knowledge (i.e., things that we assume to be true); instead, it uncovers and justifies descriptions and explanations of people, groups, and the world around us. In this book, we generally treat the term *science* (as just defined) and the term *research* as synonyms.

Science
An approach for the generation of knowledge

Dynamics of Science

Over time, science results in an accumulation of specific findings, theories, and other knowledge. In this sense, science is said to be progressive. When researchers conduct new research studies, they try to build on and extend current research theories and results. Sir Isaac Newton expressed it well when he said, "We stand on the shoulders of giants." Newton's point was that researchers do not and cannot start completely from scratch, and Newton knew that he was no exception to this rule. In short, researchers usually build on past findings and understandings.

At the same time, science is dynamic and open to new ideas and theories that show promise. Different researchers approach research differently, and they often describe, explain, and interpret things in different though often complementary ways. New ideas emerge. As new ideas are generated and evidence is obtained, results are presented at conferences and are published in monographs, books, and journals so that other members of the research community can examine them. Before findings are published in journals, the studies are usually evaluated by a group of experts, called referees, to make sure there are no major flaws and that the procedures are defensible. Researchers are usually required to report exactly how they conducted their research so that other researchers can evaluate the procedures or even replicate the study. Once published, research findings are openly discussed and are critically evaluated by members of the research community. Overall, we can say that science is a never-ending process that includes rational thinking, reliance on empirical observation, constant peer evaluation and critique, and—very importantly—active creativity and attempts at discovery.

Basic Assumptions of Science

Educational researchers must make a few general assumptions so that they can go about their daily business of doing research. Most practicing researchers do not think much about these philosophical assumptions as they carry out their daily research activities; nonetheless, it is helpful to examine some of them. The most common assumptions are summarized in Table 1.3.

First, at the most basic level, educational researchers assume that there is a world that can be studied. In education, this includes studying many phenomena that are internal to people (e.g., attitudes, values, beliefs, lived experiences), as well as many broader phenomena or institutions that are either connected to people or external to them (e.g., schools, cultures, and physical environments). Educational researchers study how the following factors relate to educational issues: **psychological factors** (e.g., characteristics of individuals and individual-level phenomena), **social psychological factors** (e.g., examining how individuals interact and relate to one another and how groups and individuals affect one another), and **sociological factors** (e.g., examining how groups form and change; documenting the characteristics of groups; studying intergroup relations; and studying group-level phenomena, such as cultural, social, political, familial, and economic institutions).

Psychological factors
Individual-level factors or variables

Social psychological factors
Factors or variables relating individuals to other individuals and to social groups

Sociological factors
Group- and society-level factors or variables

Second, researchers assume that part of the world is unique, part of the world is regular or patterned or predictable, and much of the world is dynamic (i.e., changing) and complex (e.g., involving many pieces or factors). One important task of educational research is to document the stories and experiences of particular people and groups. Another important task is to identify the predictable part of the world in order to generate findings that will apply to more than one person, group, kind of person, context, or situation. As you can imagine, conducting research would be very difficult if we had to do so on every single individual! To see an example of regularity in the world, the next time you go to your research class, note the seats that you and a few people around you are sitting in. When your class meets again, see whether you and the others you observed sit in the same seats as during the previous meeting. You will probably notice that many of the people sit in the same seats. Why is this? This happens because humans are to some degree predictable. Understanding the predictable part of the world allows researchers to generalize and apply their findings beyond the people and places used in their particular studies.

Third, the unique, the regular, and the complex in the world can be examined and studied by researchers. In other words, "discoverability" exists in our world (i.e., it is possible to document the unique, discover the regularity in human behavior, and, in time, better understand many of the complexities of human behavior). This does not mean that the task of discovering the nature of educational phenomena is simple. For example, although significant progress has been made, we still do not know all of the causes of many learning disabilities. Research must continue, and over time, we hope to find more and more pieces to the puzzles we are trying to solve. One day we hope we will be able to solve many educational problems.

TABLE 1.3
Summary of Common Assumptions Made by Educational Researchers

1. There is a world that can be studied. This can include studying the inner worlds of individuals.
2. Some of the world is unique, some of it is regular or patterned or predictable, and some of it is dynamic and complex.
3. The unique, the regular, and the complex in the world all can be examined and studied by researchers.
4. Researchers should try to follow certain agreed-on norms and practices.
5. It is possible to distinguish between more and less plausible claims and between good and poor research.
6. Science cannot provide answers to all questions.

