About the Author

Dr. James H. McMillan is Professor of Education in the School of Education at Virginia Commonwealth University (Department of Foundations of Education) and Executive Director of the Metropolitan Educational Research Consortium. He obtained his doctorate from Northwestern University and master’s degree from Michigan State University. Dr. McMillan has also published *Research in Education: Evidence-Based Inquiry; Understanding and Evaluating Educational Research*, *Sage Handbook of Research on Classroom Assessment; Assessment Essentials for Standards-Based Education*, and *Classroom Assessment: Principles and Practice for Effective Standards-Based Instruction*, in addition to more than 60 journal articles. His current research interests include classroom assessment, grading, student motivation, and the impact of high-stakes testing on schools and students, and student perceptions of assessment.

Chapter co-authors (Chapters 2, 13, and 14) are colleagues at Virginia Commonwealth University. **Dr. Lisa Abrams** is Associate Professor and Chair of the Department of Foundations of Education, **Dr. Sharon Zumbrunn** is Assistant Professor in the Department of Foundations of Education, and **Dr. Jesse Senechal** is Associate Director of Research and Evaluation of the Metropolitan Educational Research Consortium.
To the Instructor

This edition of *Fundamentals of Educational Research* is primarily for consumers of educational research and those beginning to be investigators involved in conducting studies. Consumers locate, read, understand, critique, and then use the results of research to become more effective professionally and to make sound educational decisions. Beginning researchers need to know the fundamental process of conducting good research, a foundation for learning how to actually do empirical research. This book is designed to enable students to become *intelligent* consumers and beginning investigators of educational research. It is intended for a one-semester or one-term course in educational research and is best suited for advanced undergraduate and beginning graduate students in all areas of education, as well as in other disciplines. The examples and excerpts from published studies bring sometimes obtuse and dull research principles to life by showing how they are used by people who have published their work. Students will find them interesting and informative. There are now 175 excerpts from very recently published studies from 70 different journals representing various levels of rigor and myriad subject areas. Although the excerpts focus on the field of education and educational publications, this book is also appropriate for students in related social sciences who need to learn how to read and understand research and begin the process of becoming investigators.

**The primary goal of this book is to educate students to be intelligent consumers and researchers.** This is accomplished by promoting student understanding of the researcher’s intent, the procedures, and the results. Students are then shown how to analyze and evaluate research, judging the usefulness of the findings for educational practice. More specifically, the book will help students to:

- Apply the principles of scientific inquiry to everyday problem solving and decision making.
- Develop a healthy skepticism about “studies” that purport to advance our knowledge.
- Understand the process of conceptualizing and conducting educational research.
- Understand strengths and weaknesses of different methodologies used in research.
- Be able to read, understand, critique, and use published reports of research.
- Understand the uncertain nature of knowledge about educational practice generated through research.
- Keep a balanced perspective about the relative contributions of research and professional judgment.
- Understand how to conduct research.

These goals are reached with a concise, engaging presentation of principles for conducting research and criteria for evaluating its overall credibility. The style of the book is informal, the language is nontechnical, and no prerequisite courses in measurement or statistics are needed. Numerous illustrations and excerpts from actual studies as well as *new complete published articles* are highlighted as examples to familiarize students with the style and format of published articles, to introduce students to the language of research, and to
point out features and parts of published studies. Students have found my author reflections compelling, drawing upon my years of experience teaching, conducting, and publishing research, so in this edition the number of author reflections has increased.

The sequence of topics has remained unchanged from the sixth edition, but there have been some significant changes in many chapters and there are two completely new chapters that emphasize ethics and qualitative data collection and analysis. There is also additional material on the increasingly popular mixed methods approaches. The book covers fundamental principles in the sequence found in the research process, beginning with research problems and ending with conclusions. The emphasis is on teaching students that all aspects of conducting and reporting research are important in judging the overall credibility of the findings, and how different parts of the research process are interrelated and need to be clearly aligned. The format of research articles is included in the first chapter to enable students to read published studies as early as possible in the course. My experience is that students need as much practice as possible in reading and critiquing articles. The first chapter also introduces different research methodologies. I have found this introduction helpful in providing an initial understanding of different approaches, including quantitative, qualitative, and mixed methods designs that are covered in greater depth in later chapters. From the beginning, students are able to identify different types of studies.

Chapter 2, on ethics, ethical principles, and ethical practices, is new to this edition. This chapter is included early in the book to emphasize the importance of these principles in both the conduct and reporting of research. The following chapter, which focuses on research problems and questions, showing students how to conceptualize and word research questions that align with methodology, now includes mixed methods questions, as well as greater clarity between general problems and more specific research questions.

Because good consumers and investigators need to know how to find helpful research, the chapter on reviewing literature includes skills in locating primary and secondary sources, in evaluating a review of literature section of an article, and writing a review of literature. New to this edition is an extensively revised chapter on reviewing literature that reflects the current process of using multiple electronic sources to locate published studies. This provides hints, sites, and procedures that will make it easy for students to use not only ERIC, but also other electronic avenues that are now available and widely used. Also new to the chapter is an illustration of using both literature matrices and literature maps to organize and synthesize different studies.

Chapter 4, which focuses on participant selection and sampling, now includes an emphasis on design sensitivity and completely new sampling approaches for mixed methods studies. The next few chapters focus on quantitative methods. Two chapters are devoted to measurement because of the critical role it plays in quantitative and mixed methods educational research. Basic descriptive statistical principles are presented first to enhance understanding. For example, I have found that students must know about correlation to understand reliability and validity. The two measurement chapters contain expanded treatments of graphs, variance, sensitivity, and steps in constructing a questionnaire. Both measurement validity and reliability reflect the new AERA/APA/NCME 2014 Standards for Educational and Psychological Testing.

Chapter 8 contains some significant additions and changes. There is now a more complete discussion of research design in light of the goal of most quantitative research to find relationships among variables. There is greater differentiation between comparative and causal comparative designs, and correlational designs are now classified as simple or complex. Among the complex correlational procedures presented, there is much more detail on multiple regression, as well as an introduction to structural equation modeling. The section on survey research design has been expanded considerably. The experimental design chapter has been expanded to include the concept of noise in conducting experiments,
To the Instructor

well as the MAXMINCON principle, to guide design decisions. Threats to internal validity have been fine tuned, and remain one of the most comprehensive lists available.

An important change in the coverage of qualitative research is the expansion of designs to include narrative, more detail on all the designs, and a completely new chapter that provides greater coverage of qualitative data collection and analysis procedures. Chapter 11 contains a new section on validity for qualitative research, which includes a list of threats to validity. Chapter 12 includes much more detail on conducting qualitative interviews and observations.

The mixed methods chapter has been extensively revised, with an emphasis on three designs—explanatory sequential, exploratory sequential, and convergent. A completely new set of steps to conduct mixed methods studies is included, as well as more detail on the rationale for using different designs. The action research chapter has also been revised extensively, with a new emphasis on the recursive process needed for successful action research projects.

As in the previous editions, the chapters include aids to facilitate learning essential skills and knowledge. Learning objectives at the beginning of each chapter help students focus on key concepts and principles. Key research terms are highlighted in the margins to reinforce their importance, chapter summaries in the form of concept maps organize the material succinctly, and discussion questions allow students to check their knowledge. Throughout the book, special sections called Consumer Tips emphasize the skills needed to judge studies critically. Additional pedagogical aids include Chapter Road Maps, Using Educational Research, and Author Reflections.

In summary, the following major changes have improved the text:

- Updates of all chapters.
- Mostly new excerpts from published research articles to illustrate concepts and research writing styles.
- New chapter on ethics, ethical principles, and ethical practices of both researchers and consumers.
- All-new examples of full studies.
- New separate chapter on qualitative data collection and analysis procedures.
- Substantial revision of chapters on reviewing literature, mixed methods, and action research.
- More emphasis on questionnaire construction and survey research.
- Greater emphasis on how to conduct research.
- More diagrams and figures to aid student understanding.

SUPPLEMENTS

A full complement of supplements further enhance and strengthen the seventh edition.

Instructor’s Resource Manual

An Instructor’s Resource Manual and Test Bank, including test questions and answers, additional exercises, and activities, is available for download at www.pearsonhighered.com/educator.

Online PowerPoint® Slides

PowerPoint® Slides are also available online to instructors for download on www.pearsonhighered.com/educator. These slides include key concept summaries and other aids to help students understand, organize, and remember core concepts and ideas.
TestGen

TestGen is a powerful test generator available exclusively from Pearson Education publishers. You install TestGen on your personal computer (Windows or Macintosh) and create your own tests for classroom testing and for other specialized delivery options, such as over a local area network or on the web. A test bank, which is also called a Test Item File (TIF), typically contains a large set of test items, organized by chapter and ready for your use in creating a test, based on the associated textbook material. Assessments—including equations, graphs, and scientific notation—may be created for both print and testing online.

The tests can be downloaded in the following formats:
- TestGen Testbank file—PC
- TestGen Testbank file—MAC
- TestGen Testbank—Blackboard 9 TIF
- TestGen Testbank—Blackboard CE/Vista (WebCT) TIF
- Angel Test Bank (zip)
- D2L Test Bank (zip)
- Moodle Test Bank
- Sakai Test Bank (zip)

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I am grateful to the staff at Pearson, especially Carrie Mollette and Lauren Carlson, who have been exemplary in their editing and production of the book.

As this is being written, further ideas are germinating for possible changes in organization and content for the eighth edition. Please write with any suggestions. Your comments will be most helpful.

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To the Student

It was not too long ago that I sat, somewhat nervously, in a university auditorium waiting for my first class in educational research. Perhaps you have had a similar experience. I distinctly remember thinking, given what I had heard about “research,” that I needed to learn only enough to pass the course and would not have to worry about it again! It was another hurdle that I was forced to jump to graduate. I was not bad in mathematics, but my interest was in working with people, not numbers. I certainly never thought that I would someday teach and write about educational research. But something happened to me as I grudgingly struggled through the course. What I discovered was that research is a way of thinking, a tool that I could use to improve the work I do with other people, and use to enhance student learning and motivation. My hope is that this book can instill a similar disposition in you, providing knowledge, skills, and attitudes to improve your life and the welfare of others.

Although learning the content and skills needed to become an intelligent consumer or producer of research is not easy, my experience in teaching hundreds of students is that you will improve yourself, professionally and otherwise, through your efforts. In the beginning, especially as you read published research articles, not everything will make sense. But as your experience in being an informed consumer and researcher increases, so will your understanding.

Good luck and best wishes, and please write to me or e-mail me if you have suggestions for improving the book.

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CHAPTER 1

Introduction to Research in Education

 educational research

Types

Experience and Intuition

Tradition

Experts' Authority

Logic and Reason

Sources of Knowledge

Research

Disciplined Inquiry

Format

Abstract

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Question or Hypothesis

Method

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References

Types

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Explanatory Sequential

Convergent

Mixed Methods

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Basic, Applied, Evaluation, Action

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Systematic

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CHAPTER 1  Introduction to Research in Education

CHAPTER ROAD MAP

We begin our journey by considering different ways knowledge can be identified and constructed, with a special focus on how and why characteristics of systematic inquiry, based on principles for conducting research, compose the foundation for obtaining high-quality studies. We then turn to overviews of qualitative, quantitative, and mixed methods approaches to educational research and designs, followed by presenting formats used for reporting research, with an example of a published article.

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WHY RESEARCH?

This book is about helping you and others lead a richer, more satisfying life. That may seem like a strange beginning for a textbook like this, but I want to stress that there are good reasons for increasing your knowledge of research and the process of scientifically oriented inquiry. It is clear that research in education has made, and will continue to make, important contributions to our understanding of teaching and learning at all levels.

Like other professionals, you need to be able to read and interpret research to keep abreast of contributions to the field to make better decisions. Because the quality
Why Research?

of educational research varies greatly, it is essential that you are able to make informed judgments about the credibility and usefulness of the studies. Because education is a complex, situation-specific endeavor, we must each make these judgments in our own context. A proper, balanced perspective on research will strengthen the judgments we make constantly in educational settings, and, in that way, touch the lives of many.

Furthermore, teachers and administrators are increasingly involved in conducting research in their own classrooms, schools, and districts. They have found that even informal, small-scale studies can provide new knowledge and insights to help improve student learning.

Finally, there is a renewed interest at the national level to use “evidence-based” findings to evaluate programs and policy, and the ubiquitous admonition for “data-driven” decision making. The trend is to use research and evidence based on data, whenever possible, to make decisions about effectiveness and to determine “what works” in schools. In fact, the need for educators to understand and use results from assessments and other measures has intensified. Just think about the difficult issue of using students’ academic progress to evaluate teachers. It is common now to use students’ test scores as indicators of learning and judge teachers on how much students improve or how they compare with the progress of other teachers’ students. A clear understanding of whether the data are reasonable, and the validity of conclusions about effective teaching, depends on knowing what constitutes good data and good data analyses for this purpose. In other areas, there is so much emphasis on “using data” that I am afraid that the sequence illustrated in Figure 1.1, moving from one end to the other, can sometimes result in disastrous conclusions (e.g., firing teachers on the basis of inaccurate low student test scores, or denying graduation on the basis of low scores from a flawed test).

I am confident that after reading, understanding, and conducting research in an informed, intelligent manner, you will enhance your professional and personal life with the following benefits:

- Develop critical thinking and evaluation skills to examine arguments and claims made by others.
- Enable a more complete, more accurate understanding of and evaluation of claims based on data.
- Improve understanding of educational research reports in the media.
- Allow keeping up with recently reported knowledge of best practice.
- Improve decision making.
- Inform educational policy.
- Improve educational practices.
- Foster the ability to ask the right questions.

Author Reflection  Many of my students begin their study of research with hesitation and anxiety about the content. I tell them that’s fine, that my job is to instill a positive attitude about research. Like most of my students (I hope), you may find that you actually like research! I tell my students that if this happens it puts them in a unique, rather special group. I hope you will be a part of this special group as well!
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SOURCES OF KNOWLEDGE

Professional decision making is all about judgments, and judgments are based on knowing. We “know” something when it is accepted as true or valid, when we can be fairly certain of its consequences. For example, good teachers seem to “know” when they are losing their students’ interest and need to change their method of instruction, when students need a strong rebuke or a soft reprimand, and how to phrase questions to elicit engagement from students. How do these teachers obtain or generate such knowledge? How do we come to “know” things? There are several ways, identified here as sources of knowledge (sometimes called epistemologies). Each is important; by examining them, research, as one source of knowledge, can be put in perspective.