The fourth assumption is that researchers should follow certain agreed-on norms and practices. A few of these are the selection of educational and social problems in need of attention, collection of empirical data, open discussion of findings, integrity, honesty, competence, systematic inquiry, empathic neutrality and respect toward research participants, a healthy skepticism toward results and explanations, a sense of curiosity and openness to discovery, the active search for negative evidence (e.g., instances that do not fit your emerging or current explanation of a phenomenon), the careful examination of alternative explanations for your findings, and an adherence to the principle of evidence. One of this book's authors (Johnson) likes to tell his students that a researcher is a lot like the slogan on Missouri's license plates: "The Show Me State." If you have a claim to make, then "show me the evidence, please!" A good researcher tries to collect and assemble high-quality evidence and expects other researchers to do the same. Obviously, it is all but impossible for a researcher to follow fully all of the ideals listed here. Furthermore, because science is a human activity, it is also affected by social and power relationships among researchers and society (Kuhn, 1962; Lincoln & Guba, 2000). That's why it is so important that researchers strive to follow the norms we have listed.

The fifth assumption is that it is possible to distinguish between more and less plausible claims and between good and poor research. For example, through empirical research, we can choose between competing theories by determining which theory best fits the data. We can also judge the quality of a research study by examining the research strategies used and the evidence that is provided for each of the conclusions drawn by a researcher. We say that high-quality research is more trustworthy or more valid than low-quality research. We will explain throughout this textbook how to identify and carry out research that is trustworthy, valid, credible, and, therefore, defensible.

The sixth assumption made by researchers is that science cannot provide answers to all questions. For example, science cannot answer philosophical questions such as what the meaning of life is, what virtue is, or what beauty is. Science cannot settle issues of which position is morally correct (e.g., human cloning versus no human cloning; pro-choice versus pro-life in the abortion debate) or politically correct (e.g., Republican or Democrat) and cannot explain ideas such as the difference between good and evil in the world. Ultimately, science cannot directly answer moral and metaphysical questions because these questions go beyond empirical data. However, science usually can provide very important facts, scientific information, and critical reasoning processes to help individuals and policymakers who must consider and make judgments about moral issues.

Scientific Methods

Science is not a perfectly orderly process (Kuhn, 1962). It is a dynamic process that includes countless activities. However, several of the key features of science are (1) making empirical observations, (2) generating and testing **hypotheses** (predictions or educated guesses), (3) generating or constructing and testing or justifying **theories** (explanations or explanatory systems), and (4) attempting to predict and influence the world to make it a better place to live (American Association for the Advancement of Science, 1990). Although the conduct of research is clearly not a perfectly orderly process and is composed of many activities, it still is helpful to start with some commonly used *scientific methods.*

We distinguish two major scientific methods here: the exploratory method and the confirmatory method. (Several additional methods are listed under Research Exercise 3 at the end of this chapter.) Although both of these methods use empirical data, their purpose is different. The basic **exploratory method** includes three steps. First, the researcher starts by making observations. Second, the researcher studies the observations and searches for patterns (i.e., a statement of what is occurring). Third, the researcher makes a tentative conclusion or a generalization about the pattern or how some aspect of the world operates. The basic **confirmatory method** also includes three steps. First, the researcher states a hypothesis, which is frequently based on existing theory (i.e., currently available scientific explanations). Second, the researcher collects

Hypothesis
A prediction or educated guess

Theory
An explanation or explanatory system that discusses how a phenomenon operates and why it operates as it does

Exploratory method
A bottom-up or theory-generation approach to research

Confirmatory method
A top-down or theory-testing approach to research

data to be used to test the hypothesis empirically. Third, the researcher decides tentatively to accept or reject the hypothesis on the basis of the data.

The exploratory method can be thought of as a *bottom-up approach* because it emphasizes starting with particular data and observations and discovering what is occurring more generally (i.e., movement from data to patterns to theory). This exploratory method is sometimes called the *inductive method* because it moves from the "particular to the general." On the other hand, the confirmatory method can be thought of as a *top-down approach* because it emphasizes the process of starting with a general theory and testing it with particular data (i.e., movement from theory to hypothesis to data). This confirmatory method is sometimes called the *deductive method* because it moves from the "general to the particular."

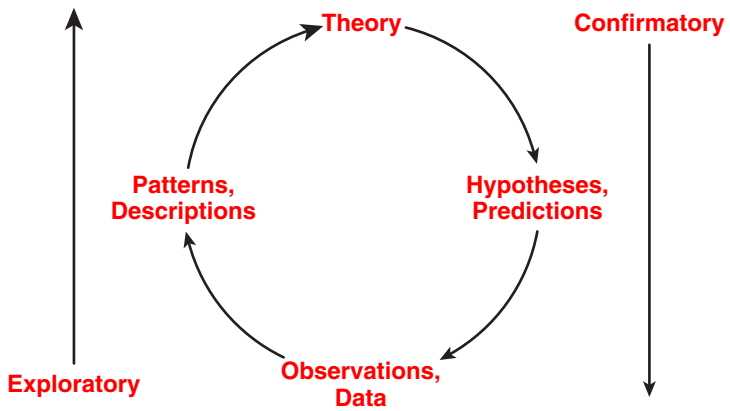
The exploratory method is the theory-*generation* approach: It follows a "logic of discovery" that says to look at your world and try to generate ideas and construct theories about how it operates. The confirmatory method is the traditional theory-*testing* approach: It follows a "logic of justification" that says always to test your theories and hypotheses with new data to see if they are justified. New knowledge is generated using the exploratory or inductive method, and this tentative knowledge is tested or justified using the confirmatory or deductive method. The bottom line is this: The exploratory scientific method focuses on theory discovery, generation, and construction, and the confirmatory scientific method focuses on theory testing or justification.

Quantitative researcher
A researcher who focuses on testing theories and hypotheses using quantitative data to see if they are confirmed or not

Qualitative researcher
A researcher who focuses on exploration, description, and understanding of subjective meanings and sometimes the generation and construction of theories using qualitative data

Although we have talked about two separate scientific methods (the exploratory method and the confirmatory method), it is important to understand that researchers use both of these methods in practice. As you can see in Figure 1.1, the use of the methods follows a cyclical process. One researcher might focus on the theory-testing process, and another researcher might focus on theory generation, but both researchers will usually go through the full cycle many, many times as they think about and carry out their research programs over time. In fact, **quantitative researchers** (i.e., educational researchers who like "hard" quantitative data, such as standardized test results, and focus on hypothesis testing) and **qualitative researchers** (i.e., educational researchers who like to explore educational issues using qualitative data, such as open-ended interviews that provide data based on the participants' perspectives and their actual words) both go through the full research cycle, but they emphasize different parts. Quantitative researchers emphasize movement from theory to hypotheses to data to conclusions (i.e., the "logic of justification"), and qualitative researchers emphasize movement directly from observations and data to descriptions and patterns and, *sometimes*, to theory generation (i.e., the "logic of discovery").

FIGURE 1.1
The Research Wheel



Theory

The exploratory and confirmatory methods both involve the concept of theory (i.e., explanation). The term *theory* as used in this book most simply refers to an explanation or an explanatory system that discusses *how* a phenomenon operates and *why* it operates as it does. Theory often refers to a generalization or set of generalizations that are used systematically to explain some phenomenon. In other words, a well-developed theory explains how something operates in general (i.e., for many people), and it enables one to move beyond the findings of any single research study. Using a well-developed theory, you should be able to explain a phenomenon, make sense of it, and make useful predictions. When you need to judge the quality of a theory or explanation, you should try to answer the nine questions listed in Table 1.4. We now define and briefly elaborate on the *criterion of falsifiability* and the *rule of parsimony*.

Sir Karl Popper (1902–1994), who was one of the most famous philosophers of science of the 20th century, contended that the most important criterion used to judge theories is the **criterion of falsifiability** (Popper, 1965, 1974, 1934/1985). The criterion of falsifiability is "the property of a statement or theory that it is capable of being refuted by experience" (Blackburn, 1994, p. 135). If someone said, "I don't care what the results of my research study are because I'm going to conclude that my theory is supported, no matter what," then that person would obviously not be doing the kind of research that could ever reject or falsify a theory. There must be two sorts of possible outcomes for empirical research: (a) outcomes that would support the theory (that would "confirm" the theory) and (b) outcomes that would not support the theory (that would "not confirm" the theory and over many tests would be used to reject or falsify the theory). Then you conduct your research to find out which type of outcome occurs. In practice, researchers do not give up on promising theories based on a single negative test, but if a theory fails many times, then the theory will be abandoned. The criterion of falsifiability also says that we should not selectively search for confirming evidence for our beliefs and explanations and then stop with that so-called evidence. Good researchers carefully search for and examine any negative evidence that operates against their beliefs, research conclusions, and theoretical explanations.

Criterion of falsifiability
The property that statements and theories should be testable and refutable

Another criterion for evaluating theories is called the **rule of parsimony**. A theory is parsimonious when it is simple, concise, and succinct. If two competing theories explain and predict a phenomenon equally well, then the more parsimonious theory is to be preferred according to the rule of parsimony. In other words, simple theories are preferred over highly complex ones, other things being equal.