Experience and Intuition

It has been said that there is no substitute for experience, whether it is your own or someone else’s. In education, we rightfully depend a great deal on direct experience to know what works. Professionals become effective through practice, and teaching, counseling, and administering are no exceptions to this rule. However, imagine if experience were the only way to obtain knowledge, or if you were confined only to your own experiences and those of friends. Not only would it be difficult to know where to begin, but it would also be difficult to know how to improve and how to handle new demands and situations. When research can be used to stimulate, inform, reinforce, challenge, and question our own experiences, the intuitive professional judgment that is absolutely essential for effective teaching and leadership is enhanced.

There are other limitations to using our personal experiences as sources of knowledge. Much of our knowledge from experience depends on what we have observed and how we have interpreted it. As humans, though, we can—and do—make mistakes in our observations. Sometimes, because we bring our own biases to a situation, we fail to see things that are clearly evident, and we make inaccurate observations and interpretations. Finally, because we are personally involved with our own interpretations, we have a natural inclination to protect our self-esteem and ego, and consequently we may not be totally objective.

Tradition

Many things seem to be done “right” simply because they have always been done that way. Advice, rules, approaches to handling problems, and “right” and “wrong” answers are passed from year to year, from one group to another, as accepted truths. Tradition eliminates the need to search for new knowledge and understanding because we simply accept what has always been done as the best or right way. However, reliance on tradition makes accepting new knowledge difficult and may mitigate your desire to question existing practices. For example, the tradition in American public education of a 180-day school year, with a summer vacation, makes it difficult to change to year-round schooling. Traditions are also often based on myths or prejudices.

Experts’ Authority

People we consider experts or authorities in a particular field are major sources of knowledge. An authority has experience or unique expertise in something and is able to provide insights and understanding that we are unable to see. We depend on such authorities—whether they
Sources of Knowledge

are doctors, lawyers, professors, teachers, or plumbers—particularly in our specialized culture. However, as with personal experience and tradition, authority can also mitigate the accumulation of knowledge. Authorities can be wrong and/or biased, and the public has a tendency to accept as fact what are actually opinions.

In fields such as education, in which practice is heavily influenced by complex interactions among students, environments, and teachers, there is room for experts to disagree about what is known. Perhaps you have read one author who suggests one approach and another who suggests the opposite approach for the same situation or question. A good example is the evidence on the effectiveness of charter schools. In 2014, the year this book was revised, the effect of charter schools on student achievement was much debated. Some studies suggested that charter schools are more effective than traditional schools, but there was also research that showed little differential impact on achievement. Both sides of the argument were made by so-called experts and conducted by high-status centers, universities, and organizations. Furthermore, the sheer number of authorities in education can be confusing. It is best to be able to analyze the suggestions of each authority and to make our own decisions.

Logic and Reason

Sometimes we can be convinced that something is true because a logical argument is made and defended, and sound reasoning is used to reach a conclusion. Logic and reason (rationalism) rely on accurate premises and foundational facts. However, logic and reason are only as good as the facts and premises that are used. There is a well-known saying that applies here to databases and computer programs that analyze data and generate results—“garbage in, garbage out.” Logic and reason are essential in conducting and reporting research, but these operations must be done before and after a careful gathering of facts.

Research

In contrast to experience, intuition, tradition, experts’ authority, and logic and reason, sources of knowledge that are primarily idiosyncratic and influenced heavily by subjective interpretations, research involves a systematic process of gathering, interpreting, and reporting information. Research is disciplined inquiry, characterized by accepted principles to verify that a knowledge claim is reasonable. Defined in this way, research is not simply going to the library, gathering information on a topic, and doing a research paper. Rather, information is gathered directly from individuals, groups, documents, and other sources. Educational research, then, is systematic, disciplined inquiry applied to gathering, analyzing, and reporting information that addresses educational problems and questions. Systematic and disciplined means that there are accepted conventions, rules, and procedures for the way studies are conducted and standards for judging quality.

Here are some of the characteristics of disciplined inquiry:

1. Skepticism about claims—having a healthy, productive distrust of findings
2. Control of personal bias so a researcher’s personal prejudices, beliefs, desires, and attitudes do not result in distorted conclusions
3. Precision to provide detailed, clear definitions, descriptions, understandings, and explanations
4. Parsimony to provide the least complicated explanations
5. Tentative conclusions that are open to change
6. Verification of findings through replication, when possible
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7. Openness to scrutiny by others (the public)
8. Logic, inductive and/or deductive, to provide meaning

In characterizing research, it is useful for you to think about two major fields of study that have contributed important knowledge and insights—social science and humanities. The traditions of social science research are grounded in years of studies in disciplines such as psychology, sociology, economics, political science, and anthropology, all of which conduct research to study society, individuals, and groups. Social science research is empirical in the sense that data of some form are gathered and analyzed. Another tradition of research is humanities oriented. This kind of research, which could also be called analytical, is based on scholarship in disciplines such as linguistics, history, jurisprudence, philosophy, and religion, as well as some subdisciplines, such as cultural anthropology, and critical arts-based and narrative forms of research—all of which are important in making contributions to knowledge, and all of which contain the essential feature of systematic inquiry. In this book, the focus is on social science methods of research, what I will refer to as empirical educational research in this chapter to distinguish it from humanities-oriented research. Note the word science in social science. Science, and methods of research inherent in science, has provided the foundation for principles of research that are used in social science disciplines, including education. That is, principles of educational research are based on scientific inquiry. We need to examine this in some detail to provide a foundation for understanding the nature of educational research we will be discussing in the book.

THE NATURE OF SCIENTIFIC INQUIRY

We expect scientists to use the scientific approach. It is easy to understand the usefulness of this approach in fields such as agriculture, medicine, engineering, biology, and the like, but is education a science? Without debating this question (although my answer is “no”), the important point is that the scientific approach is a logical method of inquiry, not a body of knowledge. It is not just for science fields of study or for laboratory situations, or limited to men and women in white coats developing complex theories. The point is that we can study education and conduct research in education in a scientific manner, using many different methods and designs, even though education itself is not a science.

Purpose

The primary purpose of scientific inquiry is to explain natural phenomena, understand the underlying relationships, and then, using this information, to predict and influence behavior. For example, we can use scientific inquiry to explain why some teachers appear to be more effective than others. The explanation leads to a knowledge base that novice teachers can use to become more effective.

Description provides fundamental knowledge about a phenomenon and is usually necessary before pursuing explanation and prediction. Accurate descriptions, often based on data from observations and interviews, are essential to understanding explanations of events or people. For example, accurate descriptions of various teaching styles and student achievement are needed before the relationship between these two phenomena can be studied. Once these phenomena are adequately described, one may be predicted by knowledge of the other. This predictive power is very important because educators must constantly make predictive-type decisions (e.g., put Johnny in group A because he will do
The Nature of Scientific Inquiry

better with the children in that group; admit a select group of students for a special program because they will benefit most; use cooperative teaching techniques because they will keep the students interested longer; advise a student against a particular occupation because the student will have difficulty passing the certification examination). Sometimes, after describing phenomena, scientists control one factor to study its effect on the other. By controlling factors in experiments (discussed in detail in Chapter 9), researchers can determine whether one factor influences another (experiments are not the only way, though, to study the influence of one factor on another).

The idea that education can be studied “scientifically” has been strongly influenced by federal policy. Three significant developments include (1) the formation of the Institute of Education Sciences (IES) to provide leadership in expanding scientific knowledge and understanding of education; (2) formation of the What Works Clearinghouse to review studies for scientific rigor; and (3) publication of Scientific Research in Education (Shavelson & Towne, 2002). These influences have created unprecedented emphasis on the need for educational research to be “scientific” and policy and practice to be “evidence based.” This emphasis has focused educational researchers on what is meant by “scientific.” Thus, the principles of scientific inquiry provide the foundation for conducting studies, regardless of the specific type of research or methodology used to collect and analyze data. These principles are used in analyzing educational problems, making decisions, and designing, conducting, reporting, and evaluating all types of studies.

**Principles**

Scientific inquiry, including educational research, is guided by six principles (Shavelson & Towne, 2002). Although these principles are targeted to researchers, not consumers of research, they provide a set of guidelines that can be used to judge the quality and contribution of research. In concert with some additional characteristics, these principles essentially constitute a set of norms that both researchers and consumers of research can use to judge the overall quality and credibility of studies. The principles apply to all types of empirical educational research.

**Scientific Principle 1: Pose Significant Questions That Can Be Investigated Empirically**

This principle emphasizes two elements: (1) the need to identify important research questions that will have significant benefits for practice or the knowledge base once answered; and (2) the need for an “empirical” approach. An empirical study is one that gathers evidence (data) that is based on observation, measurement, or experience that can be replicated by others. It is based on concrete evidence—what is seen, heard, or touched, using direct contact with what is being studied. Think of empirical as the opposite of theoretical. Traditionally, the goal is to minimize the influence of subjectivity and bias so there is little impact of a researcher’s personal viewpoint, desires, or speculations (as we will see, this is not best for some types of educational research).

**Scientific Principle 2: Link Research to Relevant Theory**

In scientific research, generation and testing of theories are important for establishing a body of knowledge that will generalize widely. A theory can be defined as a set of propositions that explain the relationships among observed phenomena. Such general explanations of behavior can be used in many contexts and have more utility for a large number of people. For example, research on effective teaching has identified general teaching behaviors—such as close supervision, providing meaningful and timely feedback to students on their performance, and asking appropriate questions that keep students
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engaged—that are positively related to student achievement for most, if not all, teachers. It doesn’t matter if the teacher has a fourth-grade class or a high school class, teaches French or science, or has honors or remedial students. The power of a theory to establish principles is what will advance our knowledge of effective teaching and educational interventions.

**Scientific Principle 3: Use Methods That Permit Direct Investigation of the Question**

An important principle in conducting empirical educational research is that the method used in the study should be the best one for the research question. No single method always provides the best answers. Rather, start with the question and then match the method to the question. Method is also influenced by the situation in which the research is conducted and by access to information. For example, whereas experiments are often thought to be the best method for determining whether an educational intervention is successful, it is difficult to design such studies in schools. Scientific claims are strengthened when multiple methods are used.

**Scientific Principle 4: Provide a Coherent, Explicit, and Evidence-Based Chain of Reasoning**

Making scientific inferences, explanations, and conclusions requires a logical chain of reasoning that is coherent and persuasive. This occurs when there is a clear alignment between all aspects of the research, from the research question and pertinent literature to methods, findings, and conclusions. Reasoning is strengthened when researchers identify limitations, uncertainty, possible bias, and errors.

**Scientific Principle 5: Replicate and Generalize Across Studies**

Findings from a study must be checked and validated, and subsequent studies must determine whether results generalize to a broader population and to other contexts (as we will see, though, some types of research do not “generalize” in the traditional sense).

**Scientific Principle 6: Disclose Research to Encourage Professional Scrutiny, Critique, and Peer Review**

A hallmark of scientific inquiry is that studies are widely disseminated and subjected to review by peers. This public, professional critique is needed for the overall credibility of the findings to be validated.

It is useful to add a few more principles to these six. In 2008, the American Educational Research Association (AERA) convened an “expert working group” to formulate a definition of “scientifically based research.” This definition was written to clarify fundamental principles of empirical research in the field of education, from the perspective of AERA. This is what AERA devised (retrieved March 23, 2014, from aera.net/):

The term *principles of scientific research* means the use of rigorous, systematic, and objective methodologies to obtain reliable and valid knowledge. Specifically, such research requires:

A. development of a logical, evidence-based chain of reasoning;
B. methods appropriate to the questions posed;
C. observational or experimental designs and instruments that provide reliable and generalizable findings;
D. data and analysis adequate to support findings;
E. explication of procedures and results clearly and in detail, including specification of the population to which the findings can be generalized;
Applying Systematic Inquiry to Educational Research

The purpose of research is to provide sound understanding and explanations that can become knowledge. The primary mode of inquiry employs a systematic series of steps to conduct the investigation. These steps are associated with questions that help us judge the quality of the research and, hence, the credibility of the results. The researcher’s goal is to obtain credible answers to research questions by designing, conducting, and reporting data that others will view as trustworthy—that is, as reasonable results that make sense.

In its most simple form, research involves four steps:

**Question**  
**Method**  
**Results**  
**Conclusions**

At the start is a question that needs to be answered; then there is some method of gathering and analyzing information. Based on the analysis and results, the researcher presents conclusions. For example, suppose you are interested in whether grading practices affect student motivation. The study could involve the four steps in the following manner:

<table>
<thead>
<tr>
<th>Question</th>
<th>Method</th>
<th>Results</th>
<th>Conclusions</th>
</tr>
</thead>
<tbody>
<tr>
<td>What is the effect of grading practices on student motivation?</td>
<td>Teacher and student surveys</td>
<td>More frequent student grades, greater student motivation</td>
<td>Training teachers to grade more frequently may increase student motivation.</td>
</tr>
</tbody>
</table>

Once the question is established, a method is selected. This involves identifying who will provide data, the instruments used to collect data, and procedures for gathering data and/or administering interventions. Results are determined by some kind of data analysis. Based on these results, the method, and previous studies, conclusions are drawn from interpretations of the results. This forms an expanded version of the four steps to show that choice of method and data analyses can affect the conclusions (see Figure 1.2). That is, depending on the nature of the individuals who are studied, how data are collected, and the procedures, different conclusions can be reached for the same question. Thus, in the preceding example, how motivation is measured could make a big difference (e.g., Is motivation based on student self-efficacy or level of interest, or both?). The conclusion is also limited to the nature of the sample (e.g., fourth- and fifth-graders).

The expanded number of steps in Figure 1.2 shows how researchers actually go about planning and then conducting research. Each step in the process is important and contributes to the overall credibility and usefulness of the research. This book is organized around these steps and questions to provide you with the knowledge and skills you will
need to make sound overall judgments about the credibility and usefulness of various studies. I will elaborate on the steps and questions introduced here in later chapters, but it is helpful for you to understand the nature of the entire process from the beginning.

In the first step, the investigator faces an obstacle to effective decision making or understanding, or identifies a general idea or question that warrants further thought. This establishes the purpose of the study. The next step, reviewing previous research on the topic, involves finding relevant research, analyzing it, and relating it to the purpose. Next, the researcher may formulate a specific research question or even a hypothesis (an informed guess about the answer to the research question). The nature of the question depends on the type of research. As we will see, some research has very specific research questions, whereas other types have more general questions.

The design of the study is based on what will provide an adequate answer to the question. It includes participants, data collection, procedures, and, in experiments, interventions. A carefully designed study is structured so that the explanation provided is the most credible one. The credibility of the results builds on previous aspects of the study, focusing on the reasonableness of the results in light of previous research and the extent to which alternative explanations are eliminated. The evaluation of the conclusions, in turn, also builds on previous credible judgments. Finally, judgments are made on the generalizability or transferability of the research—that is, whether the findings and explanations are useful in other situations and with other people, times, procedures, and measures. In other words, can the conclusions be generalized to other people in other contexts? This is an important concern for educational research because educators are interested in applying the results to particular groups and circumstances.

Both the National Research Council and AERA emphasize the importance of a chain of reasoning as essential to scientific inquiry. This principle is illustrated in Figure 1.3, which shows that each step of scientific inquiry is connected to others. A “chain” with “links” is established, with a weakness in any link sufficient to break the soundness of the study. Keep this illustration in mind—all steps in research are important, and when a strong and reasonable chain is established, the credibility and usefulness of the conclusions are enhanced.

**Review and Reflect** What are the major tenets of scientific inquiry? What are the key components of how educational research is defined? What are the advantages of gathering knowledge using research compared to other ways of knowing? Think about how your understanding of effective education has been developed. Where does research fit with other ways of knowing?
TYPES OF EDUCATIONAL RESEARCH

Although all empirical educational research is characterized by systematic inquiry, three different types of educational research are typically used—quantitative, qualitative, and mixed methods. Each of these types consists of approaches, traditions, or paradigms about research that involve important distinctions along a number of dimensions, each with its own terminology, methods, assumptions, values, and techniques.

For many decades, most educational research was based on the *quantitative* tradition. This tradition assumes that phenomena should be studied objectively with the goal of obtaining a single truth, or at least reality within known probabilities, with an emphasis on measurement, numerical data, and experiments. It is grounded in a postpositivist view of the world (beliefs that guide actions)—the idea that there is an “objective” reality. Until the mid-1980s, the vast majority of studies in education were quantitative in nature, established largely on principles of conducting psychological research (which used the scientific method).

*Qualitative* research stresses multiple realities that are rooted in participants’ views and perceptions. A focus on understanding and meaning is based on social interactions, verbal narratives, and observations, rather than numbers. Qualitative research often takes place in naturally occurring situations. It is based on an interpretive, constructivist, or transformative worldview. These epistemologies stress the importance of gaining a deep understanding of context, culture, and participant interactions with others to adequately study a phenomenon. Sometimes the context involves politics, political change, and oppression or marginalized groups with researchers addressing a social reform agenda (transformative).

More recently, researchers have combined quantitative and qualitative approaches, resulting in a third major type of research called *mixed methods*. These studies contain
elements from both quantitative and qualitative traditions in an effort to better match research questions with appropriate methodology, and to use different methods to confirm and better understand more limited information that is gathered solely by either of the two major approaches (see Figure 1.4). This approach is based primarily on a pragmatic epistemology, in which what is most appropriate for research is what works best and provides the best answers and intended consequences, using some degree of both qualitative and quantitative methods.

Table 1.1 summarizes the major features of quantitative, qualitative, and mixed methods traditions. Note the different terms that are used to refer to qualitative research. In the next section I introduce different types of quantitative, qualitative, and mixed methods research designs. Research design refers to the plan for carrying out a study. These designs are summarized here and then covered in greater detail in later chapters.

**Quantitative Research Designs**

For quantitative research, a major distinction is made between nonexperimental and experimental designs. In nonexperimental research, the investigator has no direct influence on changing what has been selected to be studied, either because it has already occurred or because it cannot be influenced. In other words, the investigator is unable to “manipulate” or control any factors or phenomena, such as an intervention or “treatment,” that may influence the participant’s (subject’s) behavior or performance. This characteristic has important implications for the conclusions that are drawn. It usually means that the study can only describe something or uncover relationships between two or more factors.

Nonexperimental quantitative studies can be classified as descriptive, comparative, correlational, causal-comparative, or ex post facto. Descriptive research includes studies that provide simple information about the frequency or amount of something (e.g., How do high school counselors spend their time during the school day?). Comparative studies examine the differences between groups on a variable of interest (e.g., What is the difference between...
<table>
<thead>
<tr>
<th>Other terms or phrases associated with the approach</th>
<th>Quantitative</th>
<th>Qualitative</th>
<th>Mixed Methods</th>
</tr>
</thead>
<tbody>
<tr>
<td>Postpositivist</td>
<td>Naturalistic</td>
<td>Mixed</td>
<td></td>
</tr>
<tr>
<td>Experimental</td>
<td>Field research</td>
<td>Multimethodology</td>
<td></td>
</tr>
<tr>
<td>Hard data</td>
<td>Ethnographic</td>
<td>Multiple methods</td>
<td></td>
</tr>
<tr>
<td>Statistical</td>
<td>Phenomenological</td>
<td>Multitrait</td>
<td></td>
</tr>
<tr>
<td></td>
<td>Anthropological</td>
<td>Mixed approach</td>
<td></td>
</tr>
<tr>
<td></td>
<td>Ecological</td>
<td>Combined</td>
<td></td>
</tr>
<tr>
<td></td>
<td>Case study</td>
<td>Blended</td>
<td></td>
</tr>
<tr>
<td></td>
<td>Interpretive</td>
<td>Integrative</td>
<td></td>
</tr>
<tr>
<td></td>
<td>Constructivist</td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

<table>
<thead>
<tr>
<th>Key concepts</th>
<th>Variable</th>
<th>Operationalized</th>
<th>Controlled</th>
<th>Statistically significant</th>
<th>Replicated</th>
<th>Hypothesized</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>Shared meaning</td>
<td>Understanding</td>
<td>Social construction</td>
<td>Context</td>
<td>Participant perspectives</td>
<td></td>
</tr>
<tr>
<td></td>
<td>Both shared meaning and controlled measurement</td>
<td>Collection of both quantitative and qualitative data</td>
<td>Both statistical and narrative analyses</td>
<td></td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

<table>
<thead>
<tr>
<th>Academic affiliation</th>
<th>Agriculture</th>
<th>Psychology</th>
<th>Basic sciences</th>
<th>Economics</th>
<th>Anthropology</th>
<th>History</th>
<th>Sociology</th>
<th>All areas</th>
</tr>
</thead>
</table>

<table>
<thead>
<tr>
<th>Goals</th>
<th>Test theory</th>
<th>Show relationships</th>
<th>Predict</th>
<th>Statistically describe</th>
<th>Develop understanding</th>
<th>Describe multiple realities</th>
<th>Capture naturally occurring behavior</th>
<th>Discover</th>
<th>Use various methods, as appropriate, to both document and understand relationships and phenomena</th>
</tr>
</thead>
</table>

<table>
<thead>
<tr>
<th>Design</th>
<th>Structured</th>
<th>Predetermined</th>
<th>Specific</th>
<th>Contrived</th>
<th>Experimental</th>
<th>Emergent</th>
<th>Evolving</th>
<th>Flexible</th>
<th>Natural</th>
<th>Holistic</th>
<th>Varied, could be either predetermined or emergent</th>
<th>Both structured and flexible</th>
</tr>
</thead>
</table>

<table>
<thead>
<tr>
<th>Sample</th>
<th>Large</th>
<th>Randomized</th>
<th>Small</th>
<th>Purposeful</th>
<th>Varied, could be both randomized and purposeful</th>
<th></th>
</tr>
</thead>
</table>

<table>
<thead>
<tr>
<th>Data</th>
<th>One or few sources</th>
<th>Measures/instruments</th>
<th>Numbers</th>
<th>Statistics</th>
<th>Surveys</th>
<th>Structured interviews and observations</th>
<th>Multiple sources</th>
<th>Narrative descriptions</th>
<th>Field notes</th>
<th>Observations</th>
<th>Documents and artifacts</th>
<th>Photographs</th>
<th>Interviews</th>
<th>Both numbers/statistics and narrative descriptions from field notes, interviews, and/or observations</th>
</tr>
</thead>
</table>

<table>
<thead>
<tr>
<th>Role of researcher</th>
<th>Distant</th>
<th>Short-term</th>
<th>Detached</th>
<th>Uninvolved</th>
<th>Close</th>
<th>Involved</th>
<th>Trusting</th>
<th>Evolving</th>
<th>Flexible</th>
<th>Both involved and detached</th>
<th>Both inductive and deductive</th>
</tr>
</thead>
</table>

<table>
<thead>
<tr>
<th>Data analysis</th>
<th>Deductive</th>
<th>Statistical</th>
<th>Interpretive</th>
<th>Inductive</th>
<th>Text analysis</th>
<th>Search for themes</th>
<th>Text analysis</th>
<th>Both inductive and deductive</th>
<th>Statistical and narrative</th>
<th></th>
<th></th>
</tr>
</thead>
</table>
male and female self-efficacy scores? Do mathematics teachers have the same or different definitions of critical thinking as English teachers?). Correlational studies investigate relationships among two or more variables (e.g., What is the relationship between physical conditioning and academic achievement? Is there a correlation between creativity and aptitude?).

Causal-comparative research examines whether a naturally occurring “intervention” (one that is not controlled by the experimenter) affects an outcome of interest, such as student performance. Ex post facto studies identify interventions that occurred in the past and subsequent responses in such a way that it may be possible to draw causal relationships between them (e.g., Do students who took typing in seventh grade have more positive attitudes in high school than students who did not take typing?).

In experimental research, the investigators have control over one or more interventions in the study that may influence the participants’ behavior. That is, they can manipulate an intervention, such as a program or instructional technique, and then see what happens to the participants’ responses as a result. The purpose of controlling a factor is to investigate its causal relationship with another factor. For example, investigators may be interested in studying the causal relationship between the amount of time devoted to teaching a given subject, such as math, and student achievement. They control time by having one group of children spend 20 minutes studying the subject and a second group spend an hour studying. If the children who spend more time studying math show higher achievement than the other children, then time devoted to studying may be causally related to achievement. As we will see, the determination of what actually or probably causes an observed difference depends on many factors.

There are several types of experimental research, depending on specific design characteristics. A true experimental design is one in which participants have been randomly assigned to different groups. A quasi-experimental design does not have random assignment. Single-subject designs use the ideas of an experiment with a single person or a few individuals.

Qualitative Research Designs

Unlike quantitative research, different types of qualitative research are not as clearly distinguished by design characteristics. However, different purposes are identified with specific questions, data collection procedures, and analyses. The goal in a phenomenological study is to fully understand the essence of some phenomenon (e.g., What is essential for students to view teachers as caring?). This is usually accomplished with long, intensive individual interviews. An ethnography is a description and interpretation of a cultural or social group system (e.g., What is the effect of high-stakes testing on the climate of the school? How has high-stakes testing influenced teacher–principal interaction?). Ethnographers spend extensive time in the setting being studied and use observations, interviews, and other analyses to understand the nature of the culture. Grounded theory studies are conducted to generate or discover a theory or schema that relates to a particular environment (e.g., How do students with learning disabilities adapt to being in regular classrooms?). As in an ethnographic study, many different modes of gathering information are used. Case studies concern in-depth study of a single or a few programs, events, activities, groups, or other entities defined in terms of time and place (e.g., examining the culture of a particular magnet school). Again, multiple methods of data collection are used, including observations, interviews, and analyses of documents and reports. In critical studies, the focus is on marginalized people, with investigations of injustice and inequity. Narrative inquiries use “lived stories” of individuals and groups to provide a deep understanding of a phenomenon.

Mixed Methods Research Designs

The third major type of research, mixed methods, is increasingly popular. As illustrated in Figure 1.4, mixed methods studies use some amount of design characteristics from both
Types of Educational Research

qualitative and quantitative approaches in a single study or series of studies. There are many advantages of mixed methods designs, which are detailed in Chapter 13. Briefly, mixed methods designs allow one approach to strengthen other, address weaknesses that exist in each approach if used by itself, and allow convergence to show how two approaches address the same question. There are three major mixed methods designs—explanatory sequential, exploratory sequential, and convergent—and the relative emphasis given to any particular method (quantitative or qualitative) can vary within each of these designs. The sequential designs start with either a quantitative or qualitative phase and then employ the other approach. If quantitative methods are used first, qualitative methods are then employed to explain the quantitative results that were obtained (this is called an explanatory sequential design). An exploratory sequential study begins with qualitative methods that are used to gather information that is then used for the subsequent quantitative phase. Convergent designs emphasize both quantitative and qualitative approaches about equally and use results from both to address the research question.

Keeping these categories and examples in mind will help you understand important design characteristics of research. Use the decision tree in Figure 1.5 to identify different types of educational research and related research designs. As you read studies and learn more about each one in later chapters, you will be able to identify them quickly, which is very important in understanding and analyzing what is presented.

FIGURE 1.5
A Decision Tree of Types of Educational Research and Research Designs
CHAPTER 1  Introduction to Research in Education

Author Reflection  Over the past two decades I have conducted many quantitative and qualitative studies, and a few mixed methods ones. What have I learned about these methods as a result of these experiences? First, it is critical to match the reason for the research with the appropriate method. Method should always be determined by the purpose and the research question. Second, using each method well is a challenge. Either can be used without appropriate rigor, which diminishes the usefulness of findings. This is especially true for mixed methods, in which there is a tendency to use one approach casually. Third, on balance, it seems that my qualitative studies have had more impact. I think this shows the importance of depth of understanding, regardless of the design. It is really important to engage in your topic with sufficient depth.

Basic, Applied, Action, and Evaluation Research

Another way to think about different types of research is based on the overall purpose for which the results will be used, rather than the specific design employed. I have identified four major types of use for research that can be targeted: basic, applied, evaluation, or action. These terms, as with the ones already discussed, are used frequently to describe studies (e.g., “I’m going to do an action research study.”). Each of these uses whatever designs are most appropriate. That is, a basic study could use quantitative, qualitative, or mixed methods.

The primary purpose of basic research (also called pure or fundamental research) is to use results for the development of theories. The goal of basic research is to understand and explain—to provide broad generalizations about how phenomena are related. It is not concerned with immediate application of the results to practical situations. Examples include studies of the workings of the memory system, language development, and social development. Not many educational studies would be classified as basic, although those that are can provide very important contributions because the findings, compared with applied, evaluation, or action types, lead to more enduring principles. Basic research in allied fields of study, such as psychology, are used extensively in education.

The purpose of applied research is to use results to test theories and other ideas in the context of naturally occurring educational settings. It is usually focused on a problem that needs to be solved to improve the practice of education. The results are immediately and directly relevant to educational decision making. To the extent that general theories are tested, the results may be generalized to many different educational settings. For example, based on theories of human memory developed through basic research, a new curriculum may be tested for improved retention of science concepts. Other examples of applied research in education are studies that compare different teaching styles, identify characteristics of effective schools, or examine the effect of lengthening the school day on student achievement.

The goal of action research is to solve a specific classroom or school problem or issue, improve practice, or help make a decision at a single local site. The intent is to improve practice immediately within one or a few classrooms or schools. Teachers may act as researchers in action studies they have designed and carried out to improve practice in their classrooms. Administrators have used action research strategies for school renewal and other improvement efforts. Those engaged in action research find both the process and results very helpful—so helpful, in fact, that I have included an entire chapter (Chapter 14) to explain in more detail how to do it, report it, and use it.

Evaluation research is directed toward making decisions about the effectiveness or desirability of a program. The goal is to make judgments about alternatives in decision-making situations. In most cases, evaluation research is focused on a specific location or type of program
and involves judgments about such questions as: Which reading curriculum should be implemented? Did the new program work? Should the district build two small schools or one large school? What is the impact of increased technology on student and teacher knowledge and attitudes? Often, such questions require research methods that are unique to each situation.

A summary of the major types of educational research, with additional examples, is provided in Table 1.2.

### Table 1.2

<table>
<thead>
<tr>
<th>Type</th>
<th>Purpose</th>
<th>Example</th>
</tr>
</thead>
<tbody>
<tr>
<td>Quantitative</td>
<td>To describe phenomena numerically to answer specific questions or hypotheses.</td>
<td>Examine the relationship between amount of homework and student achievement.</td>
</tr>
<tr>
<td>Nonexperimental</td>
<td>To describe, compare, and predict phenomena without actively manipulating factors that influence the phenomena.</td>
<td>Determine the relationship between socio-economic status and student attitudes.</td>
</tr>
<tr>
<td>Experimental</td>
<td>To determine the causal relationship between two or more phenomena by direct manipulation of factors that influence the phenomena.</td>
<td>Determine which of two approaches to teaching science results in the highest student achievement.</td>
</tr>
<tr>
<td>Qualitative</td>
<td>To provide rich narrative descriptions of phenomena that enhance understanding.</td>
<td>Observe school renewal teams to understand the role of parents.</td>
</tr>
<tr>
<td>Mixed methods</td>
<td>To study phenomena using both quantitative and qualitative methods.</td>
<td>From a randomly selected sample of at-risk students, use surveys and then interviews to know about and understand their attitudes.</td>
</tr>
<tr>
<td>Applied</td>
<td>To solve practical educational problems.</td>
<td>Determine the best approach to develop students' self-assessment skills.</td>
</tr>
<tr>
<td>Action</td>
<td>To improve practice in a school or classroom.</td>
<td>Determine which grouping procedure results in the highest achievement.</td>
</tr>
<tr>
<td>Evaluation</td>
<td>To make a decision about a program or activity.</td>
<td>Decide whether to keep or phase out a prekindergarten program.</td>
</tr>
</tbody>
</table>

*Note that some traits overlap among different types of research. For example, qualitative studies may contain numerical summaries of information.

### RESEARCH ARTICLE FORMAT

Every year, millions of dollars are spent on educational research and millions more on related research in psychology, sociology, and other social sciences, and every year hundreds of articles and reports are published. One of the primary objectives of this book is to help you become an informed, critical reader of these articles and reports. A research article or report sets forth the research problem, what the researcher has done to collect data, how the data are analyzed and interpreted, and the conclusions. In other words, the article or report is a summary of what was done, how it was done, why it was done, and what was discovered. Most published articles, as well as research reports that are not articles, follow a standard format or organizational structure, as summarized in Figure 1.6, which shows differences between quantitative and qualitative formats (mixed methods use variations of these). These parts are discussed briefly and are then identified in a
CHAPTER 1  Introduction to Research in Education

FIGURE 1.6
Quantitative and Qualitative Research Article Formats (Based on Creswell, 2013)

<table>
<thead>
<tr>
<th>Quantitative</th>
<th>Qualitative</th>
</tr>
</thead>
<tbody>
<tr>
<td>Title and Author(s)</td>
<td>May include general problem statement</td>
</tr>
<tr>
<td>Abstract</td>
<td>Brief or extensive</td>
</tr>
<tr>
<td>Introduction</td>
<td>May include general problem statement</td>
</tr>
<tr>
<td>Review of Literature</td>
<td>General Foreshadowed question</td>
</tr>
<tr>
<td>Research Problem Statement or Question</td>
<td>Specific, narrow questions Research hypotheses</td>
</tr>
<tr>
<td>Method and Design</td>
<td>Participants Setting/sites Procedures</td>
</tr>
<tr>
<td>Results</td>
<td>Narrative Descriptive</td>
</tr>
<tr>
<td>Discussion</td>
<td>*</td>
</tr>
<tr>
<td>Conclusions</td>
<td>*</td>
</tr>
<tr>
<td>References</td>
<td>*</td>
</tr>
</tbody>
</table>

published article, but please note that these parts, and what they are called in headings, can and do vary for different journals and articles.

**Title and Author(s)**
The empirical research article report typically begins with the title and name(s) of the author(s), usually with an indication of the professional affiliation of the author(s). This is each author’s affiliation when the research was conducted, not necessarily his or her present affiliation. Good research article or report titles tell the reader, in less than 15 words, something about the major variables and type of participants that are studied.

**Abstract**
In many reports, especially journal articles, the title and author are followed by an abstract. The abstract in journal articles is typically 50 to 150 words long and is often set in smaller
type than or a different font from the rest of the article. The abstract is a brief summary of the entire study, including the problem, methods used, and major findings. The abstract will usually provide enough details to allow the reader to decide whether to read the entire report.

**Introduction**

The introductory section is usually one to several paragraphs in length, including a statement of the context for the research, the significance of the research, and the general or specific research problem investigated. The context provides background information relating the study to broader areas. It also indicates briefly the development of the research problem. The significance of the research is contained in a statement about how the results will be useful. It can be thought of as a justification for conducting the research, indicating a contribution to knowledge in a discipline and/or professional practice. Almost all introductions include a statement that indicates the general research problem or purpose of the study (sometimes both a broad and a more specific problem are included). The general problem indicates the focus of the study as concisely and clearly as possible. Most general problems are stated near the beginning of the report, and more specific research questions, if any, just before the review of literature, but the level of specificity or location across articles and reports is inconsistent. In qualitative and some mixed method articles, you will find a foreshadowed problem rather than specific questions.

**Review of Literature**

Although the introductory section may include some references to other research or literature, a more formal review of literature begins after the general research problem is introduced. The review, typically several paragraphs long, summarizes and analyzes previous research on the same problem. A good review critiques the studies and shows how the findings relate to the problem being investigated. The length and complexity of the review can vary considerably, from very detailed in quantitative studies to relatively brief in some qualitative and mixed method studies.

**Specific Research Question or Hypothesis**

Often (but not always) in quantitative and mixed methods studies, specific research questions or hypotheses are stated just before the methodology. The hypothesis, if there is one, follows the review of literature because it is based on what theories and previously completed related studies have found.

**Method and Design**

In this section, the researchers indicate who or what was studied, how the information was obtained, and, in the case of an experiment, interventions. The first part of the section usually describes the source of data, usually *participants* or *sample* (although sometimes the older term “subjects” is used in quantitative studies), and how these individuals were selected. Participants are individuals from whom the researcher obtains information to address the research problem. The report describes the characteristics of the participants or sample. The second part focuses on the methods used to gather information.
CHAPTER 1  Introduction to Research in Education

from the participants, including descriptions of the measures or instruments and an evaluation of their reliability and validity. In some reports, this section also describes how an instrument was administered; in others, this information is provided in the third part of the section, procedures. The procedures section also includes a summary of how the data were collected and, in experimental studies, indicates how the interventions were carried out. The researchers may also discuss the design of the study and materials used, and they may indicate what precautions were taken to reduce bias or otherwise improve objectivity.

Results (Findings)
In this section, the researchers describe how they analyzed the data, and they present the results. Tables and graphs may be used to summarize large amounts of data succinctly. This section should, in my opinion, be restricted to a reporting of what was found, without interpretation or discussion.

Discussion
This is the section in which the investigators explain their results. The data are interpreted in light of other research and possible weaknesses in the methodology of the study.

Conclusions
Conclusions are summary statements that reflect the overall answers to the research questions or whether or not the research hypotheses are supported. The conclusion is an inference derived from the results, weaknesses in the study, and the relationship of the results to previous studies. Conclusions should be limited to what is directly supported by the findings and what is reasonable, given other research. Implications and recommendations are often included in this section, although investigators should be careful not to overgeneralize.

References
This is a listing of the sources cited in the report. The style of listing references will vary, the most common being American Psychological Association (APA) style. A bibliography includes sources that are not cited in the report but are used by the authors.

ANATOMY OF A RESEARCH ARTICLE

The best way to become familiar with empirical educational research is to read published articles. Becoming comfortable with the format and language will allow you to critique and evaluate research and help you design good studies. Don’t be too concerned about understanding everything you read. You are not expected to be an expert researcher or statistician. If you do not read the studies, though, you will not become an intelligent consumer or producer.

Figure 1.7 is an example of a quantitative research article. It illustrates the format you will find and points out other features of an empirical research article.
**FIGURE 1.7**

Format and Features of a Research Article

| Perceptual & Motor Skills: Motor Skills & Ergonomics |
| RELATIONSHIP BETWEEN PERCEIVED AND ACTUAL MOTOR COMPETENCE AMONG COLLEGE STUDENTS |
| JIANYU WANG |
| California State University, Bakersfield |
| WENHAO LIU AND WEI BIAN |
| Slippery Rock University |

**Summary.** —The relationship between perceived and actual motor competence was examined among college students. Participants were 114 college students (55 men, 59 women; $M_{age} = 22.3\, yr., SD = 3.9$). All participants completed a short survey on perception of motor competence in basketball and took a Control Basketball Dribble Test to assess their actual motor skill. Perceived motor competence in basketball was significantly related to basketball dribbling performance. Given the positive relationship between actual motor competence and perceived competence, enhancing an individual’s actual motor competence may contribute to their perceived competence, which may improve an individual’s physical activity participation.

According to Harter (1978, 1981), perceived competence plays a central role in intrinsic motivation. The model proposed by Harter is viewed as multidimensional or having specific domains (i.e., cognitive, physical, and social). In the model, actual competence is a correlate of motivation; however, it has less direct effect on motivation than perceived competence, and the role of actual competence is mainly a precursor to perceived competence. Harter suggested that people, especially children, will gravitate to activities or tasks in which they perceive themselves competent and avoid activities or tasks where a sense of accomplishment is not presented (Harter, 1978, 1981).

Other scientists have proposed different frameworks to explain the factors related to motivational processes (e.g., Deci & Ryan, 1985; Bandura, 1997). In their Self-Determination Theory, Deci and Ryan (1985) suggest that there are three fundamental human innate needs: autonomy, competence, and relatedness. An individual’s motivation is affected by the needs that they experience. The need for competence is a facilitator of intrinsic motivation. The more competent individuals perceive themselves in an activity, the more intrinsically motivated they will be in that activity.

Perceived competence has been widely used to explain individuals’ behaviors in sport and physical activity settings (e.g., Ulrich, 1987; Weigang & Broadhurst, 1998; Wang, Liu, Lochbaum, & Stevenson, 2009). A number of studies have examined the relationships between perceived competence and participation in sport and/or physical activity among children and adolescents (e.g., Paxton, Estabrook, & Dzewaltowski, 2004; Barnett, Morgan, Beurden, & Beard, 2008; Sollerhed, Apitzsch, Råstam, & Ejlertsson, 2008). Researchers have indicated that perceived competence is as an important correlate of physical activity (e.g., Sallis, Prochaska, & Taylor, 2000) and is positively and significantly associated with physical activity among children and adolescents (e.g., Paxton, et al., 2004; Sollerhed, et al., 2008).

While researchers continually study effects of perceived competence on physical activity, some scholars have examined the relationship between perceived competence and actual motor competence (Hopper, Guthrie, & Kelly, 1991; Rudisill, Mahar, & Meaney, 1993; Yoo, 1999; Raudsepp & Liblik, 2002; Castelli, Woods, Nordmeyer, Valley, Graber, Erwin, et al., 2007; LeGear,).

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1 Address correspondence to Jianyu Wang, Ph.D., Department of Physical Education and Kinesiology, California State University, Bakersfield, 9001 Stockdale Highway, Bakersfield, CA 93311-1099 or e-mail (jwang4@csub.edu).
Perceived basketball competence will be moderately correlated with actual basketball skill. In their study, LeGear and colleagues (2012) used the Pictorial Scale of Perceived Competence and Social Acceptance for Young Children and the Test of Gross Motor Development including six locomotor skills and six object control skills to measure children’s perceived and actual motor competence. They found that actual motor competence was significantly associated with perceived motor competence ($r = .26$). Raudsepp and Liblik (2002) used the Children’s Physical Self-Perception Profile as a measure of perceived competence and the EUROFIT test battery, which includes a 20-meter endurance shuttle run, 30-seconds of sit-ups, and five-area skinfold measure to assess actual motor competence. They found that perceived and actual motor competence were moderately correlated in children ($r = .25–.56$). Additionally, Castelli, et al. (2007) examined the relationship between perceived and actual motor competence in children using the Perceived Competence Scales and three motor performances in basketball, throwing, and paddle activity. They reported that perceived motor competence was significantly related to throwing ($r = .57$) and paddle activity ($r = .8$), but not to basketball ($r = .24$). Moreover, research evidence has indicated significant correlations between perceived competence in soccer and soccer skill test scores (e.g., dribbling and juggling) among youth soccer players (Hopper, et al., 1991).

In a longitudinal study Barnett, et al. (2008) investigated the interrelationships among motor proficiency in childhood and perceived sports competence and physical activity in adolescence. The researchers found that object control skill proficiency (i.e., catch, overhand throw, forehead strike) in childhood was positively associated with perceived sports competence ($r = .34$) and physical activity ($r = .36$) in adolescence, whereas locomotor skill proficiency (i.e., hop, skip, gallop) in childhood was not associated with perceived sports competence ($r = .12$) or physical activity ($r = -.08$) in adolescence. They also concluded that perceived sports competence mediated the relationship between childhood object control skills (effect size = .14) and adolescent physical activity (effect size = .16).

Previous studies have shown that there are differences in actual motor skills and perceived motor competence between boys and girls. According to Rudisill, et al., (1993), boys scored higher in both actual motor competence and perceived motor competence than girls. In another study, Barnett and colleagues (2008) also found that boys had higher perceived motor competence than girls. In addition, as for sex difference in actual motor competence, they found that the boys had a higher score in object control skill than girls, while girls had a higher score in locomotor skill than boys.

It appears that children’s perceived competence on physical ability and motor skills may not be accurate. Researchers have indicated that children tended to overestimate their motor competence (e.g., Rudisill, et al., 1993; Harter, 1999). As children’s age increases, their perceptions on motor skills and physical ability are closer to their actual physical ability and motor skills (Harter, 1999).

While most studies on actual motor skill and perceived competence have targeted children and adolescents (e.g., Raudsepp & Liblik, 2002; Castelli, et al., 2007), little research has been done among adults. Recently, Moran (2011) examined young adults’ perception in swimming and their real swimming ability and found that there was significant association between actual and perceived competence in swimming among young adults. More research investigating the relationship between adults’ perceived motor competence and their actual motor competence is needed. Thus, the purpose of this study was to examine the relationship between perceived and actual motor skill competence in basketball among college students.

Hypothesis 1. Perceived basketball competence will be higher among men than women.

Hypothesis 2. Actual basketball skill will be higher (a) among men than women and (b) among physical education majors than liberal arts students.

Hypothesis 3. Perceived basketball competence will be moderately correlated with actual basketball competence.

**Method**

**Participants**

Participants in the study were 114 college students (55 men, 59 women) randomly selected from a pool of 456 students enrolled in physical education classes in a university, which is located in central California. Of the participants, 44.7% majored in Physical Education and...
Kinesiology and the rest majored in Liberal Studies. The majority of these participants from the Physical Education and Kinesiology program were males (80%), while the majority of the participants from the Liberal Studies program were females (77.7%). The participants’ ages ranged from 18 to 48 years (M = 22.3, SD = 3.94). The participants included African Americans (17.5%), Caucasians (31.3%), Hispanic Americans (44.1%), Asians (4.5%) and other races (2.6%). There was a large range in their physical activity level. The study was approved by the first author’s Institutional Review Board and the informed consent was obtained from all participants.

**Measures**

**Perceived motor competence.**—The Perceived Competence Scale was used to assess participants’ perceived motor competence. Grounded from Self-Determination Theory, the scale was designed to assess individuals’ perceived competence in relevant behaviors or domains. This questionnaire is a face-valid instrument that could be used in different areas. Based on their research purposes, researchers in different fields have adapted the Perceived Competence Scale to assess participants’ perceptions on managing glucose levels (Williams, Freedman, & Deci, 1998), students learning interviewing (Williams, & Deci, 1996) and motor skills (Castelli, et al., 2007). Additionally, researchers suggested that perceived competence is sport-specific and questions on perceived competence should be developed in specific sports (e.g., Feltz & Brown, 1984; Hopper, et al., 1991).

In the current study, an adapted four-item questionnaire was used to measure Perceived Competence in Basketball, with items, “I feel confident in my ability to play basketball”, “I feel capable of playing basketball”, “I am able to play basketball”, and “I feel capable of meeting the challenge of playing basketball.” Items were rated on a 7-point scale, with anchors, 1: Not at all true and 7: Very true. Each participant’s score was calculated by averaging his or her responses on the four items.

**Actual motor competence.**—The Control Basketball Dribble Test was used to measure participants’ actual motor competence in basketball in the study. The test requires the participants to dribble a basketball as fast as possible around cones set in the paint area of the basketball court. The validity of this test has been reported to range from .37 to .91 and test-retest reliability from .88 to .97 (Safrit & Wood, 1995). Researchers have used this test to measure children’s basketball performance (French & Thomas, 1987).

**Data Collection and Analysis**

The participants took the Control Basketball Dribble Test immediately after they completed the Perceived Competence in Basketball Scale. Each participant took three trials during the skill test and the fastest time was taken as the measure of the skill. All participants spent about three minutes becoming familiar with the routine of the test before taking the test. While there was no additional training provided in basketball dribble before the test, a large range in times might have been observed among participants because some were Physical Education majors and others were Liberal Studies majors.

Descriptive statistics were calculated for each scale by gender and major. A 2 × 2 (gender × major) multivariate analysis of variance (MANOVA) and follow-up analysis of variance (ANOVA) tests were conducted. Additionally, Pearson’s product moment correlation coefficient was computed on perceived competence in basketball and basketball dribbling time.

**Results**

Descriptive statistics for perceived competence in basketball and basketball dribbling time are shown in Table 1. The MANOVA results indicated that gender differences existed (Wilk’s lambda $F_{2,109} = 8.89$, $p < .002$, $\eta^2 = 0.12$), but the effect size was small. The univariate main effects of perceived competence in basketball and actual basketball dribbling time were examined. Gender had no effect on perceived competence in basketball ($F_{1,110} = 1.84$, $p = .18$, $\eta^2 = 0.02$), with the mean scores for men ($M = 5.83$) only slightly higher than for women ($M = 5.02$). Gender did have a moderate effect on basketball dribbling time ($F_{1,110} = 8.49$, $p < .005$, $\eta^2 = 0.07$), with the dribbling time for men ($M = 8.36$ sec.) faster than for women ($M = 10.28$ sec.).
The MANOVA showed a moderate overall effect for study major (Wilks’s lambda $F_{2,159} = 56.01$, $p < .001$, $\eta^2 = .40$). The effect on perceived competence in basketball ($F_{1,110} = 56.21$, $p < .001$, $\eta^2 = .34$) was moderate: the mean score for Physical Education majors ($M = 6.43$) was higher than Liberal Studies majors ($M = 4.59$). The effect on basketball dribbling time was moderate ($F_{1,110} = 39.39$, $p < .001$, $\eta^2 = .26$); the mean basketball dribbling time for Physical Education majors ($M = 8.06$) was faster than for Liberal Studies majors ($M = 10.40$). The results supported Hypothesis 2. Additionally, the interaction effect of gender and major was very weak (Wilks’s lambda $F_{2,159} = 1.00$, $p = .34$) but not statistically significant.

Perceived motor competence in basketball was statistically significantly and inversely related to basketball dribbling time ($r = -.55$, $p < .01$, 95% CI $= -.49$ to $-.85$). That is, higher scores in perceived competence in basketball were associated with faster/shorter dribbling time, and lower scores in perceived competence in basketball were associated with slower/longer dribbling time. The results supported Hypothesis 3.

**DISCUSSION**

The current study examined the relationship between perceived and actual motor competence among college students. The findings of the study suggest that perceived motor competence in basketball is significantly associated with basketball dribbling time for college students. The result of the current study partially supports the results of the prior studies.

There are mixed findings in the literature on the relationship between perceived motor competence and actual motor competence among children and adolescents. Some reported perceived competence was statistically significantly associated with actual competence in object-control skill but not with actual competence in locomotor skill among children (e.g., Barnett, et al., 2008). Others reported that perceived competence was associated statistically significantly with actual competence in locomotor skills for boys and girls, but not in object control skills for girls (LeGear, et al., 2012). Castelli and colleagues (2007) reported that perceived motor competence was statistically significantly associated with the actual motor competence in throwing and paddle activity, but not with basketball skill. Moreover, one study indicates that statistically significant relationships were found among perceived soccer competence and soccer skill performances (Hopper, et al., 1991).

Furthermore, the current study suggested that Physical Education majors had higher scores in both perceived competence in basketball and basketball dribbling time than Liberal Studies majors; these results could be attributed to the past experience in playing basketball (e.g., Horn, 2004). The results of the study also suggested that the male participants had higher scores in basketball dribbling time than female participants. However, one should be careful to interpret this result since there were more male than female participants majoring in Physical Education, and there were more female than male participants majoring in Liberal Studies. Given that actual motor competence is positively associated with perceived competence, enhancing an individual’s actual motor competence may contribute to their perceived competence (LeGear, et al., 2012), which may encourage participation in physical activity.

**TABLE 1**

<table>
<thead>
<tr>
<th>Measure</th>
<th>Physical Education Majors</th>
<th>Liberal Studies Majors</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>Men ($n = 41$)</td>
<td>Women ($n = 10$)</td>
</tr>
<tr>
<td></td>
<td>M $\pm$ SD</td>
<td>M $\pm$ SD</td>
</tr>
<tr>
<td>Perceived competence</td>
<td>6.35 $\pm$ 0.81</td>
<td>6.75 $\pm$ 0.47</td>
</tr>
<tr>
<td>Basketball dribble test</td>
<td>7.90 $\pm$ 0.87</td>
<td>8.70 $\pm$ 0.86</td>
</tr>
</tbody>
</table>

Table in APA format

**FIGURE 1.7**

(continued)
One limitation of the study is that only the Basketball Dribble Test was used to measure the actual motor competence in basketball, and the results of the test may not be a valid measure of participants' ability to play basketball. It would be helpful for future researchers to use more comprehensive and holistic assessment tools to measure basketball ability. Another limitation is that the current study only examined the relationship between perceived and actual competence in one sport, so results may not generalize. In the future, researchers need to examine the relationship between perceived and actual competence by using different sport or motor skills.

REFERENCES


Chapter 1  Introduction to Research in Education

Figure 1.7

(continued)


Author order shows relative contributions

Discussion Questions

1. What are some important ways in which educational knowledge is obtained? What are the strengths and weaknesses of different sources of knowledge?

2. How is a scientific approach to inquiry different from inquiry based on personal experience?

3. In what ways can explanation of educational phenomena improve teaching and learning?

4. In what ways can theories be useful in education? What are some limitations of theories?

5. What are the steps of scientific inquiry? Why are questions used as part of the overall framework?

6. What is necessary for a study to be judged “credible”?

7. What are the differences between qualitative, quantitative, and mixed methods approaches to research?

8. How can research you have read be classified as basic, applied, evaluation, or action research?

9. Search a journal in your field of study and find an empirical research article that is of interest to you and identify the major parts of the article. What is the type of research (quantitative, qualitative or mixed method)? What is (are) the research design(s) used in the research?

Enhanced etext self-check 1.1

Thinking Like a Researcher

Exercise 1.1: Qualitative or Quantitative?

Enhanced etext thinking like a researcher 1.1

Exercise 1.2: Identifying Sections of a Research Report

Enhanced etext thinking like a researcher 1.2
CHAPTER 2

Ethical Issues, Principles, and Practices

Lisa Abrams and James McMillan

Ethical Principles and Practice

Professional Competence
- Integrity
- Responsibility
- Justice
- Respect for People’s Rights and Dignity
- Serve the Public Good

Federal Law and Requirements

Application to Practice
- Respect for Persons
- Beneficence
- Justice

IRB Review
- Exempt
- Expedited
- Full

Professionalism
- Conflict of Interest
- Accuracy
- Authorship

Do Not Harm
- Minimize Risk/Maximize Benefit
- Deception
- Debriefing
- Confidentiality
CHAPTER 2  Ethical Issues, Principles, and Practices

CHAPTER ROAD MAP

Whether you are a consumer or researcher (or both), ethical principles, researcher responsibilities, and legal requirements constitute increasingly important guidelines for conducting and reporting research. As a consumer, you need to be assured that appropriate professional and regulatory guidelines have been followed. More importantly, perhaps, you will need to use and cite research in a responsible and ethical manner. A researcher, of course, is obligated to conduct and report research in an ethical way, consistent with legal requirements and professional standards. In this chapter, we explain these principles and describe the different ethical frameworks that influence educational research. We discuss how ethical principles get enacted and apply to research, and essential federal requirements that researchers must meet before starting research studies. You will learn what to think about and look for to be sure research is conducted according to the highest ethical and professional standards.

<table>
<thead>
<tr>
<th>Chapter Outline</th>
<th>Learning Objectives</th>
</tr>
</thead>
</table>
| Introduction to Ethics and Ethical Decision Making                              | 2.1.1 Understand the nature of ethics and how ethics is applied to educational research.  
2.1.2 Know the professional ethical standards required of educational researchers. |
| Federal Law and Legal Requirements for Conducting Ethical Research              | 2.2.1 Become familiar with the background and egregious ethical practices that led to passage of federal laws governing ethical research practice.  
2.2.2 Understand how the federal government continues to regulate and inform ethical requirements and policies.  
2.2.3 Understand the overlap between professional ethical standards and those described in federal law. |
| Application of Ethical Principles to Research Practice                          | 2.3.1 Understand the three essential ethical principles described in the foundational work and reporting on the US government regarding research involving human subjects.  
2.3.2 Understand the essential differences among the three principles and implications for the conduct of educational research.  
2.3.3 Learn how ethical principles are enacted or applied when conducting educational research.  
2.3.4 Understand the purpose and requirements for informed consent, parental permission, and child assent.  
2.3.5 Apply the principle of respect for persons and the requirements of informed consent to an example consent document.  
2.3.6 Understand the primary risks involved with educational and social behavioral research.  
2.3.7 Understand how researchers can minimize risk through sound data collection and data management procedures. |
| Ensuring Ethical Research: The Role of Institutional Review Boards (IRBs)       | 2.4.1 Understand how universities, colleges, organizations, and other institutions review proposed research to ensure adherence to ethical standards.  
2.4.2 Know the different levels of IRB review.                                  |
| Ethical and Legal Standards in Authoring and Publishing                        | 2.5.1 Understand the ethical principles of authoring and publishing.  
2.5.2 Understand that only individuals making substantial contributions to the research should be listed as authors.  
2.5.3 Give examples of plagiarism as well as appropriate paraphrasing of others’ work. |
INTRODUCTION TO ETHICS AND ETHICAL DECISION MAKING

Without getting into a quagmire of definitions and philosophies, we need to begin by clarifying just what is meant by “ethics” in the context of educational research. **Ethics** are standards and principles that are used to guide conduct, to determine what is right or wrong, a virtue or vice, good or evil, often related to values and morals. The word *ethic* comes from the Greek word *ethos*, which refers to character or guiding beliefs. Current use of “ethics” refers to rules of behavior and questions of value or judgments that can be identified as good or bad, right or wrong.

**Ethics as Applied to Educational Research**

Applied to educational research, ethics are what we base our decision making on with regard to the conduct, reporting, and use of research findings. The idea is that investigators and users of research will understand how ethical principles guide research design, and how ethical practices must be used to result in high-quality study implementation and valid results. Generally, research must be conducted in ways that are fair and beneficial to the participant groups and the study population of interest. This includes protecting study participants from harm and ensuring that the benefits derived from the study outweigh any potential risks associated with participation. In this sense, educational research ethics have a utilitarian bent, in which the potential benefits to participants, society, and the researcher are weighed against the risks associated with the requirements for conducting the research. An assessment of risk in educational research includes considering the potential harm caused by a breach in or a lack of confidentiality, such as if a study participant and his or her personal information become known to others, as well as considering the implications of the power and social dynamics that exist within classrooms and schools for data collection and recruitment.

Ethical considerations in educational research influence investigators’ decisions about study design, recruitment, data collection strategies, and implementation, for which there are rarely absolutely right and wrong answers. The following questions are just a few examples of the types of issues you might think about:

- Is it right to randomly assign children to receive an educational intervention to improve reading, or should the resources be used for the lowest-performing students?
- Is it fair to intentionally deceive students so they do not catch on to the purpose of the research and, as a result, bias the study results?
- Should teachers be required to complete daily journal or log entries after school as part of a study of the type of feedback they give their students throughout the day?
- Should adolescents be provided the opportunity to choose to participate in a study even though their parents may have already given permission?
- Should the student test scores of individual teachers be reported in presentations, papers, or reports?

To answer these types of questions, you should refer to a set of generally accepted professional ethical standards or codes of ethics. Such principles have been established by many professions, including medicine and psychology as well as education. These principles represent the broadest perspectives about what standards or guidelines should be considered in decision making. As such, they are both the most vague and most generalizable. The principles are not intended to determine behavior in specific situations, but hopefully communicate a broad message about what needs to be considered in all research endeavors. They are ideals, aspirational in nature.
Fundamental Ethical Principles for Professional Practice

Many professional organizations have adopted codes or standards for acceptable professional practice. Generally, these codes reflect six main principles similar to those shown in Table 2.1. These principles are intended to provide guidelines that serve as the foundation for sound decision making, choices, and behavior of producers of educational research. At the heart of these principles is the notion of integrity and respect for your own work, the work of others, and for individuals who contribute to your research. Professional competence means that both producers and consumers of research need to be aware of the extent of their own professional knowledge and experiences, be aware of their own limitations in what they know and understand, be comfortable with that, and seek help and the expertise of others when needed, to result in more accurate information and higher-quality studies. Researchers can also expand their expertise and enhance their professional competence through professional development activities. For example, you

### Table 2.1: Ethical Principles for Educational Research

<table>
<thead>
<tr>
<th>Principle</th>
<th>Definition</th>
<th>Examples</th>
</tr>
</thead>
</table>
| Professional Competence    | Researchers understand work within their areas of competence and consult with others when needed.   | • It would be unethical for a manuscript reviewer to make judgmental comments about a statistical procedure with which he or she was not familiar.  
  • Ethical consumers do not judge research methods they do not understand. |
| Integrity                  | Researchers are honest and trustworthy, and promote accuracy. They do not cheat, steal, deceive, or disrepresent. | • A researcher who reported only the most positive findings would be unethical.  
  • Ethical researchers do not over-generalize by simply saying “Research says...” |
| Responsibility             | Researchers accept responsibility for their work. They are sensitive to the ethical behavior of colleagues. | • A researcher admits publicly that he or she made a mistake in reporting findings.  
  • A reporter apologizes for attributing ideas or points to the wrong person. |
| Justice                    | Researchers are sensitive to the welfare of all individuals, take into account all perspectives in making decisions, and do not allow biases to result in unjust actions. | • A researcher is unethical if he or she fails to be sensitive to minorities in the language used to report results.  
  • Users of research findings use conclusions in an unjust manner because they are unaware of the impact of the results on overweight students. |
| Respect for People’s Rights and Dignity | Researchers must respect the rights and dignity of all research participants and be sensitive to cultural, individual, sexual, ethnic, and role differences. All participants are held in high regard. | • An ethical researcher is able to word questions on a survey so that students with all gender identifications are not alienated.  
  • It would be unethical for a reporter to show only poor results for Hispanic students and ignore poor results for other groups. |
| Serving the Public Good    | Researchers are focused on what is good for the larger society and design and report research that results in the greatest public good. | • An unethical researcher should not be hired to conduct an “unbiased” study on charter schools by the Charter School Advancement Council.  
  • It would be unethical to choose research to report results that support a single political view, ignoring other research. |
Federal Law and Legal Requirements for Conducting Ethical Research

may be in the process of building your professional competence and enhancing your understanding of and skills for interpreting published research studies by taking a graduate course in educational research. Even reading this chapter qualifies as professional development!

*Integrity* is concerned with issues of fairness and honesty, and requires trustworthy conduct. *Responsibility* communicates the importance of being accountable for one’s work and ensuring that professional, scholarly, and research activities adhere to high standards of conduct. Similar to integrity, *justice* is also concerned with issues of fairness and sensitivity to research participants. The principle of justice demands that the results of research are reported in ways that are sensitive to different characteristics of the study participants or the populations that the results reflect. When study results are reported by subgroups such as race/ethnicity, gender, or geographic region, the principle of justice requires that researchers consider how the reporting of results may affect these different populations in positive as well as harmful ways. Similarly, the principles of *respect for people’s rights and dignity* and *serving the public good* are concerned with eliminating bias, being sensitive to differences among the populations studied, adhering to legal guidelines for the protection of study participants, and recognizing their social responsibility to contribute to the public good through professional and research activities.

These six fundamental principles serve as the foundation for commonly held standards for many professional organizations, including the American Educational Research Association (AERA), a national research organization that promotes research and inquiry to improve education. (This organization, founded in 1916, has more than 25,000 members, including university faculty members, educational researchers, graduate students, school administrators, instructional specialists, and classroom teachers [see aera.net for more information]. You might want to think about joining!). The AERA Code of Ethics (AERA, 2011) is broadly applied and relevant to the professional work of all of its members. In February 2014, AERA also endorsed the Singapore Statement on Research Integrity (singaporestatement.org), which provides guidance for the responsible conduct of research by focusing on honesty, accountability, professional courtesy and fairness, and good stewardship on behalf of others. Other education-related national organizations with ethical professional codes include the American Psychological Association (APA) and the American Evaluation Association (AEA).

One of the key ethical principles in all professional guidelines is *respect for persons*, specifically study participants. There are some good reasons for this. First, this principle has been violated in the past, with detrimental effects on participants. Second, in the United States, federal laws govern how research with human “subjects” must be conducted. These laws were developed to ensure that individuals who participate in research studies are protected from harm. A look at some of the historical events that led to the creation of current federal regulations for the protection of human subjects, and how these regulations are enforced and influence the practice of conducting research, is important to understanding the standards.

**FEDERAL LAW AND LEGAL REQUIREMENTS FOR CONDUCTING ETHICAL RESEARCH**

Most ethical standards for conducting research are concerned with how researchers interact with and treat participants throughout the study. Ethical principles and standards are relevant to all aspects of how research is conducted, beginning with the nature of the research topic. For example, will the topic raise sensitive issues or address issues that
parents may not want discussed with their child? Further questions relate to the study procedures, and whether these procedures will in any significant way result in potential risks, including physical, psychological, or professional risks:

- How are participants recruited and selected?
- How are participants’ privacy and confidentiality protected?
- How do study participants experience interventions?
- Will data collection and analysis procedures affect the well-being of the participants?

As we will see, formal ethical review procedures are in place at universities and other organizations to ensure that research conducted by those affiliated with the institutions adhere to federal ethical guidelines.

A Brief History of Federal Ethics Codes

Research Without Regulation

Research with human subjects (i.e., participants—ethical standards still use the term subjects) has had a troubled history. One of the most egregious examples of unethical research was the Tuskegee Study of Untreated Syphilis in the Negro Male, conducted by the US Public Health Service over a 40-year period (1932–1972). This research was conducted to document and record the naturally occurring history of syphilis to investigate differences in the presentation of the disease and to develop treatment programs. (At the start of the study, there were no known effective treatments for the disease.) The researchers enrolled 600 men—399 with syphilis and 201 who did not have the disease—most of whom were illiterate and poor sharecroppers. All the men were told they were going to be treated for “bad blood,” a common term at the time that was used to describe a variety of ailments, including syphilis, general fatigue, and anemia—but they weren’t. By participating, the men received free medical exams, transportation to and from the clinics, free meals, medical treatment for minor complaints, and burial insurance. In 1972, the Associated Press (AP) broke a story condemaing the Tuskegee Study. The news story described how the 40-year study left syphilis untreated among the study participants, even though penicillin was widely accepted as the preferred treatment for the disease as early as 1945. The withholding of penicillin from the study participants had resulted in numerous unnecessary deaths and the needless infection of countless numbers of wives and other individuals. The uproar that resulted from the AP story set into motion several actions that resulted in federal laws that codified ethical principles and practice for research that involves human subjects (see Figure 2.1).

Emergence of Federal Research Regulations

Public outcry about the Tuskegee Study demonstrated the need to change research practices so mistakes made in the study would not be repeated. There was a compelling need for ethical rules and regulations for the conduct of research involving humans. The National Research Act was passed in 1974. It established the National Commission for the Protection of Human Subjects of Biomedical and Behavioral Research, which was responsible for creating a code of ethics for research involving human subjects conducted in the United States. In 1979, the National Commission published a report, “Ethical Principles and Guidelines for the Protection of Human Subjects of Research,” commonly known as the Belmont Report or the Belmont principles. These principles are the foundation for current ethical laws—the Code of Federal Regulations (CFR) Title 45, Part 46: Protection of Human Subjects. The ethical guidelines and requirements in the federal code apply to
both social-behavioral research—which educational research is most often considered—and biomedical research. In 1991, Subpart A, the section of these regulations on the protection of human research subjects, was adopted by 15 federal agencies and became known as “the Common Rule.” It is now the primary doctrine governing all research with human subjects.

**Recent Federal Efforts to Promote Ethical Standards**

Since the aforementioned regulations were adopted, other national commissions have continued the work of studying and promoting the highest ethical standards as technology, research methods, and expertise have advanced. Consider the technological advances of the past decades and the influence technology has had on the way research is conducted. As approaches to research have changed, so have ethical guidelines. For example, when the National Commission was formed, the use of the Internet for data collection and use of personal computers for research management, data storage, and analysis was not widespread. The National Bioethics Advisory Committee (1996–2001) examined topics such as cloning, human stem cell research, and other emerging research. This commission was succeeded by the President’s Council on Bioethics (2001–2009), which reported on stem cell research and reproductive technologies, among other topics. More recently, in 2009, the President’s Commission for the Study of Bioethical Issues was created. These efforts have ensured that current ethical legislation is keeping pace with technology and research advances, and that researchers continue to be sensitive to ethical issues.

**APPLICATION OF ETHICAL PRINCIPLES TO RESEARCH PRACTICE**

The Belmont Report identified three core principles that should govern all research and researcher–participant interactions: *respect for persons, beneficence, and justice*. These principles are ethical values that, when carried out or reflected in actions, are often

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**FIGURE 2.1**

Timeline of Main Events Leading to the Federal Ethical Guidelines for Research

<table>
<thead>
<tr>
<th>Year</th>
<th>Event</th>
<th>Description</th>
</tr>
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<tbody>
<tr>
<td>1932</td>
<td>Tuskegee Study starts</td>
<td>600 Men enrolled</td>
</tr>
<tr>
<td>1945</td>
<td>Penicillin accepted as recommended treatment for syphilis</td>
<td></td>
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<tr>
<td>1964</td>
<td>World Medical Association develops a code of research ethics — Declaration of Helsinki</td>
<td></td>
</tr>
<tr>
<td>1972</td>
<td>July: AP story breaks about Tuskegee Study and withholding of treatment</td>
<td>October: Tuskegee Study ends</td>
</tr>
<tr>
<td>1974</td>
<td>Research Act passed</td>
<td>Creation of the National Commission for the Protection of Human Subjects of Biomedical and Behavioral Research</td>
</tr>
<tr>
<td>1979</td>
<td>The National Commission issues the Belmont Report</td>
<td></td>
</tr>
</tbody>
</table>

1This timeline highlights the key events the lead up to the creation of federal ethical codes and guidelines. A more detailed timeline of events surrounding the 40-year implementation of the Tuskegee Study, medical developments, and research priorities that kept the study going can be found on the Centers for Disease Control and Prevention website, see “The Tuskegee Timeline.”
considered the practice of “doing ethics.” Table 2.2 summarizes how these three principles are applied to actual research studies. We look at each of them in some detail.

**Respect for Persons**

The *respect for persons* principle reflects the idea that individuals are autonomous and are entitled to make their own independent decisions about their actions. A key component of respect for persons is in the “voluntariness” of research. That is, participants should be free to decide for themselves whether they want to participate in a study and whether they want to end or discontinue their participation for any reason. We see respect for persons most clearly recognized in the *informed consent* process. The informed consent process usually takes the form of a written consent document that the researcher discusses with each potential study participant prior to their involvement in the research. The document and consent discussion should include the following essential characteristics:

1. Disclose to potential research participants all of the information needed to make an educated decision about participation.
2. Ensure that the potential participants understand the information that describes the study and what participation will involve.
3. Support the voluntary nature of the decision to participate.

A consent document is important for both the researcher and participant because it is essentially a contract designed to protect the participants. It also requires that the researchers describe their study in ways that are clear, easily understandable and transparent. The federal Office of Human Research Protections (OHRP) provides a valuable informed consent checklist for ensuring that everything that is required is included. The checklist in Figure 2.2 includes all the required elements of consent for minimal risk studies characteristic of educational research. The OHRP checklist shows the information that should appear in consent documents and should be explained to potential research participants.

**Review and Reflect**  Take a look at the checklist and compare it with what you have learned about the Tuskegee Study to see how an informed consent process could have improved the outcomes of the study and provided participants with greater protections. Also, think about your own experiences with research to make an assessment of how the information required fully informs possible study participants.
FIGURE 2.3 shows an example of a teacher consent form we used recently for a study on K–12 teacher perceptions and experiences with periodic accountability testing during the school year. The consent document describes the purpose of the study, why teachers are being contacted to participate, what participation in the study will involve, any potential risks and benefits associated with participation, how much time it will take to

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**FIGURE 2.2**

**Informed Consent Checklist**

- ✓ A statement that the study involves research
- ✓ A description of the purpose of the research study
- ✓ The expected duration of participation—how long will participation in the study take until completion?
- ✓ A description of the procedures to be followed—what does participation involve?
- ✓ Identification of any procedures which are experimental—in which not all participants receive the intervention or the same degree of the intervention
- ✓ A description of any reasonably foreseeable risks or discomforts to the subject
- ✓ A description of any benefits to the participants or to others which may reasonably be expected from the research
- ✓ A disclosure of appropriate alternative procedures, if any, that might be beneficial for the participant
- ✓ A description of how the confidentiality of data and identifying information will be protected and any circumstances under which confidentiality may not be maintained (e.g., participant describes wanting to hurt self or others)
- ✓ Information about whom to contact for answers to questions about the research and research subjects’ rights, and whom to contact in the event of a research-related injury
- ✓ A statement that participation is voluntary, refusal to participate will involve no consequences, and the subject may choose to discontinue his or her participation at any time without consequences.

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**FIGURE 2.3**

**Example of a Consent Form**

**RESEARCH SUBJECT INFORMATION AND CONSENT FORM**

**TITLE:** Teachers’ perceptions of the use of benchmark tests for formative assessment

**VCU IRB NO.:** HM12403

This consent form may contain words that you do not understand. Please ask the study investigator to explain any words that you do not clearly understand. You may review unsigned copy of this consent form to think about or discuss with family or friends before making your decision.

**PURPOSE OF THE STUDY**

The purpose of the study is to explore teachers’ perceptions of the formative use of benchmark testing results. You are being asked to participate in this study because you have been identified as an educator who administers benchmark tests.

**DESCRIPTION OF THE STUDY AND YOUR INVOLVEMENT**

If you decide to be in this research study, you will be asked to sign this consent form after you have had all your questions answered and understand what will happen to you. This study involves the participation in a focus group, with 3–5 other teachers, that will last approximately 45 minutes to one hour. The focus group will address topics associated with benchmark testing including the type of information the tests provide, how test results are used as well as the influence of benchmark test results on instructional and assessment practices. With your permission, the focus group will be recorded, but no names will be recorded. After the focus group, the recording will be transcribed and participants may be asked to review the transcript to ensure accuracy. It is anticipated that approximately 110–170 elementary and middle teachers, representing several school districts will participate in the study.

**RISKS AND DISCOMFORTS**

It is not anticipated that talking about issues related to benchmark testing will create any psychological or emotional discomfort. However, you do not have to talk about any subjects that you would prefer not to address and you can stop the interview at any time.

(continued)
**FIGURE 2.3**

(continued)

<table>
<thead>
<tr>
<th>BENEFITS TO YOU AND OTHERS</th>
</tr>
</thead>
<tbody>
<tr>
<td>You may not get any direct benefit from this study, but, the information learned from educators in this study may help us inform test-based school policies and identify effective instructional and assessment practices.</td>
</tr>
</tbody>
</table>

<table>
<thead>
<tr>
<th>COSTS</th>
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<tbody>
<tr>
<td>There are no costs for participating in this study other than the time you will spend participating in the interview.</td>
</tr>
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</table>

<table>
<thead>
<tr>
<th>PAYMENT FOR PARTICIPATION</th>
</tr>
</thead>
<tbody>
<tr>
<td>There is no payment or compensation for participation in this study.</td>
</tr>
</tbody>
</table>

<table>
<thead>
<tr>
<th>ALTERNATIVES</th>
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</thead>
<tbody>
<tr>
<td>The alternative is to not participate in the study.</td>
</tr>
</tbody>
</table>

<table>
<thead>
<tr>
<th>CONFIDENTIALITY</th>
</tr>
</thead>
<tbody>
<tr>
<td>Potentially identifiable information about you will consist of focus group notes and recordings. The focus group data are being collected only for research purposes. Your data will be identified by a pseudonym, not your actual name, and will be stored separately from any contact information that was provided to schedule the focus group session. All personal identifying information will be kept in password-protected files. Other records, including the transcriptions and contact information, will be kept in a locked file cabinet. Electronic files of the interviews will be kept indefinitely. Access to all data will be limited to study personnel.</td>
</tr>
</tbody>
</table>

We will not tell anyone the information you provide; however, information from the study and the consent form signed by you may be looked at or copied for research or legal purposes by Virginia Commonwealth University. Further, your choice to participate will be kept strictly confidential; school principals and district personnel will not ever be informed of your participation. What we find from this study may be presented at meetings or published in papers, but your name will never be used in these presentations or papers.

As described, the focus group sessions will be audiotaped, but no names will be recorded. At the beginning of the focus group, you will be asked to use first names only so that no full names are recorded. During the transcription process, your first name will be changed to a pseudonym. The tapes and the notes will be stored in a locked file cabinet. After the information from the tapes is typed, the files will be destroyed.

<table>
<thead>
<tr>
<th>VOLUNTARY PARTICIPATION AND WITHDRAWAL</th>
</tr>
</thead>
<tbody>
<tr>
<td>You do not have to participate in this study. If you choose to participate, you may stop at any time without any penalty. You may also choose not to answer specific questions that are asked during the focus group. You may withdraw from the study at any time.</td>
</tr>
</tbody>
</table>

<table>
<thead>
<tr>
<th>QUESTIONS</th>
</tr>
</thead>
<tbody>
<tr>
<td>In the future, you may have questions about your participation in this study. If you have any questions, complaints, or concerns about the research, contact:</td>
</tr>
</tbody>
</table>

Dr. Lisa M. Abrams  
Assistant Professor, School of Education  
1015 West Main Street, P.O. Box 842020  
Richmond, VA 23284-2020  
804-827-2627  
lmabrams@vcu.edu

If you have any questions about your rights as a participant in this study, you may contact:

Office for Research  
Virginia Commonwealth University  
800 East Leigh Street, Suite 113  
P.O. Box 980568  
Richmond, VA 23298  
Telephone: 804-827-2157

You may also contact this number for general questions, concerns, or complaints about the research. Please call this number if you cannot reach the research team or wish to talk to someone else. Additional information about participation in research studies can be found at [http://www.research.vcu.edu/irb/volunteers.htm](http://www.research.vcu.edu/irb/volunteers.htm).
CONSENT FOR PARTICIPATION
I have been given the chance to read this consent form. I understand the information about this study. Questions that I wanted to ask about the study have been answered. My signature says that I am willing to participate in this study. I will receive a copy of the consent form once I have agreed to participate.

Participant name printed

Participant signature

Date

Name of Person Conducting Informed Consent Discussion / Witness (Printed)

Signature of Person Conducting Informed Consent Discussion / Witness

Date

Investigator Signature (if different from above)

Date

CONSENT FOR RECORDING
I understand the information about this study and that the focus group sessions will be recorded with my permission. Questions that I wanted to ask about the recording and transcriptions of the focus groups have been answered. I have checked the box below that indicates my permission or declination of the recording of the focus group session.

☐ YES, I give my permission to have the focus group session recorded.

☐ NO, I do not give my permission to have the focus group session recorded.

complete the study, and how teachers’ participation decisions and the information they provide will be protected. The goal is that the consent form should provide potential participants with all the information needed to make an informed decision about participation. In this example, it was important to assure teachers that their school principal or any district administrators would not know about their decision whether or not to participate. This assurance enabled teachers to make an independent decision about participation and guarded against their feeling compelled to participate in the study.

Educational research often involves children (typically defined as individuals under 18 years of age). In investigations with children, researchers usually must obtain permission from parents or legal guardians for children to participate in a study. Obtaining parental permission is very similar to the informed consent process. The same information is described and required, although permission, not consent, is sought. What does the parental permission process mean for respecting the autonomy of children? For example, adolescents or teenagers make important decisions about their well-being during the school day, after school, on social outings with friends, and as members of organizations, clubs, and sports teams. Would obtaining parental permission to study these areas respect the autonomy of the adolescents?

Should children be able to make an independent decision about participating in a research study? The answer to this question is clearly yes. The National Commission recommends that child consent, known as child assent, should be required at the age of seven and older. However, federal regulations in the United States do not include specific requirements for informed assent similar to the requirements listed in Figure 2.2. It is generally recognized that researchers should inform children aged seven and up of the research activities and provide an opportunity for assent to their participation in the study.
CHAPTER 2 Ethical Issues, Principles, and Practices

Language that appears in the parental permission or consent form is modified for children so that it can be easily understood. A good approach is to use guiding questions, in which researchers would provide responses to the following types of questions:

What is this study about?
What will happen to me if I choose to be in the study?
Will you tell anyone what I say?
Do I have to be in this study?

The bottom line is that children need to understand the proposed research procedures and that they may discontinue their participation at any time, without any penalty. The researcher needs to communicate this in concrete language that is appropriate to the child's age and other considerations that may affect the child's comprehension of what he or she is assenting or agreeing to. The child needs to be allowed to ask questions and not feel undue pressure to participate. Including both parental permission and child assent ensures that researchers are recognizing the legal rights of the parents, as well as the autonomy of children, when it comes to making informed choices about participation in a research study.

Beneficence

According to the principle of beneficence, researchers are obligated to protect study participants from harm and to act in ways that are in the best interest of the participants’ welfare. Two key guidelines or rules illustrate the principle of beneficence: (1) do not harm and (2) maximize the possible benefits and minimize the possible harms. Research studies on educational issues, policies, and practices are often considered studies that involve “minimal risk,” in which participants are not putting themselves at greater risk than they would ordinarily experience in the course of a typical day. That is, the possible “harms” tend to be minimal because interventions or data gathering are often nonintrusive study procedures that involve existing tests or noninvasive surveys, and results are typically reported in aggregate or summary form without any attribution to individuals.

The most common risk in educational research is some form of psychological stress. This may occur if the research topic is sensitive, or in situations in which there is accidental disclosure of private information or a breach in confidentiality. The public disclosure of an individual's participation in a study and the identification of private information could cause personal embarrassment and reputational harm.

Do Not Harm

Perhaps you are familiar with the well-documented 1960s studies on obedience by Stanley Milgram. If you are, you are not likely to forget how the research was conducted. In a series of experiments, Milgram used what are now clearly recognized as unethical procedures to see how willing participants (“teachers”) applied electrical shocks to “learners” (confederates, who volunteered to appear to be shocked), as encouraged by an authority figure. The purpose of the study was to explore why average, everyday individuals may act in terrible ways that physically harm others just because the authority figure said it was all right. In the Milgram study, when the learners failed to answer a question correctly, the teachers were to administer shocks and were encouraged to do so by the lab assistant. The “teacher” participants were to continue to deliver greater amounts of shock treatments for wrong answers, despite protests from the learners. The teachers could only hear and not see the learners, and believed that the learners were experiencing pain and suffering as a result of the continued and increasing severity of the shocks. The results showed that many of the “teachers” were willing to obey, believing that it was in the best interests of the learners to be given increasingly painful shocks of electricity. Although the findings
“shocked” many, an important positive outcome was much greater sensitivity to the psychological damage studies can have on participants. In this case, there was evidence that some participants in Milgram’s study did suffer psychological harm by tending to be less trusting in the future after they were told about what was actually being studied. It was one of several studies that led to the essential ethical principle that it is of utmost importance to inflict no harm and minimize risks of harm on participants.

Another notable characteristic of Milgram’s study was the use of deception to accomplish the research goals. As we learned from the discussion about respect for persons and informed consent, research participants should be aware of the purpose and nature of the study they are being asked to participate in. In other words, full disclosure is required to allow participants to make an informed decision about participation. Sometimes, though, if participants know the purpose, it makes the outcomes suspect. If Milgram’s participants knew that the study was about obedience, they surely would not have given the shocks. In some research, then, the only way to provide credible results is to essentially deceive the participants about the purpose. Deception, though strongly discouraged, is sometimes the only way to conduct valid research, even in some educational studies. For example, if an observational study is investigating whether teachers’ use of specific kinds of formative feedback affects student motivation, students’ knowledge of why the observer was present could influence their behavior. They might fake their behavior to make the teacher look good.

If deception is used, it is necessary to debrief participants. Debriefing is a process of fully informing the participants about the actual nature of the study and why deception was necessary, and allows them to ask questions and discuss any concerns. Debriefing should occur immediately following data collection or the participant’s completion of the study requirements. It is an essential component to minimize any potential negative consequences or harm that may have resulted from participation.

One notorious study that demonstrated the risk of psychological harm was the Stanford prison experiment. This landmark study, conducted by Philip Zimbardo in 1971, was designed to examine human reaction to captivity and how individuals assume “roles” during this captivity. As part of the study, male undergraduate students were paid to assume the role of either a prison guard or prisoner. A fake prison was constructed in the basement of a university building, and volunteers assumed their roles in the study setting. “Guards” received uniforms, nightsticks, and mirrored sunglasses as part of their role. “Prisoners” were dressed in prison uniforms. The research became very intense and unpredictable, with physical and psychological outcomes escalating as the “guard” participants became further engrossed in the role. Less than two days after the study began, participants reported feeling distressed. The experiment was intended to last approximately two weeks, but was stopped after six days to prevent further risk of harm to participants.

**Minimizing Risk and Maximizing Benefit**

As we have discussed, the risks associated with social-behavioral and educational research are different from those of biomedical research. Biomedical research could involve the study of a new drug treatment, the effectiveness of a new medical device such as those used to deliver insulin, or an intervention in which a participant is exposed to common cold germs or deprived of sleep. Think of the sleep and cold studies that are common on many college campuses. These examples suggest some physical risk or potential for injury associated with study participation. In contrast, educational research, by nature, rarely involves physical risk. As noted earlier, the types of risk most common in educational research are psychological, social, and reputational. Thus, researchers must weigh the potential risks involved with the study against the potential benefits of the knowledge gained. For research to be ethical, the benefits must be greater than any potential risk involved with participation. This can be called the risk/benefit ratio way of thinking, in which the risks are weighed against benefits. As illustrated in Figure 2.4, when risks outweigh benefits there is a poor ratio and
you probably shouldn't be doing the study, whereas when benefits "weigh" more than risks, the ratio is good.

One way to support a positive risk/benefit ratio is to use confidentiality. A breach in confidentiality or accidental disclosure of a participant's name or personally identifiable study information (e.g., responses on a survey or test scores) could have a detrimental impact on students' self-perceptions, schools' professional personnel, or community standing. Think about teachers who participate in a survey about the soundness of a controversial school policy. How would they likely feel, when the results were disseminated, if their answers were known by name to the school principal? They may be concerned about negative implications or ramifications as a result of their participation. For example, they may be concerned that their responses might affect their yearly professional evaluations.

To ensure the validity of research findings, participants need to be free to communicate their views, perceptions, or thoughts accurately and honestly. Protecting the confidentiality of participation and the privacy of personal information are essential to minimizing risk. In addition to providing assurances of confidentiality, researchers need to carefully consider how data are collected, stored, analyzed, and reported to ensure privacy. One common way to do this is to assign each study participant an ID code so the researchers do not have to use participant's names on data collection forms or in databases. For example, participants can record something like the second number of their street address, third letter of their mother's maiden name, and fourth digit of their phone number. This allows you to match pretest with posttest scores. In qualitative research, researchers use pseudonyms, or fake names, to describe participants and research settings or sites (e.g., names of schools, school districts). If a study is conducted in a way that no names or identifiable information at all are collected, the data will be anonymous. Whether confidential or anonymous, the level of detail in reporting study findings should be sufficiently general or in summary form to protect the confidentiality of the participants and locations, to avoid possible identification in the future.

You might be wondering, what with our electronic databases and well-documented snooping capabilities: How private is confidential information? Many do not believe that electronic surveys are really anonymous. A study at Harvard University proves this point. The university's Data Privacy Lab found that 87% of Americans can be identified using
only three pieces of information: five-digit zip code, gender, and birthday (Sweeney, 2000). Because participants may have privacy concerns, it is important to do everything possible to assure them that their privacy is protected. Depending on the software programs used, the topic, and the nature of participants, traditional paper surveys may provide a better assurance of privacy than electronic surveys.

In addition to developing procedures to maintain confidentiality, data security is an important privacy issue. This includes developing systems to properly store and secure electronic data and study documents. Using encryption software, password protections, locking down computers in research labs, avoiding storing data on laptops that can be easily stolen, and locking file cabinets and office doors are just a few ways to enhance data security and mitigate any potential breaches of confidentiality. Many colleges and universities have data safety and security standards to ensure that affiliated faculty and researchers are up to date on the best practice for securing their electronic data and records.

In summary, it is unethical to ever put participants through an experience that could result in physical, psychological, or mental discomfort, harm, or injury. Even though it is unusual for educational studies to have a significant risk of harm, certain circumstances may reasonably be questioned and need to be approved by reviewers (review is discussed further in a later section). For instance, asking participants about deviant behavior that could make them feel uncomfortable or may stimulate further considerations and thinking (e.g., “Have you ever cheated on an exam?”), may need a review before implementation. Then, of course, there are direct interventions, or sometimes lack of intervention, that could be considered unethical due to the potential for harm. For example, would putting a student into a weight reduction program negatively affect self-esteem? Would it be ethical for a researcher to randomly select some students to receive a “failing” grade on a test to see their reaction to the low grade? Again, review is needed.

Justice

The final essential ethical principle is justice, which is really about fairness. The following question was posed in the Belmont Report: “Who ought to receive the benefits of research and bear its burdens?” The justice principle requires that the benefits and burdens of research are equitably distributed. This means that in research intended to benefit a specific segment of the population, study participants should be obtained from this same group. This principle guards against using samples of convenience, such as institutionalized or incarcerated individuals, for research that is not of direct benefit to them. An appalling example of disregarding justice was a study conducted on mentally disabled boys institutionalized at the State Residential School in Massachusetts, where the boys were intentionally fed radioactive iron and calcium in breakfast cereal to study adult nutrition and metabolism. In essence, there was no compelling reason to study children when the benefits were for adults. In this instance, children bore the brunt of the research, but were not the group intended to benefit from the study findings.

ENSURING ETHICAL RESEARCH: THE ROLE OF INSTITUTIONAL REVIEW BOARDS

Even though few educational studies have severe potential negative consequences for the participants, much educational research has some level of small, or what is termed “minimal,” risk. It is important to be sure that even in these circumstances the research is ethical. Minimal risk studies are generally ethical, but every study is unique and needs to be
reviewed, just to be sure. Colleges, universities, hospitals, and other organizations where research is conducted are required to establish institutional review boards (IRBs). These boards or committees are charged with the responsibility of protecting the rights and welfare of human subjects, and in doing so ensure that affiliated personnel who conduct research and the studies associated with the institution are compliant with the federal ethical regulations. By design, IRBs are comprised of a diverse group of individuals, including scientists, non-scientists, and community members, representing different areas of expertise intended to reflect a broad range of perspectives. IRB committees review research before it begins to ensure that the study procedures, recruitment materials, informed consent, and assent documents meet the federal ethical requirements (found in the Code of Federal Regulations [CFR] Title 45, Part 46: Protection of Human Subjects), and reflect the principles of respect for persons, beneficence, and justice. As part of the review process, the IRB committee members weigh the benefits and risks involved in a study to determine whether the study should be approved and/or whether changes are required to further mitigate potential risks and afford greater protections to study participants. IRBs have an important role in helping to ensure that research is ethical, allowing for the enhanced validity of research findings and professional integrity.

There are three levels of institutional review, depending on the nature of the study. The first consideration is to identify whether the proposed study is research that needs a review. Federal guidelines that are used by institutions have a specific definition of “research” that is used for this determination. The definition of research used at our institution is the following:

A systematic investigation designed to develop or contribute to generalizable knowledge about a living individual either through interaction or intervention or use of identifiable private information.

If either of these two requirements—the intent to disseminate results and the interaction with living individuals or use of their private information—is not part of the study, a review may not be needed. This may suggest that in some cases, pilot studies and class assignments (e.g., an empirical investigation conducted in a research course) may not need to be reviewed formally, but ethical principles must still be adhered to. It is up to each institution to establish guidelines for determining whether proposed projects meet the definition of research and require review.

Once it is clear that an institutional review is needed, a study usually falls into three review categories: exempt, expedited, or full, depending on the level of risk involved in participation. Although we cannot go into all the complexities involved in deciding which type of review is needed, we will give you a brief overview.

In the exempt category, a study that very clearly has minimal risk is freed from federal regulations, but ethical principles still apply. The exempt determination must typically be made by IRBs. Exempt projects are very low risk and do not require a formal consent process. These studies may involve research that is conducted in educational settings or involve normal educational practices, such as research about instructional strategies or curriculum. Data collection in exempt studies can include observations, surveys, and interviews, provided that no identifiers are collected. Exempt studies commonly involve the use of existing data that are publicly available or data that have been recorded so participants cannot be identified.

Studies that need an expedited review are also minimal risk but have greater participant involvement; the researchers may have more direct contact with study participants than in studies meeting exempt criteria. Most studies that involve children will, at a minimum, require expedited review. Expedited studies can include surveys, interviews, or classroom observations where personal identifying information is collected or recorded. These reviews are often conducted by an individual member of the IRB committee and do not require a review by the full board. Take a look again at Figure 2.3. The study described
went through an expedited review by our institution’s IRB. By comparison, studies that need a full board review typically involve greater than minimal risk, but do not meet the exempt or expedited review categories. Full board studies sometimes include specific “vulnerable” populations, such as prisoners, children, or pregnant women. A full board review requires that a majority of the members of the IRB committee review and discuss the study at a panel or committee meeting. Diversity in the IRB committee membership is important so that the risk/benefit ratio is reviewed from differing perspectives, depending on committee members’ expertise and background. Full board studies may involve the collection of blood and tissue samples, interventions that involve the consumption of alcohol to study driving impairment, or sensitive topics such as domestic abuse and violence.

The main point is that proposed research involving human subjects, regardless of review category, requires an external assessment to ensure that the legal and ethical requirements are met to safeguard potential research participants. The level of review depends on the level of risk associated with participation and the degree to which the target participants need additional protections.

**Author Reflection** The IRB process can be perplexing and frustrating, sometimes taking weeks or even months for approval before a study can be initiated. However, our experience is that it not only results in more ethical studies and safeguards for participants, but it also enhances the quality of the research. It’s a hurdle, yes, but an important one you need to learn more about.

**ETHICAL AND LEGAL STANDARDS IN AUTHORING AND PUBLISHING**

Both the AERA and APA have developed ethical guidelines related to being a researcher, writing about research, and publishing. The guidelines focus on three goals: avoiding conflicts of interest, ensuring accuracy, and protecting intellectual property rights. Each of these equally important guidelines will be discussed.

**Avoiding Conflicts of Interest**

It’s not hard these days to read about research in which there are fairly obvious conflicts of interest. If the National Association of Year-Round Schooling sponsors, conducts, and reports “research” describing the benefits of year-round schooling, you should be cautious, at the very least, and probably suspicious. It is best if those doing the research do not have a vested interest in the nature of the results. What the National Association of Year-Round Schooling needs to do is identify others who are willing to do the research in a completely unbiased way, clearly without strings attached. Or suppose you want to do research on something that would benefit you financially. If there are any economic and/or commercial interests, it is really hard to be unbiased.

Some circumstances related to financial gains are obvious, such as having stock holdings in a company whose product is being evaluated, being a recipient of royalties from a new test that is developed, or providing data that would put you in a better position to get a grant. Other situations are less clear cut, and should be IRB reviewed.

Conflicts of interest are not just a concern for researchers. Reviewers of research can also have a conflict of interest in that they may benefit if the review is positive or negative. In general, reviewers have an obligation to be unbiased, and should recuse themselves from a request to review if there is any conflict of interest. A potential conflict of interest should be discussed with the journal editor. In a similar vein, reviewers are obligated to keep reviewed manuscripts confidential.
Ensuring Accuracy

It is well documented that researchers have knowingly reported spurious data or results, or altered data, in a variety of fields, but it is not hard to understand why. Often a lot—whether financial or professional, such as getting tenured and/or promoted at a university—is riding on results. Obviously, it is unethical to falsify data or results, or deliberately mislead, but it's more than that. Duplicate publication—in which data are misrepresented as original when they have previously been published—is generally prohibited, and it is unethical to submit essentially the same study for publication in two journals with different titles and slightly different wording or formatting. It is also best to avoid piecemeal publication, in which different parts of research are published separately, rather than together.

Protecting Intellectual Property Rights

Intellectual property of individuals, organizations, agencies, and other groups must be protected. There are two major principles involved: plagiarism and authorship.

Plagiarism

You know about plagiarism—claiming words or ideas of others as your own. The key determinant of plagiarism is that authors present something as if it were their own work, when in reality it is someone else's work. Using the same words that someone else wrote is pretty obvious, and can often be detected easily by doing electronic searches of phrases. What is less clear is what you need to do when you paraphrase others' words or ideas. Paraphrasing is needed when other research and theory is discussed; just be sure that you make appropriate citations when that occurs. Give credit where credit is due, including from your own work (yes, there is self-plagiarism!).

Sometimes you will need to get permission to use others' work. Each journal has its own approach to permissions, which, we can tell you from our experience, can sometimes be difficult and expensive. Generally, small quotes don't need permission; several paragraphs, tables, figures, and instruments usually do need permission.

Authorship

Authorship can be a big deal, so you need to get it right. There are a few helpful ethical guidelines when multiple authors are involved. First, authorship should be bestowed only to those who have made a "substantial contribution" to a study and its publication. What "substantial contribution" means can vary, of course, but it typically means that each individual author has had a major role in and responsibility for contributing theory, deriving hypotheses, designing data collection, conducting interventions, and doing data analyses. Those providing lesser contributions, such as administering surveys or entering data, can be acknowledged in a footnote.

Principal authors are listed first, followed by others based on decreasing contribution. If authorship is alphabetical, that could mean equal contributions, but it should be so noted to be clear. With journal publications based on dissertations, the student is typically principal or sole author; faculty members are rarely listed. When you start a research project with others, take time to sketch out responsibilities and decide, to the extent possible, the author order of any products or presentations. It can be a little rough if that is not clear from the beginning. In the end, just remember that each author must make a substantial contribution to the work.

Author Reflection  There is a great deal of pressure these days for professors to publish journal articles, so authorship can be an issue. An unethical individual might be tempted by having graduate students do a lot—perhaps even the majority—of the work, for which the faculty member wants to claim principal authorship. If you are a student, which is extremely likely if you're reading this, and you get involved with faculty research, be assertive about your rights!
Figure 2.5 is a checklist of considerations to make sure that the research process and reporting of results is ethical.

**DISCUSSION QUESTIONS**

1. What is the nature of ethics, and why are ethics important for both consumers and researchers?
2. What are some examples of how essential ethical principles for conducting research are violated?
3. What have been the most important contributions of federal laws on protecting research participants?
4. Why is it important for researchers to consider the justice principle in their studies?
5. How are the essential ethical principles for conducting research reflected in the review of prospective studies that focus on respect for persons, beneficence, and justice?
6. What does risk/benefit refer to, and why is it an important ethical principle?
7. Why is it necessary to have IRBs?
8. What does it mean to “be an ethical educational researcher?”
9. How does conflict of interest influence research?

**ENHANCED eText**  
**SELF-CHECK 2.1**

**THINKING LIKE A RESEARCHER**

**Exercise 2.1: Identifying Potential Risks in Educational Research**

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**THINKING LIKE A RESEARCHER 2.1**

**Exercise 2.2: Assuring Assent**

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**THINKING LIKE A RESEARCHER 2.2**