Rule of parsimony
Preferring the most simple theory that works

Now let's briefly examine an educational theory to give you an idea of what a relatively well-developed theory looks like. According to *expectation theory*, teachers' expectations about

TABLE 1.4
How to Evaluate the Quality of a Theory or Explanation

1. Is the theory or explanation logical and coherent?
2. Is it clear and parsimonious?
3. Does it fit the available data?
4. Does it provide testable claims?
5. Have theory-based predictions been tested and supported?
6. Has it survived numerous attempts by researchers to identify problems with it or to falsify it?
7. Does it work better than competing or rival theories or explanations?
8. Is it general enough to apply to more than one place, situation, or person?
9. Can practitioners use it to control or influence things in the world (e.g., a good theory of teaching helps teachers to influence student learning positively; a good theory of counseling helps counselors influence their clients' mental health positively)?

their students affect their behavior toward their students, which in turn affects their students' behavior. The theory is based on the self-fulfilling prophecy (Merton, 1948). Robert Rosenthal and Lenore Jacobson (1968) studied the effects of teachers' expectations and found that students whom teachers expected to perform well had higher increases in IQ than did other students. These authors labeled this the *Pygmalion effect.* Rosenthal also found that "those children in whom intellectual growth was expected were described as having a significantly better chance of becoming successful in the future, as significantly more interesting, curious, and happy" (Rosenthal, 1991, p. 6). Students who had IQ increases but had not been expected to have increases by the teachers were not viewed more favorably by the teachers. These results suggest that teacher expectations can sometimes affect student performance. Note, however, that recent research has suggested that the power of expectations is not as great as had originally been concluded (Goldenberg, 1992). Nonetheless, the theory of expectations is a useful idea.

There are many theories in education. A few are attribution theory, constructivism, labeling theory, Kohlberg's theory of moral development, operant conditioning, proximal development, rational emotive therapy, site-based management, situated learning, and social learning theory. If you want to find out more about any of these theories, just go to the library (or, using your computer, go to https://eric.ed.gov) and conduct a search using ERIC or one of the other computerized search tools, which are discussed in Chapter 4. You can also find nice descriptions of many educational and psychological theories at http://www.instructionaldesign.org/theories/.

Keep in mind as you read research articles that you will not always find the word *theory* in the article because often a well-developed or *explicit theory* will not be available to the researcher, or the researcher might not have a fancy name for his or her theory. In this case, you can view the authors' explanations of their findings as the theory. Remember that some theories are highly developed and others are very brief or not well developed. When we use the word *theory* in this book, you might replace it with the word *explanation* until you get used to the idea that *theory* most simply means "explanation."

The Principle of Evidence

Many beginning students believe that science and research are processes in which researchers constantly prove what is true. You might be surprised to learn that researchers rarely use the word *prove* when discussing their research findings. In fact, as we mentioned earlier, we recommend that you eliminate the word *prove* from your vocabulary when you are talking about research because most researchers hold knowledge to be ultimately tentative (D. C. Phillips & Burbules, 2000; Shadish, Cook, & Campbell, 2002). They recognize that principles that are believed to be true today might change eventually; some of today's findings will later be found to be partially true or even patently false. What we obtain in research is scientific "evidence." It is essential that you understand this idea. An important educational methodologist, the late Fred Kerlinger (1986), made this point very clearly:

> The interpretation of research data culminates in conditional probabilistic statements of the "If p, then q" kind. We enrich such statements by qualifying them in some such way as: If p, then q, under conditions r, s, and t. *Let us flatly assert that nothing can be "proved" scientifically. All one can do is to bring evidence to bear that such-and-such a proposition is true.* Proof is a deductive matter, and experimental methods of inquiry are not methods of proof [emphasis added]. (p. 145)

Here is the way the American Association for the Advancement of Science (1990) put it:

> Science is a process for producing knowledge. The process depends on making careful observations of phenomena and on inventing theories for making sense out of those observations. Change in knowledge is inevitable because new observations may challenge prevailing theories. No matter how well one theory

> explains a set of observations, it is possible that another theory may fit just as well or better, or may fit a still wider range of observations. In science, the testing and improving and occasional discarding of theories, whether new or old, go on all the time. (p. 2)

As you learn more about research, keep these points in mind. It is also important to understand that you should never place too much weight on a single research study. **Replication** by other researchers (i.e., research examining the same variables with different people and in different ways) should make you more confident about a research finding because the resulting evidence is much stronger. The Reproducibility Project by the Open Science Collaboration (2015) in psychology has demonstrated the need for replication. In a systematic, well-organized attempt to replicate 100 studies from 2008, approximately half or more of the new studies failed to replicate the findings of the original study. This reminds us that one study is not proof and that replication is an important part of science. Even in the face of replication, strong evidence rather than proof is all that is obtained because we always leave open the possibility that future researchers will come up with new theories and new conclusions.

Replication
Research examining the same variables with different people

Whenever you are tempted to use the word *prove*, please stop and think and remind yourself about the fundamental nature of educational research. For now, whenever you want to use the word *proof*, just use the word *evidence* instead. Sometimes I (Johnson) like to tell my students that proof is what television commercials claim for their products' performance, but in research the best we can do is to obtain strong *evidence.* During a presidential election in the 1990s, a campaign manager kept a slogan posted in the campaign office that read, "It's the economy, stupid!" to keep the staff focused on the economic performance of the current administration as the primary campaign issue. In research our slogan goes like this: "It's about evidence, not proof!" We call this idea the **principle of evidence**.

Principle of evidence
The philosophical idea that empirical research provides evidence, not proof

Critical/Scientific Reasoning Versus Pseudoscience

This book teaches you about scientific reasoning, which is important in research and in your lifelong learning. We will explain how to critically evaluate empirical research articles (e.g., see Tables 4.2, 4.3, and 4.4 in Chapter 4) and how you can determine appropriate methods of data collection (Chapter 8) and the best research designs for answering different kinds of research questions (Chapters 4 and 12–17). In Chapter 10 we show you the ways to obtain representative samples of research participants. Chapter 11 is especially important because you will learn about the different types of validity required for high-quality quantitative, qualitative, and mixed methods research. In short, from the beginning to the end, this book promotes critical thinking that should help you with lifelong learning.

Please remember the following summary point: Whenever researchers (or you) are conducting (or evaluating) empirical research, they will need to provide sufficient justification for each claim (including the kinds of validity that were achieved) and "delimit" the claims (i.e., indicate where and for whom the claims should apply and where they should not apply). Regarding the last point, it is very rare in social, behavioral, or educational research for a claim to apply "universally" (i.e., applying to every person and every group in all places at all times). Always remember that good research provides evidence (not final proof), and this evidence provides the "justification" or "warrant" for the claim, meaning it can be trusted. *When you hear others make claims about people and the natural world, you should always critically evaluate their claim by examining the evidence for each claim, and then you can judge the claim accordingly.*

The opposite of scientific reasoning and research practice is known as **pseudoscience**, which is any set of beliefs or practices that purport to be scientific but are not. You have probably been confronted with many pseudoscientific claims, for example, in television commercials, from biased politicians, and other claims such as with ESP, levitation, flat earth, fortune-telling, astrology, and various superstitions. Table 1.5 lists some strategies that are popular in pseudoscience—please

Pseudoscience
Any set of beliefs or practices that purport to be scientific but are not

TABLE 1.5
Strategies Used in Pseudoscience

• Appealing to trust/faith rather than empirical/observable evidence.
Reversal of the burden of proof (someone tells you to prove that his or her claim is "not" true).
• Using only confirmatory or supportive information when making a claim.
Ignoring negative evidence.
• Ignoring *plausible* alternatives to a claim.
Overreliance on testimonials and anecdotal evidence.
• Use of confusing language in the attempt to make a claim sound "scientific."

Anonymous peer review
Anonymous review of book and article manuscripts by experts for scientific accuracy and merit

avoid these strategies! One additional and systematic way that is used in social, behavioral, and educational research to help avoid pseudoscientific claims is through the use of **anonymous peer review**—the majority of works published in high-quality journals have been critically reviewed and revised before they are published. (For a fun list of some "logical fallacies" also to be avoided, do a quick Google search of "The Ten Commandments of Logic." That provides a nice "starter list" of common logical fallacies.)

REVIEW QUESTIONS

OBJECTIVES OF EDUCATIONAL RESEARCH

Exploration
The research objective of attempting to generate new ideas about phenomena

Discussions of science and empirical research often focus on the importance of explanation. However, several additional objectives are also important if the field of educational research is to continue to operate effectively and to progress. The first objective is **exploration**, or attempting to learn about and generate ideas about phenomena. Exploration is especially important in the early phases of research because researchers must generate ideas about phenomena before additional research can progress. To determine whether exploration was the objective of a particular research study, answer the following questions: